



Draft Scoping Report for the proposed construction of Kentani Solar Development consisting of twelve solar PV or CPV facilities, Dealesville, Free State

Draft Scoping Report



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Prepared for:
SA Mainstream Renewable
Power Developments (Pty) Ltd

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Report details



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|----------------------|---|--------------------|
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| CSIR Report Number: | CSIR/CAS/EMS/ER/2014/0011/B | |
| CSIR Project Number: | EMS0088 | |
| DEA Ref Numbers: | Kentani Solar PV | 14/12/16/3/3/2/724 |
| | Klipfontein Solar PV | 14/12/16/3/3/2/722 |
| | Braklaagte-Braambosch Solar PV | 14/12/16/3/3/2/725 |
| | Meeding Solar PV | 14/12/16/3/3/2/719 |
| | Irene Solar PV | 14/12/16/3/3/2/718 |
| | Leliehoek Solar PV | 14/12/16/3/3/2/728 |
| | Sonoblomo Solar PV | 14/12/16/3/3/2/723 |
| | Klipfontein 1 Solar PV | 14/12/16/3/3/2/721 |
| | Klipfontein 2 Solar PV | 14/12/16/3/3/2/726 |
| | Boschrand 1 Solar PV | 14/12/16/3/3/2/727 |
| | Boschrand 2 Solar PV | 14/12/16/3/3/2/720 |
| | Eksteen Solar PV | 14/12/16/3/3/2/717 |
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| | |

Summary



DEPARTMENT OF ENVIRONMENTAL AFFAIRS: INFORMATION REQUIREMENTS

| General Site Information | Reference in the Draft Scoping Report |
|---|--|
| Description of all affected farm portions | Chapter 5 |
| 21 digit Surveyor General codes of all affected farm portions | Chapter 1, Section 1.1 |
| Copies of deed of all affected land portions | Appendix A.3 |
| Photos of areas that give a visual perspective of all parts of the site | To be included in the Draft Environmental Impact Assessment (EIA) report |
| Photos from sensitive visual receptors (tourism routes, tourism facilities, etc.) | To be included in the Draft EIA report |
| Solar plan design specifications including: <ol style="list-style-type: none"> 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 | <ol style="list-style-type: none"> 1. Photovoltaic (PV) or Concentrated PV 2. 3 m (solar structure) 3. 300 – 400 ha 4. Single Axis Tracking PV, Fixed Axis Tracking PV or Dual Axis Tracking PV 5. 120 X 120 m during the construction phase 6. Section 1.1 of Chapter 1 lists the projects and their respective generation capacity |
| Generation capacity of the facility as a whole at delivery points | Each facility will either have a 75 MW or 100 MW generation capacity |
| Site maps and GIS information | Reference in the Draft Scoping 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) | Included on CD and shown in Figure 1.1 of the Draft Scoping Report |
| A status quo map/layer must be provided that includes the following: <ul style="list-style-type: none"> • Current use of land on site • 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 | Included on CD and discussed in Chapter 5 (description of the affected environment) of the Draft Scoping Report |

| | |
|--|---|
| <ul style="list-style-type: none"> • 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 proposed that indicate:</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, stream 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 | This will be included within the Draft Environmental Assessment Report. |
| Regional map and GIS information | Reference in the Draft Scoping 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 | Included on CD submitted with this report and discussed in Section 6.11. |
| Railway lines and stations | Included on CD submitted with this report |
| 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 | The project applicant intends to source the required water from the local municipality |
| A visibility assessment of the areas from where the facility will be visible | Visual considerations discussed in Chapter 6 of the Draft Scoping Report and topography shown in Figure 5.4 and Figure 5.5 within Chapter 5 of the Draft Scoping Report |

| | |
|--|-----|
| CBAs and ESAs | 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 | N/A |

PROJECT OVERVIEW

South Africa Mainstream Renewable Power Developments (Pty) Ltd. (“Mainstream”) (Reg. No. 2009/007850/07) intends to develop 12 solar PV or CPV facilities and associated electrical infrastructure near Dealesville in the Free State province, South Africa. The projects are collectively referred to as the Kentani Solar Development and are located 12 km from Dealesville in the Tokologo Local Municipality within the Lejweleputswa District Municipality, approximately 50 km south-east of Boshof, and 70 km north-east of Bloemfontein (Figure 1).

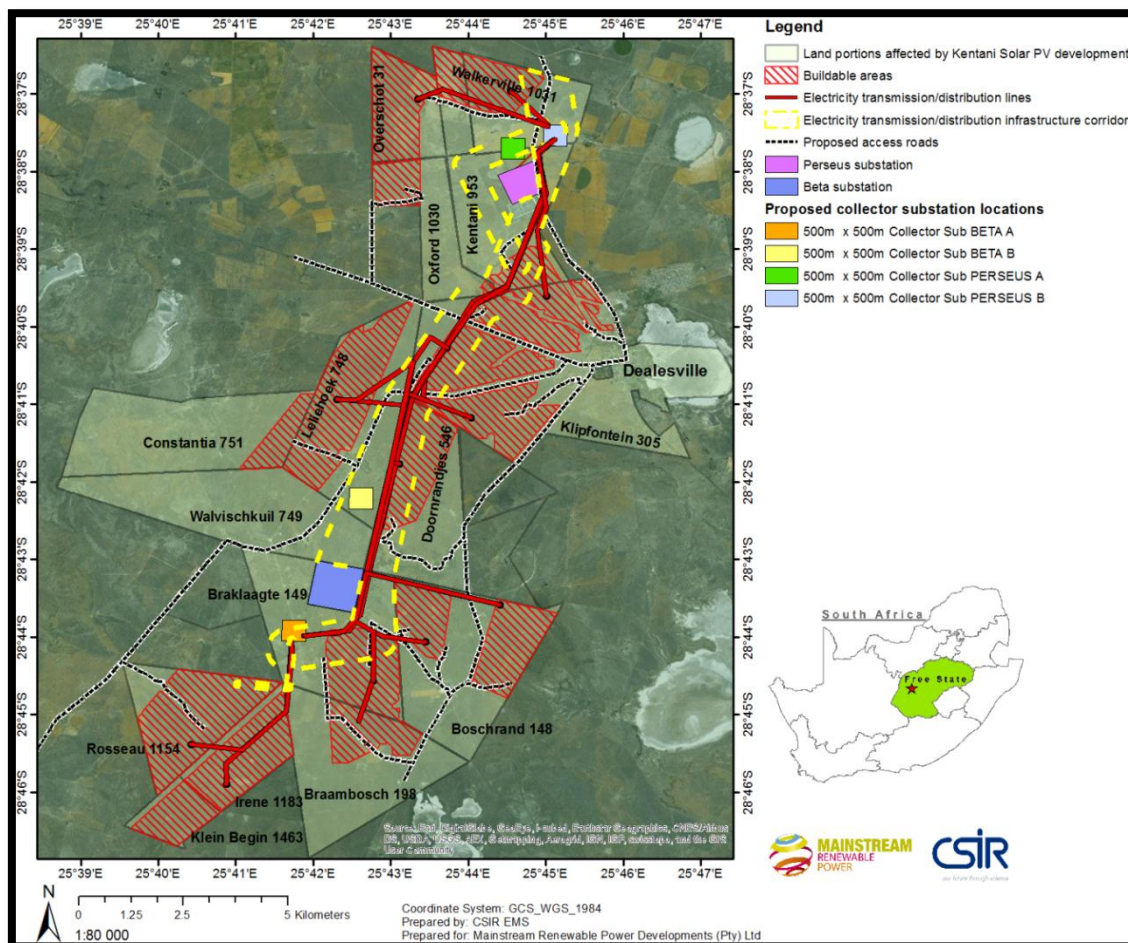


Figure 1. Location of the twelve projects and proposed electrical infrastructure routing that form part of the Kentani Solar Development.

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 12 proposed projects (attached in Appendix A of the Draft Scoping Report). The projects and associated DEA reference numbers are shown in Table 1. The proposed projects will make use of PV or CPV solar technology to generate electricity from the sun's energy. 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. The proposed projects, DEA reference numbers, associated generation capacities and land required for optimal efficiency are shown in the table below:

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

| | Project Name | DEA Reference Number | Generation Capacity (MW) | Land required (ha) for optimal efficiency |
|----|--------------------------------|----------------------|--------------------------|---|
| 1 | Kentani Solar PV | 14/12/16/3/3/2/724 | 100 | 400 |
| 2 | Klipfontein Solar PV | 14/12/16/3/3/2/722 | 100 | 400 |
| 3 | Braklaagte-Braambosch Solar PV | 14/12/16/3/3/2/725 | 100 | 400 |
| 4 | Meeding Solar PV | 14/12/16/3/3/2/719 | 100 | 400 |
| 5 | Irene Solar PV | 14/12/16/3/3/2/718 | 100 | 400 |
| 6 | Leliehoek Solar PV | 14/12/16/3/3/2/728 | 100 | 400 |
| 7 | Sonoblomo Solar PV | 14/12/16/3/3/2/723 | 75 | 300 |
| 8 | Klipfontein 1 Solar PV | 14/12/16/3/3/2/721 | 75 | 300 |
| 9 | Klipfontein 2 Solar PV | 14/12/16/3/3/2/726 | 75 | 300 |
| 10 | Boschrand 1 Solar PV | 14/12/16/3/3/2/727 | 75 | 300 |
| 11 | Boschrand 2 Solar PV | 14/12/16/3/3/2/720 | 75 | 300 |
| 12 | Eksteen Solar PV | 14/12/16/3/3/2/717 | 75 | 300 |

Project Proponent

Mainstream 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 (REIPPP). Both PV farms are operating on time and on budget and supplying power to the national grid. In addition, Mainstream has bid and won the 138 MW Jeffrey's Bay Wind Farm in Round 1 in the Eastern Cape.

In Round 3 of the DOE's REIPPP Mainstream successfully won 3 wind farms totalling 360 MW of power. In addition to the proposed PV facilities near Dealesville, Mainstream has developed an 80 MW wind farm in the Free State near Springfontein and therefore has experience developing projects in the Free State province.

Purpose of the Project

The Integrated Resource Plan for South Africa for the period 2010 to 2030 (referred to as “IRP2010”) proposes to secure 17 800 MW of renewable energy capacity by 2030. In August 2011 the Department of Energy (DoE) launched the Independent Power Producer (IPP) Procurement Programme 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 hydro projects. The first procurement phase of the DoE’s IPP Procurement Programme includes five bidding windows. Currently, the two main evaluation criteria for compliant bids are price and economic development with a point allocation of 70/30 (Department of Energy, 2011¹). Other selection criteria include 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 these criteria will have the greatest potential to be appointed Preferred Bidders by DoE. Mainstream intends to bid the 75 MW projects in the 2015 bidding process to be potentially selected as an IPP.

The motivation behind also applying for solar facilities with a generation capacity of 100 MW is that it may be determined by Mainstream that not all the projects be bid in the DOE’s REIPPP where the generation capacity cap of a facility to bid in the REIPPP is 75 MW. Additionally, a larger project is more economical to build and therefore if the project is built outside of the REIPPP it is financially beneficial to have a larger solar PV facility. A project outside of the REIPPP also needs to be more competitive as it has to compete with traditional fuel technologies and thus there is a need to build a larger project to be able to compete in the energy market. Due to land availability constraints, applying for a facility with a generation capacity larger than 100 MW is not deemed feasible.

The need and desirability of this project are discussed further in Chapter 3 of the Draft Scoping Report.

Identification of Issues and Potential Impacts

A key purpose of the Scoping Phase is to identify the key issues and potential impacts to be addressed during the Impact Assessment Phase of EIA and the approach to be followed in investigating the relevant issues. The list below indicates the potential impacts associated with the key issues identified thus far during the Scoping Phase. These impacts will be addressed during the EIA process (i.e. field investigation and impact assessment). A more detailed description of the preliminary identification of issues and potential impacts is presented in Chapter 6; including both biophysical, heritage and socio-economic issues (including impacts that have been assessed of negligible significance for the proposed project e.g. dust emission, noise emission, etc.).

In summary, the following potential impacts have been identified to date:

- Impacts on soils and agricultural potential
 - Loss of agricultural land use;
 - Soil erosion by wind or water;
 - Loss of topsoil;
 - Generation of alternative land use income through rental for energy facility;
 - Cumulative impacts due to the regional loss of agricultural resources; and production as a result of other developments on agricultural land in the region.

¹ Department of Energy (2011) TENDER NO: DOE/001/2011/2012, PART C: EVALUATION CRITERIA, Section 1.4.

- Visual impacts
 - Potential visual intrusion;
 - Potential visual impact of night lighting;
 - Potential landscape impact;
 - Potential cumulative visual impact of 12 photovoltaic solar plants and two large Eskom substations on the existing rural agricultural landscape; and
 - Potential cumulative visual impact of 12 photovoltaic solar plants and two large Eskom substations on the existing views and viewpoints of sensitive visual receptors in the region.

- Impacts on the aquatic environment
 - The potential loss of aquatic habitat (physical destruction);
 - Loss of ecosystem services;
 - Habitat fragmentation (loss of support areas); and
 - Sedimentation and erosion.

- Impacts on the terrestrial environment
 - Loss of natural vegetation;
 - Habitat fragmentation - loss of biodiversity;
 - Impacts on species of special concern; and
 - Establishment of declared weeds and alien invader plants.

- Impact on the socio-economic environment
 - Impacts on overall economic development potential in the area;
 - Impacts associated with project expenditure on direct and indirect employment and household incomes;
 - Impacts associated with upstream and downstream economic linkages and spin-offs would also be assessed taking import content and other relevant factors into consideration;
 - Impacts associated with required socio-economic development contributions and community shareholding allocations under the REIPPP; and
 - Impacts associated with environmental impacts that cannot be mitigated and have economic implications.

- Impact on heritage resources
 - Based on a desktop review, discussed in Chapter 5 and 6 of the Draft Scoping Report, it is not expected that the study area will contain any significant heritage features.

The following specialist studies have been identified based on the issues and impacts potentially associated with the project. The Term of Reference for each specialist study is discussed in Chapter 7 of the Draft Scoping Report. The specialist studies and associated specialists are shown in Table 2 below.

Table 2. Specialist studies and associates specialists.

| Name | Organisation | Specialist study |
|--------------------------|----------------------------------|---|
| <i>Johann Lanz</i> | Private consultant | Soil and Agricultural Impact Assessment |
| <i>Henry Holland</i> | MapThis Trust | Visual Impact Assessment |
| <i>Dr. Brian Colloty</i> | Scherman Colloty & Associates cc | Aquatic Impact Assessment |
| <i>Dr. Jayson Orton</i> | ASHA Consulting (Pty) Ltd | Heritage Impact Assessment |
| <i>Dr. Lloyd Rossouw</i> | Subcontracted by ASHA Consulting | Palaeontological Impact Assessment |

| | | |
|-------------------------------------|--------------------------------------|----------------------------------|
| | (Pty) Ltd | |
| <i>Dr. Hugo van Zyl</i> | Independent Economic Researchers | Socio-economic Impact Assessment |
| <i>Andrew Skowno and Simon Todd</i> | Ecosol GIS and Simon Todd Consulting | Terrestrial Impact Assessment |

Environmental Assessment Process

Given the strategic importance of energy development in South Africa, the proposed project requires full Scoping and Environmental Impact Reporting (S&EIR) in terms of Government Notice Regulation (GN R) 545, and includes activities listed in GN R544 (requiring Basic Assessment) and GN R546 (for geographical areas). A complete list of triggered activities listed in GN R 544, R 545 and R 546 is included in Chapter 2. The Scoping Phase of the EIA refers to the process of determining the spatial and temporal boundaries for the EIA. In broad terms, this involves three important activities:

- Confirming the process to be followed and opportunities for stakeholder engagement;
- Clarifying the project scope and alternatives to be covered; and
- Identifying the key issues to be addressed in the impact assessment phase and the approach to be followed in addressing these issues.

The legislation, guidelines and information series documents that have informed the scope and content of the Final Scoping Report are listed in Chapter 2.

Public involvement forms an important component of this process, by assisting in the identification of issues and alternatives to be evaluated. As part of the Scoping process all Interested and Affected Parties are invited to comment on this Draft Scoping Report. All comments should be submitted to the CSIR (contact details below). This report is available for public review at the Dealesville and Boshof public libraries and an electronic version of this report is available on the project website at: www.csir.co.za/eia/ketanisolar. This report is available for commenting for a 40-day period from the date of release. All comments and responses should be submitted to the contact below by **31 October 2014**.

Comments may be submitted to the following contact person:

CSIR- Environmental Management Services

Contact Person: Surina Brink

Postal Address: PO Box 320, Stellenbosch, 7599

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Acronyms



| | |
|---------|---|
| CA | Competent Authority |
| CBA | Critical Biodiversity Area |
| CPV | Concentrated Photovoltaic |
| CSIR | Council for Scientific and Industrial Research |
| DEA | Department of Environmental Affairs |
| DEA&DP | Department of Environmental Affairs and Development Planning |
| DoE | Department of Energy |
| DNI | Direct Normal Irradiance |
| EA | Environmental Authorisation |
| EAP | Environmental Assessment Practitioner |
| EAPSA | Environmental Assessment Practitioner for South Africa |
| EIA | Environmental Impact Assessment |
| EMPr | Environmental Management Programme |
| EMS | Environmental Management System |
| ESA | Ecological Support Area |
| GDS | Growth and Development Strategy |
| GHI | Global Horizontal Irradiation |
| GIS | Geographic Information Systems |
| I&AP | Interested and Affected Parties |
| IDP | Integrated Development Plan |
| IPP | Independent Power Producer |
| IRP | Integrated Resource Plan |
| kV | Kilovolt |
| MW | Megawatt |
| NFEPA | National Freshwater Ecosystem Priority Area |
| O&M | Operation and Maintenance |
| PGDS | Provincial Growth and Development Strategy |
| PPA | Power Purchase Agreement |
| PPP | Public Participation Process |
| PSEIA | Plan of Study for the Environmental Impact Assessment |
| PV | Photovoltaic |
| REDZ | Renewable Energy Development Zones |
| REIPPPP | Renewable Energy Independent Power Producer Procurement Programme |
| S&EIR | Scoping and Environmental Impact Reporting |
| SARERD | South African Renewable Energy Resource Database |
| SEA | Strategic Environmental Assessment |
| SDF | Spatial Development Framework |
| SIP | Strategic Infrastructure Plan |
| ToR | Terms of Reference |

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Dealesville, Free State

Chapter 1: Introduction



DRAFT SCOPING REPORT



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1. INTRODUCTION

This chapter provides an overview of the proposed Kentani Solar Development project comprising 12 Solar Photovoltaic (PV) or Concentrated PV (CPV) facilities. Furthermore, information on the Applicant, South Africa Mainstream Renewable Power Developments (Pty) Ltd (“Mainstream”), the appointed Environmental Assessment Practitioner (EAP), the Council of Scientific and Industrial Research (“CSIR”), and the specialist team is provided.



1.1. Project Overview

South Africa Mainstream Renewable Power Developments (Pty) Ltd. (Reg. No. 2009/007850/07) intends to develop 12 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 Development and are located 12 km from Dealesville in the Tokologo Local Municipality within the Lejweleputswa District Municipality, approximately 50 km south-east of Boshof, and 70 km north-east of Bloemfontein (Figure 1.1). The land portions and relevant SG 21 code for each of the 12 projects are shown in Table 1.1.

Table 1.1. Land portions affected by the each of the proposed 12 solar energy projects (including proposed distribution lines)

| NR | PROJECT | LAND PORTION | SG 21 Code |
|----|--|---|-----------------------|
| 1 | Kentani <i>Development & Distribution line</i> | The Farm Overschot, Farm Number 31, Title Deed No. G00/1885 | F0040000000003100000 |
| | | Remainder of Farm Oxford, Farm Number 1030, Title Deed No. T31534/2007 | F00400000000103000000 |
| | | Portion 1 of the Farm Walkerville, Farm Number 1031, Title Deed No. T940/1957 | F00400000000103100001 |
| | | Remainder of the Farm Walkerville, Farm Number 1031, Title Deed No. T939/1957 | F00400000000103100000 |
| 2 | Sonoblomo <i>Development & Distribution line</i> | Portion 1 of the Farm Walkerville, Farm Number 1031, Title Deed No. T940/1957 | F00400000000103100001 |
| | | Remainder of the Farm Walkerville, Farm Number 1031, Title Deed No. T939/1957 | F00400000000103100000 |
| 3 | Klipfontein <i>Development & Distribution line</i> | Remainder of The Farm Kentani, Farm Number 953, Title Deed No. T2881/1912 | F00400000000095300000 |
| | | Remainder of the Farm Klipfontein, No. 305, Title Deed No. T970/1915 | F00400000000030500000 |
| | | Remainder of Farm Oxford, Farm Number 1030, Title Deed No. T31534/2007 | F00400000000103000000 |
| 4 | Klipfontein PV 1 <i>Development &</i> | Remainder of the Farm Klipfontein, No. 305, Title Deed No. T970/1915 | F00400000000030500000 |

| NR | PROJECT | LAND PORTION | SG 21 Code |
|-----------|--|--|--|
| | | <i>Distribution line</i> | |
| 5 | Klipfontein 2 <i>Development & Distribution line</i> | Remainder of the Farm Klipfontein, No. 305, Title Deed No. T970/1915 | F00400000000030500000 |
| 6 | Braklaagte/ Braambosch PV <i>Development & Distribution line</i> | Remainder of the Farm Braklaagte Number 149, Title Deed No. T25925/2005 The Farm Braambosch, No. 198, Title Deed No. T11519/1991 | F00400000000014900000 F00400000000019800000 |
| 7 | Boschrand PV 1 <i>Development & Distribution line</i> | The Farm Boschrand, No. 148, Title Deed No. T14232/2000 Remainder of the Farm Braklaagte Number 149, Title Deed No. T25925/2005 | F00400000000014800000 F00400000000014900000 |
| 8 | Boschrand PV 2 <i>Development & Distribution line</i> | The Farm Boschrand, No. 148, Title Deed No. T14232/2000. Remainder of the Farm Braklaagte Number 149, Title Deed No. T25925/2005 | F00400000000014800000 F00400000000014900000 |
| 9 | Meeding PV <i>Development & Distribution line</i> | The Farm Rosseau, No. 1154, Title Deed Number T97/1919 The Farm Irene, No. 1183, Title Deed No. T8926/2007 The Farm Braambosch, No. 198, Title Deed No. T11519/1991 Remainder of the Farm Braklaagte Number 149, Title Deed No. T25925/2005 | F004000000000115400000 F004000000000118300000 F00400000000019800000 F00400000000014900000 |
| 10 | Irene PV <i>Development & Distribution line</i> | The Farm Irene, No. 1183, Title Deed No. T8926/2007 Farm Klein Begin No. 1463 The Farm Braambosch, No. 198, Title Deed No. T11519/1991 Remainder of the Farm Braklaagte Number 149, Title Deed No. T25925/2005 | F004000000000118300000 F004000000000146300000 F00400000000019800000 F00400000000014900000 |
| 11 | Eksteen PV <i>Development & Distribution line</i> | Remaining extent of the Farm Doornrandjes, No. 546, Title Deed No. T26617/1882 | F00400000000054600000 |
| 12 | Leliehoek PV <i>Development & Distribution line</i> | Remainder of Farm Leliehoek, No. 748, Title Deed No. T95/2002 Remainder of Farm Constantia, No. 751, Title Deed No. T95/2002 | F00400000000074800000 F00400000000075100000 |

Land portions affected by the proposed transmission line corridor:

Table 1.2. Land portions affected by the proposed transmission line corridor

| PROJECT | SG 21 Code |
|--|-----------------------|
| Remainder of Farm Oxford, Farm Number 1030, Title Deed No. T31534/2007 | F00400000000103000000 |
| Portion 1 of the Farm Walkerville, Farm Number 1031, Title Deed No. T940/1957 | F00400000000103100001 |
| Remainder of the Farm Walkerville, Farm Number 1031, Title Deed No. T939/1957 | F00400000000103100000 |
| The Farm Kentani, Farm Number 953, Title Deed No. T2881/1912 | F00400000000095300000 |
| Remainder of the Farm Klipfontein, No. 305, Title Deed No. T970/1915 | F00400000000030500000 |
| Farm Number 149, Title Deed No. T25925/2005 | F00400000000014900000 |
| The Farm Boschrand, No. 148, Title Deed No. T14232/2000 | F00400000000014800000 |
| Remaining extent of the Farm Doornrandjes, No. 546, Title Deed No. T26617/1882 | F00400000000054600000 |
| Remainder of Farm Leliehoek, No. 748, Title Deed No. T95/2002 | F00400000000074800000 |
| Remaining extent of Farm Walvischkuil No. 749, Title Deed No. T47081/2000 | F00400000000074900000 |
| Remainder of the Farm Braklaagte Number 149, Title Deed No. T25925/2005 | F00400000000014900000 |

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 12 proposed projects (attached in **Appendix A** of the Draft Scoping Report). The projects and associated DEA reference numbers are shown in Table 1.2. The proposed projects will make use of PV or CPV solar technology to generate electricity from the sun's energy. 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. The proposed projects, DEA reference numbers, associated generation capacities and land required for optimal efficiency are shown in Table 1.3.

Table 1.3: Proposed projects and generation capacity and land required.

| Project Name | DEA Reference Number | Generation Capacity (MW) | Land required (ha) for optimal efficiency |
|--------------------------------|----------------------|--------------------------|---|
| Kentani Solar PV | 14/12/16/3/3/2/724 | 100 | 400 |
| Klipfontein Solar PV | 14/12/16/3/3/2/722 | 100 | 400 |
| Braklaagte-Braambosch Solar PV | 14/12/16/3/3/2/725 | 100 | 400 |
| Meeding Solar PV | 14/12/16/3/3/2/719 | 100 | 400 |
| Irene Solar PV | 14/12/16/3/3/2/718 | 100 | 400 |
| Leliehoek Solar PV | 14/12/16/3/3/2/728 | 100 | 400 |
| Sonoblomo Solar PV | 14/12/16/3/3/2/723 | 75 | 300 |
| Klipfontein 1 Solar PV | 14/12/16/3/3/2/721 | 75 | 300 |
| Klipfontein 2 Solar PV | 14/12/16/3/3/2/726 | 75 | 300 |
| Boschrand 1 Solar PV | 14/12/16/3/3/2/727 | 75 | 300 |
| Boschrand 2 Solar PV | 14/12/16/3/3/2/720 | 75 | 300 |

| | | | |
|------------------|--------------------|----|-----|
| Eksteen Solar PV | 14/12/16/3/3/2/717 | 75 | 300 |
|------------------|--------------------|----|-----|

As shown in Table 1.3: above, in order for the proposed solar facilities to operate at optimal efficiency, the proposed facilities will either require an area of approximately 300 ha (for the 75 MW facilities) or 400 ha (for the 100 MW facilities). The land required for optimal efficiency of the facilities is based on the fact that the closer the solar panels are to each other, the more shading is created on the adjacent rows of panels. This will directly impact on the amount of energy produced by the facility. In addition, the smaller the distances are between the rows, the higher the impact will be on the vegetation present between the rows due to lack of sunlight and higher stormwater run-off per surface area. It is important to note that the possibility exists to construct these facilities in a smaller area, depending on the size of the buildable areas on the land portions, environmental constraints, solar technology (PV or CPV) and mounting system technology (fixed PV or tracking PV) to be used. The buildable areas (i.e. maximum developable land available on a land portion) for each project will be assessed during the Scoping and EIA phases.

Draft Scoping Report

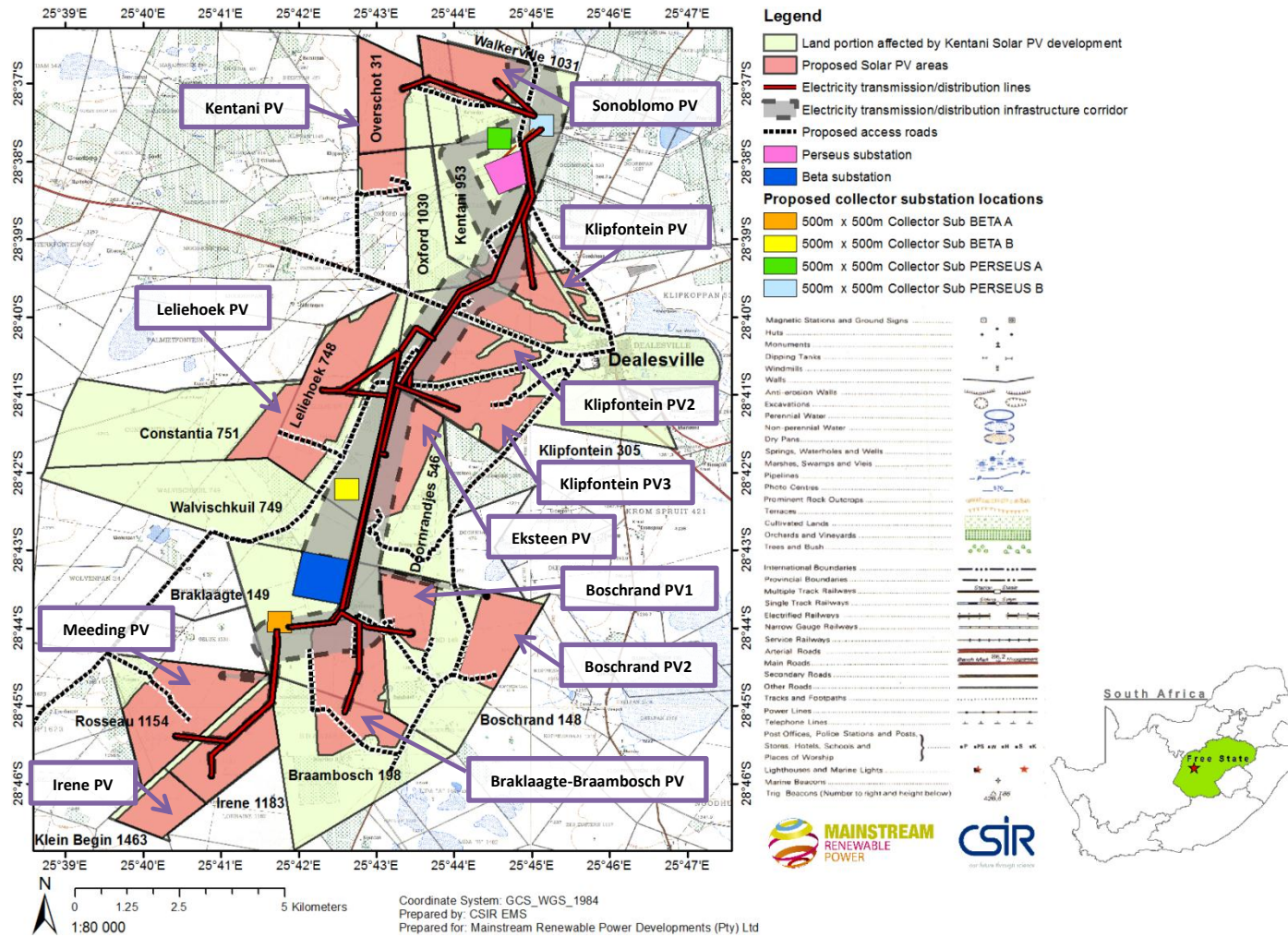


Figure 1.1: The 12 Solar projects, associated electrical infrastructure and the 15 land portions that form part of the proposed development.

The solar facility will comprise of the following components (discussed in more detail in Chapter 3: Project Description of this Draft Scoping Report):

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.

Associated infrastructure

- Transmission and distribution lines;
- Access roads;
- Internal gravel roads;
- Fencing;
- Operation and Maintenance Area;
- Laydown Area;
- Stormwater channels; and
- Water pipelines.

Each solar facility will either:

- 1) connect via an on-site substation to a northern or southern collector substation (to be constructed) to the existing Eskom Perseus substation (located on Farm Kentani 953) or Eskom Beta substation (located on Farm Braklaagte 149), or
- 2) connect directly via a northern or southern collector substation (to be constructed) to the existing Eskom Perseus substation or Eskom Beta substation.

The alternative locations of the proposed collector substations and locations of the existing Eskom substations are shown in Figure 1.1. Mainstream will implement the Self-Build Option for the additional electrical infrastructure to be constructed. Following the construction phase, the electrical infrastructure will either be transferred into the ownership of Eskom or otherwise remain in the ownership of Mainstream.

1.2. Environmental Assessment Process

Regulations for Environmental Impact Assessment (EIA) were promulgated under Chapter 5 of the National Environmental Management Act (NEMA) (Act 107 of 1998) in 1997¹, 2006², 2010³ and, most recently, in 2013⁴. The proposed project requires full Scoping and Environmental Impact Reporting

¹ Government Notice No. R1182 of 5 September 1997 (as amended)

² Government Notice No. R385, R386 and R387 of 21 April 2006 (as amended)

³ Government Notice No. R543, R544, R545 and R546 of 18 June 2010 (as amended)

⁴ Government Notice No. R922 and R923 of 29 November 2013

(S&EIR) in terms of Government Notice Regulation (GN R) 545, published in June 2010, including activities listed in GN R 544 and GN R 546. The listed activities triggered by the proposed project are described in Chapter 2 of this 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 EIA process is also designed to meet the requirements of the National Heritage Resources Act, 1999 (Act 25 of 1999).

The CSIR will undertake the Public Participation Process (PPP) for this EIA. Public involvement forms an important component of this process, by assisting in the identification of issues and alternatives to be evaluated. Public meetings provide the opportunity for Interested and Affected Parties (I&APs) to raise issues and concerns for consideration by the Specialist Consultants in their investigations and/or inclusion in the EIA. As such, they form part of the ongoing communication strategy between the project team and I&APs.

In order to provide I&APs and the DEA with a holistic picture of the Kentani Solar Development, all the reports (i.e. Draft and Final Scoping and EIA Reports) will collectively discuss, provide information and contain the impact assessments of the 12 projects. Therefore, the PPP and the Scoping and EIA processes for the 12 projects will be run in parallel. Subsequently, all project milestones and deliverables are projected against the same timeline. The PPP that will be undertaken for the Scoping Phase and the EIA Phase are discussed in Chapter 2 and 7 of this Draft Scoping Report, respectively.

1.3. Purpose of the Project

Due to its energy intensive economy and high dependence on coal-based power generation, South Africa is ranked as largest emitter of greenhouse gases in Africa and amongst the top 20 largest emitters of greenhouse gases in the world (National Treasury, 2010⁵): “South Africa is the 12th largest emitter of CO₂ in the world. In 2004, South Africa emitted about 387 million metric tons of CO₂, just under half of CO₂ emissions for all of Africa, and about 1.6 per cent of global emissions.” (National Treasury, 2010).

Eskom currently uses approximately 2% of South Africa’s total fresh water resources for the generation of power from coal pressuring an arid South African country with existing severe water constraints (Eskom, 2009⁶). Mainstream plans to develop solar energy projects in the Free State offering a combined solution with no operational direct water consumption (except for periodic washing of the solar panels) and feed “green electricity” into the national electricity grid with zero greenhouse gas emissions during operations.

The Integrated Resource Plan for South Africa for the period 2010 to 2030 (referred to as “IRP2010”) proposes to secure 17 800 MW of renewable energy capacity by 2030. In August 2011 the Department of Energy (DoE) launched the Independent Power Producer (IPP) Procurement Programme 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 hydro projects. The first procurement phase of the DoE’s IPP Procurement Programme includes five bidding windows. Currently, the two main evaluation criteria for compliant bids are price and economic development with a point allocation of 70/30 (Department of Energy, 2011⁷). Other selection criteria include technical feasibility and grid connectivity, environmental acceptability, black economic empowerment, community development

⁵ National Treasury (2010) DISCUSSION PAPER FOR PUBLIC COMMENT, Reducing Greenhouse Gas Emissions: The Carbon Tax Option. South Africa: National Treasury.

⁶ Eskom presentation, Water Security Africa, 18-20 May 2009: http://www.eskom.co.za/live/content.php?Item_ID=2785

⁷ Department of Energy (2011) TENDER NO: DOE/001/2011/2012, PART C: EVALUATION CRITERIA, Section 1.4.

and local economic and manufacturing propositions. The bidders whose responses rank the highest according to these criteria will have the greatest potential to be appointed Preferred Bidders by DoE. Mainstream intends to bid the 75 MW projects in the 2015 bidding process to be potentially selected as an IPP.

The motivation behind also applying for solar facilities with a generation capacity of 100 MW is that it may be determined by Mainstream that not all the projects be bid in the DOE's REIPPP where the generation capacity cap is 75 MW. Additionally, a larger project is more economical to build and therefore if the project is built outside of the REIPPP it is financially beneficial to have a larger solar PV facility. A project outside of the REIPPP also needs to be more competitive as it has to compete with traditional fuel technologies and thus there is a need to build a larger project to be able to compete in the energy market. Due to land availability constraints, applying for a facility with a generation capacity larger than 100 MW is not deemed feasible.

The need and desirability of this project are discussed further in Chapter 3 of the Draft Scoping Report.

1.4. Project 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 (REIPPP). Both PV farms are operating on time and on budget and supplying power to the national grid. In addition, Mainstream has bid and won the 138 MW Jeffrey's Bay Wind Farm in Round 1 in the Eastern Cape.

In Round 3 of the DOE's REIPPP Mainstream successfully won 3 wind farms totalling 360 MW of power. In addition to the proposed PV facilities near Dealesville, Mainstream has developed an 80 MW wind farm in the Free State near Springfontein and therefore has experience developing projects in the Free State province.

1.5. EIA Team

The CSIR has been appointed by Mainstream to undertake the EIA process. The CSIR has been involved in numerous research and applied science projects across 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 environmental management 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 led by Paul Lochner who has 20 years' experience in environmental assessment and management studies, primarily in the leadership and integration functions. This has included Strategic Environmental Assessments (SEA), EIAs and EMPs. He is a certified Environmental Assessment Practitioner for South Africa (EAPSA) since July 2002. Paul has extensive experience in conducting environmental assessment and management processes through-out South Africa, but especially in the Western, Northern and Eastern Cape. Paul is supported by CSIR Project Manager,

Surina Brink. Surina has a Masters degree in Environmental Management and more than 3 years' experience in environmental assessment and management. She has experience in undertaking Basic Assessments and Scoping and EIAs for various sectors, including renewable energy, industry and tourism (please refer to Appendix B for the Curriculum Vitae of the EAPs).

The EIA team appointed to undertake the EIA is presented in Table 1.4.

Table 1.4: The EIA project team.

| NAME | ORGANISATION | ROLE |
|---|--|---------------------------------|
| Environmental Assessment Practitioners | | |
| Paul Lochner | CSIR | Project leader (EAPSA) |
| Surina Brink | 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 |

1.6. Objectives for this Scoping Report

The Scoping Phase of the EIA involves the process of determining spatial and temporal boundaries for the EIA. This involves three important activities:

- Confirming the process to be followed and opportunities for stakeholder engagement;
- Clarifying the project scope and alternatives to be covered; and
- Identifying the key issues to be addressed in the impact assessment phase and the approach to be followed in addressing these issues.

The above mentioned is achieved through consulting with:

- The authorities involved in the decision-making for this EIA application;
- Civil society to ensure that local issues are well understood; and
- The EIA specialist team to ensure that technical issues are identified.

The objective for the Scoping Report is to present stakeholders, including organs of state, with an overview of the proposed activity and associated issues that require assessment in the EIA Phase. Its availability in the public domain allows for additional issues that may require assessment to be identified. Issues expressed during the review of the Draft Scoping Report will be captured and collated in an Issues and Response report to be included in the Final Scoping Report. Regulation 28 of the NEMA EIA Regulations (GN R543) prescribes the content of Scoping Reports and specifies the supporting information that must accompany the submission of the Final Scoping Report.

Regulations 54 to 57 in GN R543 relate to the PPP to be followed. Table 1.5 shows how these requirements are addressed in this Draft Scoping Report.

Table 1.5: Content of Scoping Report Requirements as per GN R543 Part 3 Section 28.

| Section of the EIA regulations | Description of EIA Regulations Requirements for Scoping Report | Location in this Draft Scoping Report |
|--------------------------------|---|--|
| 28 (1)(a) | <i>Details of– The EAP who prepared the report The expertise of the EAP to carry out scoping procedures</i> | Chapter 1 Section 1.6 |
| 28 (1)(b) | <i>A description of the proposed activity</i> | Chapter 3 |
| 28 (1)(c) | <i>A description of any feasible and reasonable alternatives that have been identified</i> | Chapter 4 |
| 28 (1)(d) | <i>A description of the property on which the activity is to be undertaken and the location of the activity on the property</i> | Chapter 5 |
| 28 (1)(e) | <i>A description of the environment that may be affected by the activity and the manner in which activity may be affected by the environment</i> | Chapter 5 |
| 28 (1)(f) | <i>An identification of all legislation and guidelines that have been considered in the preparation of the scoping report</i> | Chapter 2 |
| 28 (1)(g) | <i>A description of environmental issues and potential impacts, including cumulative impacts, that have been identified</i> | Chapter 6 |
| 28 (1)(h)(i) | <i>Details of the public participation process conducted in terms of regulation 27(a), including steps taken to notify potential interested and affected parties (I&APs) of the application</i> | Chapter 2 |
| 28 (1)(h)(ii) | <i>Details of the public participation process conducted in terms of regulation 27(a), including proof that notice boards, advertisements and notices notifying potentially interested and affected parties of the application have been displayed, placed or given</i> | To be included within the Final Scoping Report |
| 28 (1)(h)(iii) | <i>Details of the public participation process conducted in terms of regulation 27(a), including a list of all persons or organisations that were identified and registered in terms of regulation 55 as interested and affected parties in relation to the application</i> | Appendix C for potential Interested and Affected Parties |
| 28 (1)(h)(iv) | <i>Details of the public participation process conducted in terms of regulation 27(a), including a summary of the issues raised by interested and affected parties, the date of receipt of and the response of the EAP to those issues</i> | To be included within the Final Scoping Report |
| 28 (1)(i) | <i>A description of the need and desirability of the proposed activity</i> | Chapter 3 |
| 28 (1)(j) | <i>A description of identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may</i> | Chapter 4 |

| Section of the EIA regulations | Description of EIA Regulations Requirements for Scoping Report | Location in this Draft Scoping Report |
|--------------------------------|---|--|
| | <i>be affected by the activity</i> | |
| 28 (1)(k) | <i>Copies of any representations, and comments received in connection with the application or the scoping report from interested and affected parties</i> | To be included within the Final Scoping Report |
| 28 (1)(l) | <i>Copies of the minutes of any meetings held by the EAP with interested and affected parties and other role players which record the views of the participants</i> | Not applicable |
| 28(1)(m) | <i>Any responses by the EAP to those representations, objections, comments and views</i> | To be included within the Final Scoping Report |
| 28 (1)(n) | <i>A plan of study for environmental impact assessment which sets out the proposed approach to the environmental impact assessment of the application, which must include (i) a description of the tasks that will be undertaken as part of the environmental impact assessment process, including any specialist reports or specialised processes, and the manner in which such tasks will be undertaken; (ii) an indication of the stages at which the competent authority will be consulted; (iii) a description of the proposed method of assessing the environmental issues and alternatives, including the option of not proceeding with the activity; and (iv) particulars of the public participation process that will be conducted during the environmental impact assessment process</i> | Chapter 7 |
| 28 (1)(o) and (p) | <i>Any specific information required by the competent authority; Any other matters required in terms of sections 24(4)(a) and (b) of the Act</i> | Not applicable |
| 28 (2) | <i>In addition, a scoping report must take into account any guidelines applicable to the kind of activity which is the subject of the application</i> | Chapter 2 |
| 28 (3) | <i>The EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in subregulation (1)(c), exist.</i> | Alternatives to be assessed are included in Chapter 4. The full assessment on alternatives will be included in the Draft Environmental Impact Report |

Draft Scoping Report for the proposed
construction of Kentani Solar Development
consisting of twelve solar PV or CPV facilities,
Dealesville, Free State

Chapter 2:

Legislative Context and Public Participation



DRAFT SCOPING REPORT



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2. LEGISLATIVE CONTEXT AND PUBLIC PARTICIPATION



This chapter provides an overview of the legal context of the proposed project, including the applicable legislation, guidelines and information that will inform the Scoping and EIA process. This chapter also details the PPP to be undertaken during the Scoping Phase in accordance with the NEMA EIA Regulations (Regulations 54). The PPP to be undertaken during the EIA phase is discussed in Chapter 7 of this report.

2.1. Legal context for this EIA

Section 24(1) of the NEMA (Act 107 of 1998) 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 NEMA relates to the regulations promulgated respectively in GN R544, R545 and R546 in Government Gazette (GG) No. 33306, dated 18 June 2010, which came into effect on 2 August 2010. The relevant GN published in terms of 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. Mainstream's 12 solar projects, collectively referred to as Kentani Solar Development, each requires a full EIA, in particular because it includes, inter alia, the following activity listed under Activity Number 1 in GN R 545 in GG No 33306 of June 2010:

“The construction of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more.”

All the listed activities potentially forming part of this proposed development that require EA are included in the application form prepared and submitted to the National DEA on 20 June 2014 and is attached as Appendix A.1 of this report. The listed activities are indicated in Table 2.1 below. It should be noted that a precautionary approach was followed when identifying listed activities in the application form i.e. if the activity potentially forms part of the project, it is listed. However, the final project proposal will be shaped by the findings of the EIA process and certain activities may be added or removed from the project proposal. The DEA and I&APs will be informed in writing of such amendments. Please note that it has been determined, following the submission and registration of the projects at the DEA, that an additional activity has been identified to potentially be applicable to the projects. This is shown in red text in the table below.

Please note that currently, all the activities listed below are applicable to all 12 proposed solar PV projects. During the Scoping and EIA phases it may be determined that certain activities are not applicable to a specific solar facility; for example, no water courses may be present on the Klipfontein PV site and therefore Activity 11 of Government Notice R544 relating to the construction of facilities within 32 meters of a watercourse is not applicable to this project even though watercourses are present on the Sonoblomo site, which means that this activity is applicable to the Sonobolomo PV project. Based on this, the applicable listed activities relevant to

each project will be confirmed and highlighted in the EIA Report. This will ensure that the EA obtained for each facility is project specific.

Table 2.1: Listed activities that may be triggered by the proposed solar energy facilities and associated electricity infrastructure.

| Government Notice and Listed Activity | Description of project activity that potentially triggers listed activity |
|---|---|
| Government Notice R544 and Listed Activity | |
| <p>Activity 9 The construction of facilities or infrastructure exceeding 1000 metres in length for the bulk transportation of water, sewage or stormwater –</p> <ul style="list-style-type: none"> (i) With an internal diameter of 0.36 metres or more; or (ii) With a peak throughput of 120 litres per second or more, <p>Excluding where-</p> <ul style="list-style-type: none"> a) Such facilities or infrastructure are for bulk transporation of water, sewage or storm water or stormwater drainage inside a road reserve; or b) Where such construction will occur within urban areas but further than 32 metres from a watercourse, measured from the edge of a watercourse. | <p>Water pipelines may need to be constructed to facility for the transportation of water to the facilities. The design of the pipelines and the necessity thereof will be determined during the EIA and detailed engineering phase.</p> |
| <p>Activity 10 The construction of facilities or infrastructure for the transmission and distribution of electricity –</p> <ul style="list-style-type: none"> (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts (kV) | <p>Electrical infrastructure (distribution and transmission lines and collector substations) will be required to provide power to the proposed development. The voltage of such infrastructure will be confirmed during the detailed engineering design phase.</p> |
| <p>Activity 11 The construction of:</p> <ul style="list-style-type: none"> (xi) infrastructure or structures covering 50 square metres (m²) or more where such construction occurs within a watercourse or within 32 metres (m) of a watercourse, measured from the edge of a watercourse. | <p>The possibility exists that components of the proposed project may be constructed within a watercourse or within 32 metres of a watercourse. However, this will be confirmed once the project layout is finalised during the EIA process.</p> |
| <p>Activity 13 The construction of facilities or infrastructure for the storage, or the storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 80 but not exceeding 500 cubic metres.</p> | <p>The possibility exists that the facilities will make use of battery storage on site. These battery containers may be defined as ‘dangerous goods’ as per SANS 10234 because of flammability or toxicity of the contents container. The applicability of this activity and the feasibility of having battery storage on site will be determined during the EIA phase of this project.</p> |
| <p>Activity 18</p> | <p>Should any component of the proposed project be</p> |

| | |
|--|---|
| <p>The infilling or depositing of any material of more than 5 cubic metres (m³) into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from</p> <p>(i) a watercourse.</p> | <p>constructed in close proximity to an existing watercourse/s, the potential exists for the infilling or depositing of material of more than 5 cubic metres into a watercourse.</p> |
| <p>Activity 22</p> <p>The construction of a road, outside urban areas,</p> <p>(i) with a reserve wider than 13.5 m or,</p> <p>(ii) where no reserve exists where the road is wider than 8 m.</p> | <p>The proposed project may require that roads with a reserve wider than 13.5 m, or wider than 8 m where no reserve exists, be constructed outside an urban area.</p> |
| <p>Activity 24</p> <p>The transformation of land bigger than 1000 m² in size, to residential, retail, commercial, industrial or institutional use, where, at the time of the coming into effect of this Schedule such land was zoned open space, conservation or had an equivalent zoning</p> | <p>The construction of the proposed solar PV facility will result in the transformation of undeveloped land for commercial use where the total area to be transformed is 200 hectares or more.</p> |
| <p>Activity 29</p> <p>The expansion of facilities for the generation of electricity where:</p> <p>(i) regardless of the increased output of the facility, the development footprint will be expanded by 1 hectare or more.</p> | <p>Possible expansion of existing substations/substation yard, such that the development footprint will be expanded by 1 hectare or more, may be required to facilitate operation of the proposed solar PV facility.</p> |
| <p>Activity 38</p> <p>The expansion of facilities for the transmission and distribution of electricity where the expanded capacity will exceed 275 kilovolts and the development footprint will increase.</p> | <p>Possible expansion of existing substations/substation yard, such that the expanded capacity will exceed 275 kilovolts and the development footprint will increase.</p> |
| <p>Activity 40</p> <p>The expansion of</p> <p>(iv) infrastructure by more than 50 square metres</p> <p>Within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, but excluding where such expansion will occur behind the development setback line.</p> | <p>Possible expansion of existing substations/substation yard, such that the infrastructure is expanded by more than 50 square metres within a watercourse or within 32 metres of a watercourse, excluding where such expansion will occur behind the development setback line.</p> |

| Government Notice and Listed Activity | Description of project activity that potentially triggers listed activity |
|--|--|
| Government Notice R545 and Listed Activity | |
| <p>Activity 1</p> <p>The construction of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts (MW) or more.</p> | <p>The proposed project involves the construction of infrastructure for the generation of electricity where the electricity generation output will be 75 MW or 100 MW.</p> |
| <p>Activity 3</p> <p>The construction of facilities or infrastructure for the</p> | <p>The possibility exists that the facilities will make use of battery storage on site. These battery containers may</p> |

| | |
|---|---|
| storage, or the storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity exceeding 500 cubic metres | be may be defined as 'dangerous goods' as per SANS 10234 because of flammability or toxicity of the contents container. The applicability of this activity and the feasibility of having battery storage on site will be determined during the EIA phase of this project. |
| Activity 8 The construction of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kV or more, outside an urban area or industrial complex. | The proposed solar PV facility will involve the construction of a facility and supporting electrical infrastructure for the transmission and distribution of electricity of 275 kV or more, outside an urban area. |
| Activity 15 Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares (ha) or more. | Construction of the proposed solar PV facility will result in the physical alteration of undeveloped land for commercial use where the total area to be transformed is 200 hectares or more. |

| Government Notice and Listed Activity | Description of project activity that potentially triggers listed activity |
|--|--|
| Government Notice R546 and Listed Activity | |
| Activity 4 The construction of a road wider than 4 metres with a reserve less than 13.5 m. (a) in the Free State Province (ii) Outside urban areas, (cc) sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority. (ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve | The proposed project will be located in the Free State province, outside urban areas, and may require that roads of wider than 4 metres with a reserve of less than 13.5 m be constructed. These roads may be constructed in close proximity to, or otherwise encroach upon, sensitive areas and/or Critical Biodiversity Areas (CBAs). This listed activity is included as a precautionary measure, and its applicability will be confirmed during the EIA process. |
| Activity 10 The construction of facilities or infrastructure for the storage, or the storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres. a) in the Free State Province (ii) Outside urban areas, | The possibility exists that the facilities will make use of battery storage on site. These battery containers may be defined as 'dangerous goods' as per SANS 10234 because of flammability or toxicity of the contents container. The applicability of this activity and the feasibility of having battery storage on site will be determined during the EIA phase of this project. |

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| <p>(cc) sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority.</p> <p>(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.</p> <p>(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve</p> | |
| <p>Activity 12</p> <p>The clearance of an area of 300 square metres or more of vegetation where 75% or more of the vegetation cover constitutes indigenous vegetation</p> <p>Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment</p> | <p>Construction of the proposed solar PV facility will result in the clearance of vegetation which may exceed 300 square meters since the total area to be transformed is 200 hectares or more. This listed activity is included as a precautionary measure, and its applicability will be confirmed during the EIA process.</p> |
| <p>Activity 13</p> <p>The clearance of an area of 1 hectare or more of vegetation where 75 per cent (%) or more of the vegetative cover constitutes indigenous vegetation.</p> <p>(a) in the Free State Province,</p> <p>All areas outside urban areas, including the following:</p> <p>(cc) sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority.</p> <p>(ff) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve</p> | <p>The proposed solar PV facility will be constructed outside urban areas in the Free State province, and may require the clearance of an area of more than 1 hectare of vegetation where 75 % or more of the vegetative cover constitutes indigenous vegetation. This listed activity is included as a precautionary measure, and its applicability will be confirmed during the EIA process.</p> |
| <p>Activity 14</p> <p>The clearance of an area of 5 hectares or more of vegetation where 75 per cent (%) or more of the vegetative cover constitutes indigenous vegetation.</p> <p>(a) in the Free State Province,</p> <p>(i) All areas outside urban areas.</p> | <p>The proposed solar PV facility will be constructed outside urban areas in the Free State province, and may require the clearance of an area of 5 hectares or more of vegetation where 75 % or more of the vegetative cover constitutes indigenous vegetation. This listed activity is included as a precautionary measure, and its applicability will be confirmed during the EIA process.</p> |
| <p>Activity 16</p> <p>The construction of:</p> <p>(iii) buildings with a footprint exceeding 10 m² in size; or</p> <p>(iv) infrastructure covering 10m² or more where such</p> | <p>The proposed project will be located outside urban areas in the Free State province, and will involve the construction of buildings with a footprint exceeding 10 m² in size and/or infrastructure covering 10 m² or more where construction may occur within 32m of a watercourse. These buildings and/or infrastructure</p> |

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| <p>construction occurs within a watercourse or within 32m of a watercourse.</p> <p>(a) in the Free State Province</p> <p>(ii) Outside urban areas,</p> <p>(dd) sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority.</p> <p>(ff) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.</p> | <p>may be constructed in close proximity to, or otherwise encroach upon, sensitive areas and/or CBAs. However, this listed activity is included as a precautionary measure, and its applicability will be confirmed during the EIA process.</p> |
| <p>Activity 19</p> <p>The widening of a road by more than 4 m, or the lengthening of a road by more than 1 km.</p> <p>(a) in the Free State Province,</p> <p>(ii) outside urban areas</p> <p>(cc) sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority.</p> <p>(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.</p> <p>(ii) Areas on the watercourse side of the development setback line or within 100 m from the edge of a watercourse where no such setback line has been determined.</p> | <p>The project is proposed to be constructed outside urban areas in the Free State province, and may require that existing roads be widened by more than 4 m or lengthened by more than 1 km. The widened or lengthened portions of these roads may be located in close proximity to, or encroach upon, sensitive areas, CBAs and/or areas within 100 m from the edge of a watercourse. However, this listed activity is included as a precautionary measure, and its applicability will be confirmed during the EIA process.</p> |
| <p>Activity 24</p> <p>The expansion of</p> <p>(d) infrastructure where the infrastructure will be expanded by 10 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.</p> <p>In the Free State Province,</p> <p>(ii) Outside urban areas, in:</p> <p>(cc) sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority.</p> <p>(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.</p> <p>(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any</p> | <p>Possible expansion of existing substations/substation yard, such that the infrastructure will be expanded by 10 square metres or more, where construction will occur within 32 metres of a watercourse. The proposed expansion will take place within the Free State province, outside urban areas, and may result in these expanded areas being located in close proximity to, or encroaching upon, sensitive areas and CBAs.</p> |

protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve

2.2. Legislation and guidelines pertinent to this EIA

The scope and content of this Draft Scoping Report has been informed by the following legislation, guidelines and information series documents:

- NEMA (Act 107 of 1998) and EIA Regulations published under Chapter 5 of the NEMA on 18 June 2010 (GN R543, GN R544, GN R545 and GN R546 in Government Gazette 33306);
- National Environmental Management Biodiversity Act (NEMBA) (Act 10 of 2004);
- National Heritage Resources Act (NHRA) (Act 25 of 1999);
- Electricity Act (Act 41 of 1987);
- Electricity Regulations Amendments (August 2009)
- Energy Efficiency Strategy of the Republic of South Africa (DME, 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);
- Conservation of Agricultural Resources Act (Act No. 43 of 1983);
- Astronomy Geographic Advantage (Act 21 of 2007);
- National Water Act (Act No. 36 of 1998);
- National Forests Act (Act 84 of 1998);
- Occupational Health and Safety Act No. 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 No. 31 of 2004);
- National Environmental Management: Waste Management Act (Act 59 of 2008);
- National Road Traffic Act (Act No. 93 of 1996);
- Subdivision of Agricultural Land Act (Act 70 of 1970);
- Free State Nature Conservation Ordinance, 1969 (Act No. 8 of 1969);
- Public Participation Guideline, October 2012 (Government Gazette 35769);
- Department of Environmental Affairs and Development Planning (DEA&DP) Guidelines published in terms of the NEMA EIA Regulations, in particular:
 - Guideline on Transitional Arrangements (DEA&DP, March 2013)
 - Guideline on Alternatives (DEA&DP, March 2013)
 - Guideline on Public Participation (DEA&DP, March 2013)
 - Guideline on Need and Desirability (DEA&DP, March 2013)
- Information Document on Generic Terms of Reference for EAPs and Project Schedules (March 2013);
- Integrated Environmental Management Information Series (Booklets 0 to 23) (Department of Environmental Affairs and Tourism (DEAT), 2002 - 2005);
- Guidelines for Involving Specialists in the EIA Processes Series (DEA&DP; CSIR and Tony Barbour, 2005 - 2007);
- United Nations Framework Convention on Climate Change (1997); and
- Kyoto Protocol (which South Africa acceded to in 2002).

Apart from the above mentioned, additional Acts, standards and/or guidelines which may also be applicable will be reviewed in more detail as part of the specialist studies to be conducted for the EIA. A review of international standards will be undertaken to ensure that the proposed project satisfies the minimum standards applicable under the World Bank and is compliant with Equator Principles.

2.3. Principles for Scoping and Public Participation

The PPP for this Scoping and EIA process will include a stakeholder engagement process that will include inputs from authorities, I&APs, technical specialists and the project proponent. Public participation is one of the most important aspects of the Environmental Authorisation process. This stems from the requirement that people have a right to be informed about potential impacts that may affect them and that they must be afforded an opportunity to comment on those impacts. Effective public participation also improves the ability of the Competent Authority (CA) to make informed decisions, which results in improved decision-making as the view of all parties are considered.

According to the Guideline on Public Participation (DEA, 2012), an effective PPP:

- “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.”

Furthermore, 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.

2.4. Objectives of the Scoping Process

This Scoping process is being planned and conducted in a manner that is intended to identify and provide sufficient information to enable the authorities to reach a decision regarding the scope of issues to be addressed in the EIA process, and in particular, to convey the range of specialist studies that will be included as part of the Environmental Impact Reporting Phase of the EIA, as well as the approach to these specialist studies.

Within this context, the objectives of this Scoping process are to:

- Identify and inform a broad range of stakeholders about the proposed development;
- Clarify the scope and nature of the proposed activities and the alternatives being considered;
- Conduct an open, participatory and transparent approach and facilitate the inclusion of stakeholder concerns in the decision-making process;
- Identify and document the key issues to be addressed in the forthcoming Environmental Impact Reporting Phase of the EIA, through a process of broad-based consultation with stakeholders;
- Ensure due consideration of alternative options in regard to the proposed development, including the “No development” option.

2.5. Tasks in the Scoping Phase

This section provides an overview of the tasks being undertaken in the Scoping Phase, with a particular emphasis on providing a clear record of the PPP followed. As discussed in *Chapter 1* of the Scoping Report, the twelve projects collectively form the Kentani Solar Development. The PPP will be integrated, i.e. all adverts, site notices, notification letters etc. will serve to notify the public and organs of state of the joint availability of all reports for the abovementioned twelve projects and will provide I&APs with an opportunity to comment on the reports. This process is outlined in Figure 2.1. This approach is proposed because of the close proximity of the sites (i.e. the proposed projects will take place in the same geographical area), the streamlining of the PPP and to ensure transparency of the process.

Task 1: I&AP identification, registration, and the creation of an electronic database

Prior to advertising the EIA process, an initial database of I&APs was developed for the Scoping process. Appendix C contains the current I&AP database, which includes all potential I&APs. While I&APs will be encouraged to comment on the Draft Scoping Report (i.e. this report), the identification and registration of I&APs will be ongoing for the duration of the study. Stakeholders from a variety of sectors, geographical locations and/or interest groups can be expected to show an interest in the proposed project, for example:

- Provincial and Local Government Departments;
- Local interest groups, for example, Councillors and Rate Payers associations;
- Farmers Organisations; and
- Environmental Groups and national governmental organisations (NGOs).

In terms of the electronic database, I&AP details are captured and automatically updated as and when information is distributed to, or received from, I&APs. This ongoing and up-to-date record of communication is an important component of the PPP. It must be noted that while not required in terms of regulations, those I&APs proactively identified at the outset of the Scoping Process will remain on the project database through the EIA process and will be kept informed of all opportunities to comment and will only be removed from the database by request.

Task 2: Announcement of the Project and Draft Scoping Reports (current stage)

This stage of the process entails the release of the Draft Scoping Report for public review. In order to notify and inform the public of the proposed project, invite them to register as I&APs and comment on the Draft Scoping Reports, the following steps will be undertaken:

- Placement of one advertisement in Volksblad and Mangaung Express to notify potential I&APs of the availability of the Draft Scoping Reports;
- Mailing/emailing of notification letters detailing the EIA process and proposed projects to all pre-identified key stakeholders on the database;
- Maildrop of notification letters (in either English, Afrikaans or Tswana) to occupants of properties located within 100 m of the projects sites;
- A public meeting will be held during the Scoping Phase;
- Placement of site notice boards (in Afrikaans, English and Tswana) at various locations within the of the proposed development area, providing information on the project and EIA process and in Dealesville at conspicuous places to the public; and
- Report Distribution - providing hard copies of the Draft Scoping reports at the Dealesville and Boshof local libraries and on the project website for viewing by I&APs.

All potential I&APs have a 40-day commenting period during which they will have the opportunity to register and/or comment on the Draft Scoping Reports. Copies of the letters and newspaper advertisements and photographic proof of the placement of the site notices will be included within the Final Scoping Reports.

Task 3: Ongoing communication and capacity building

Within the context of the EIA process, capacity building is not viewed as a “once off” event, but rather a series of events and/or information sharing, providing information on a continuous basis in order to build knowledge and the capacity of I&APs to effectively participate in the EIA process, raise issues of concern, etc. The public participation process aims to build the capacity of I&APs to participate. The process for this EIA aims to ensure that people are involved from the outset through the proactive soliciting of stakeholder involvement, that attention is focused on all three dimensions of sustainability (i.e. biophysical, social and economic), and that I&APs are provided with sufficient and accessible information to contribute meaningfully to the EIA process.

One of the challenges facing the participation process is the diversity of South African society. Public participation by its very nature is a dynamic process with various sectors of society having varying needs, values and interests. The core question for public participation is “How can I as an I&AP meaningfully participate in the process?” This varies according to the needs of I&APs. The PPP should be inclusive of all I&APs, and afford them the opportunity to raise their issues and concerns in a manner that suites them. Coupled with this South African society is characterized by varying socio-economic, literacy and language levels all of which need to be considered in the participation process. For example, certain I&APs may want to receive documentation only and not attend meetings, some I&APs may want to only attend meetings, other I&APs may not want to attend

meetings and send their comments in writing, and some I&APs may want to be personally engaged in the process (on occasions or throughout).

In order to accommodate the varying needs of I&APs and develop their capacity to participate in the process, information-sharing forms an integral and ongoing component of the EIA process. The following provides an overview of how information sharing is being effected throughout the EIA process in order to develop the capacity of I&APs to effectively engage:

- **Website** - placing EIA related project information on the website: www.csir.co.za/eia/kentanisolar.
- **Language** - encouraging I&APs to use the language of their choice at meetings and providing translations at meetings in English and Afrikaans, when required.
- **Newspaper Advertisements** - requesting I&APs to register and comment on the Scoping and EIA reports and advertising the details of the public meeting. The advertisement will be placed in Volksblad and Mangaung Express newspapers.
- **Letters to I&APs** - notifying them of the various stages of the EIA process, availability of reports for comment and inviting them to attend public meetings to be held (these letters will be distributed in English, Afrikaans and Tswana).
- **Report Distribution** - providing hard copies of the Scoping and EIA reports at the Dealesville and Boshof local libraries and on the project website for viewing by I&APs.
- **Public Meetings** - a public meeting will be held during the Scoping Phase.
- **Focus Group Meetings** - may be undertaken depending on the interest in the project, to target key I&AP groups (Councillors, ratepayers association, surrounding landowners, affected organs of state, environmental organisations) and proactively invite them to attend a meeting where they are provided with an overview of the project and EIA process.

Documents will continuously being posted onto the CSIR website (www.csir.co.za/eia/kentanisolar) as and when they become available and I&APs will be notified accordingly.

Task 4: Consultation with authorities and I&APs

All public participation documentation will reach the lead authority (DEA) as well as other relevant authorities included on the I&AP database. Comments received by the public and authorities will be included in the Issues and Response report as an appendix in the Final Scoping Report.

Additionally, consultation with relevant authorities on a one-on-one basis will be effected, where necessary. The CSIR EIA project leader and manager, and the client team will seek to hold meetings, as necessary, with the key authorities at various milestones throughout the process. Notes will be compiled summarising the main outcomes from these meetings with authorities, and used to provide inputs into the EIA process.

Task 5: Technical Scoping with project proponent and EIA team

The Scoping process has been designed to incorporate two complementary components: a stakeholder engagement process that includes the relevant authorities and wider I&APs; and a technical process involving the EIA team (EAP and specialist team) and the project proponent (Mainstream). The purpose of the technical Scoping process is to draw on the past experience of

the EIA team and the project proponent to identify environmental issues and concerns related to the proposed project upfront, and confirm that the necessary specialist studies have been identified prior to the EIA phase.

Task 6: Final Scoping Reports (following Draft Scoping Reports commenting period)

Following the commenting period of the Draft Scoping Reports and incorporation of the comments received into the reports, a notification letter will be compiled and sent to all registered I&APs to serve as a notification of the submission of the Final Scoping Reports to DEA for their decision making. I&APs will be informed of any material changes in the Final Scoping Reports and will be given a reasonable period to comment on the changes to the Final Scoping Reports (i.e. 21-day commenting period). As required by the regulations, comments should be sent directly to the competent authority.

The Final Scoping Reports will include Issues and Response reports detailing all the comments that were received on the Draft Scoping Reports and proof of the PPP that was undertaken to inform state organs and the public of the availability of the Draft Scoping Reports. To ensure ongoing access to information, a copy of the Final Scoping Report will be placed at the Dealesville and Boshof public libraries as well as on the project website (www.csir.co.za/eia/kentanisolar).

This step marks the end of the PPP for the Scoping Phase. The publication participation programme for the subsequent Environmental Impact Reporting Phase is presented in the Plan of Study for EIA (Chapter 7).

2.6. EIA schedule

The proposed schedule for the EIA, based on the legislated EIA process, is presented in Table 2.2. 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.



Key principles incorporated into this approach:

- efficient authorisation process minimising need for amendments
- efficient stakeholder engagement
- consistency with Department of Energy REIPPP requirements
- holistic process including cumulative impacts

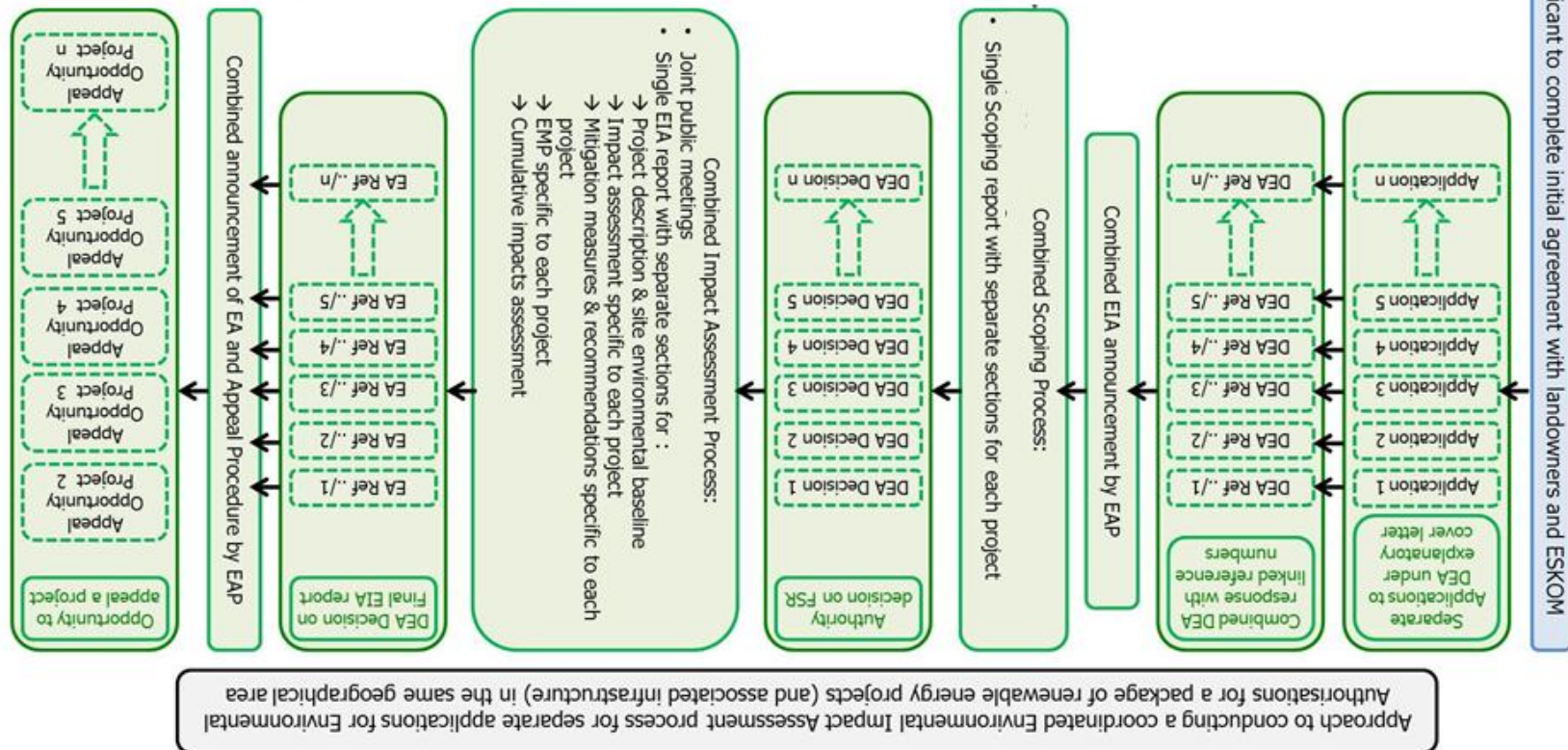


Figure 2.1: Proposed CSIR approach to conduct a combined EIA process with 12 separate EIA applications.

Draft Scoping Report for the proposed
construction of Kentani Solar Development
consisting of twelve solar PV or CPV facilities,
Dealesville, Free State

Chapter 3: Project Description



DRAFT SCOPING REPORT



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3. PROJECT DESCRIPTION



This chapter provides an overview of the site selection process of the project sites, the conceptual project design and the need and desirability of the proposed Kentani Solar Development consisting of 12 Solar PV or CPV facilities. Due to the fact that the site selection process and technology to be used on the sites are similar, these aspects are collectively discussed in this chapter. Based on the findings and input of the specialist studies during the EIA phase of the project, the project design will be refined and an updated design presented in the Draft EIA Report. This chapter is based on information provided by Mainstream. A description of the affected environment is detailed in Chapter 5 of this Draft Scoping Report.

3.1. Site selection

3.1.1. National level considerations

3.1.1.1. Solar radiation

The north-western part of South Africa has the highest Global Horizontal Irradiation¹ (GHI), relevant to PV installations, (Figure 3.1) and Direct Normal Irradiance² (DNI), relevant to CPV and tracking PV installations (Figure 3.2). Therefore, this section of South Africa is deemed the most suitable for the construction and operation of solar energy facilities. Within the Free State Province, the western area (the area with the predominant darker orange shading in Figure 3.1) has a solar GHI and DNI of ≥ 2200 kWh/m² per annum, which is the highest GHI and DNI for the province. Therefore, this area was deemed the most suitable for the construction and operation of the proposed solar PV or CPV facilities.

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

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

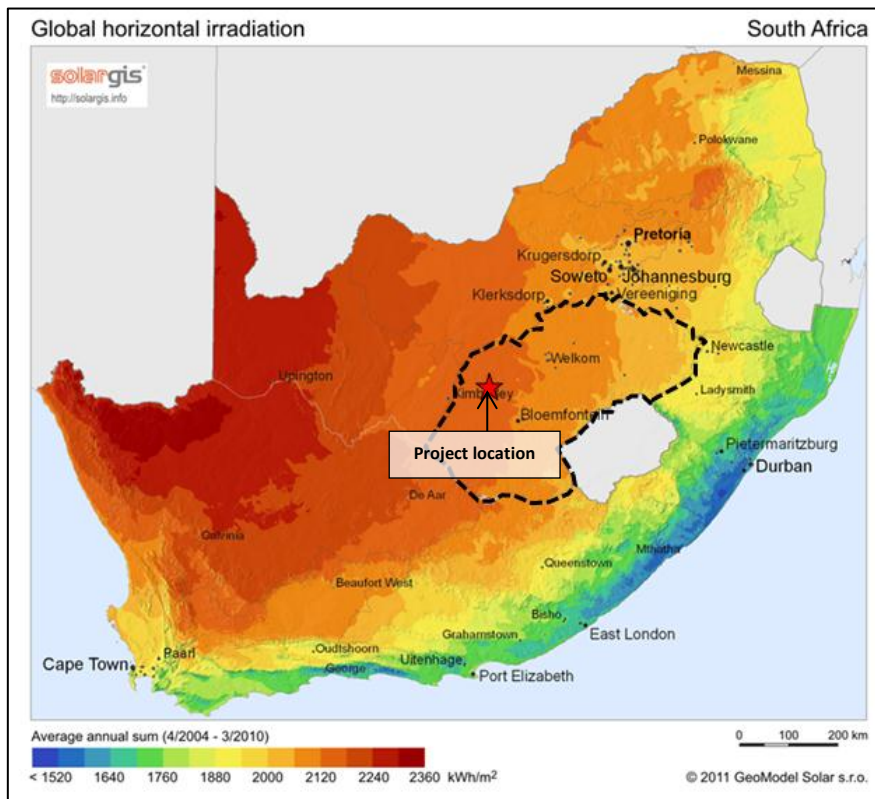


Figure 3.1: Global Horizontal Irradiation of South Africa (Source: SolarGIS map© 2014 GeoModel Solar).

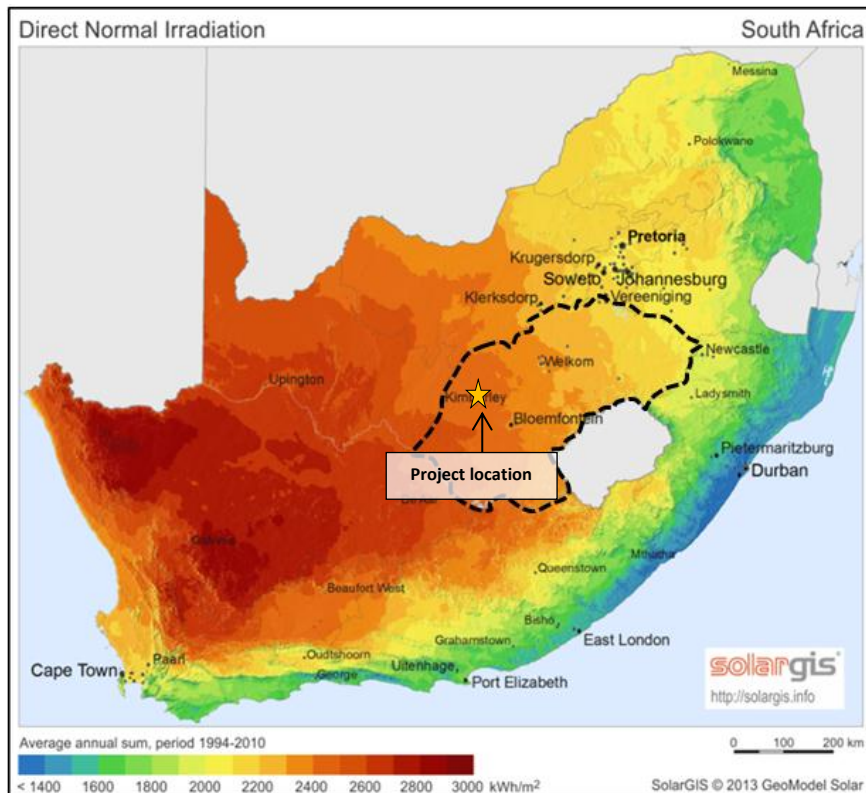


Figure 3.2: Direct Normal Irradiation of South Africa (Source: SolarGIS map© 2014 GeoModel Solar).

3.1.1.2. Independent Power Producer Program and Strategic Environmental Assessment for the efficient roll-out of Wind and Solar PV in South Africa

The Integrated Resource Plan for South Africa for the period 2010 to 2030 (referred to as “IRP2010”) proposes to secure 17 800 MW of renewable energy capacity by 2030. The DoE subsequently has entered into a bidding process for the procurement of 3725 MW of renewable energy from Independent Power Producers (IPP) by 2016 and beyond to enable the Department to meet this target. In order to submit a bid, the proponent is required to have obtained an 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. To this end, the National DEA, in discussion with the DoE, has been mandated by MinMec to undertake a Strategic Environmental Assessment (SEA)³ to identify the areas in South Africa that are of strategic importance for Wind and Solar PV development. The SEAs are in support of the Strategic Infrastructure Plan (SIP) 8, which focuses on the promotion of green energy in South Africa. The SEAs aim to:

- Identify geographical areas (known as Renewable Energy Development Zones (REDZs)) best suited for the rollout of wind and solar PV energy projects and the supporting electricity grid network;
- Provides a platform for coordination between the various authorities who have a mandate in terms of issuing authorisations, consents or permits to allow for a more streamlined process; and
- Enable participating authorities to issue general authorisations or exemptions for energy applications within these areas based on certain conditions or adherence to certain criteria or standards.

By the third quarter of 2014, the SEA study will be completed following which, the REDZs 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. The Focus Areas that have been identified and are currently being further assessed as part of the SEA process are shown in

Figure 3.2. These Focus Areas are currently being assessed on a broad level by specialists, including birds and bats, agriculture/soil potential and visual assessments. The specialist studies are aimed at identifying areas of varying sensitivity in each Focus Area. This information will eventually be used to refine the Focus Areas, which will then be considered for the gazetting of REDZ.

The proposed solar facility currently falls within the Focus Area 5 demarcated area which means that the proposed facility is in line with the criteria of the SEA in identifying this area as being of strategic importance for Solar PV development. Site specific assessments are still required to determine the constraints and impacts of a project on a local and site specific level. The assessment of the environmental impacts and opportunities and constraints associated with this project will be undertaken as part of this EIA process. The benefit of the proposed project potentially falling within a REDZ will allow for proactive and socialised infrastructure investment which could enable sustained growth in the wind and solar PV energy sector. Since these REDZs are determined on a national strategic level, the suitability of the site for a solar PV development is supported, depending on the site specific assessment and impacts identified during the EIA phase.

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

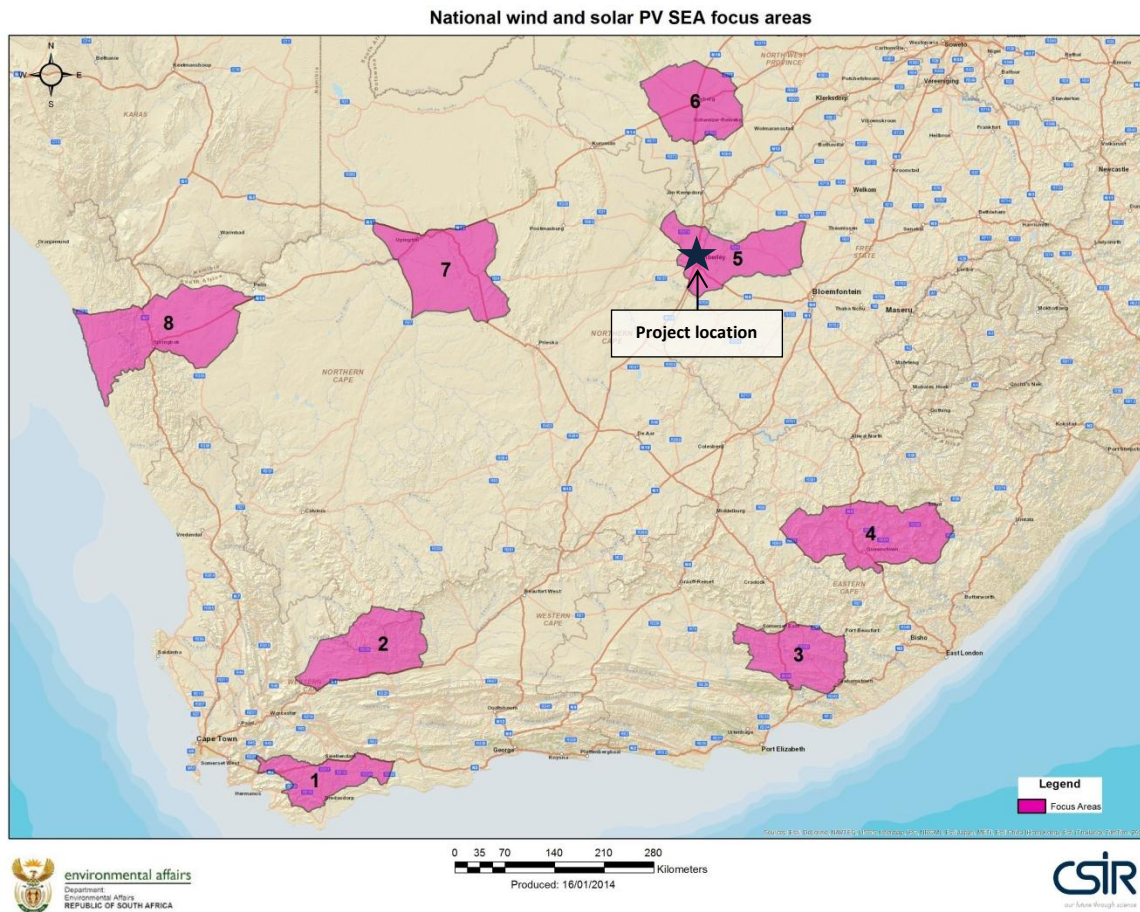


Figure 3.2: Renewable Energy Development Areas identified in the Strategic Environmental Assessment, the proposed facility falls within Focus Area 5 (CSIR, 2014).

3.1.2. Local level (site specific) considerations

On a local (site specific) level, the site selection process considered the following factors (Table 3.1):

Table 3.1: Site selection factors.

| Factor | Suitability |
|------------------------------|---|
| Distance to grid | Sites are within 7 km of the closest substation |
| Available grid capacity | More than 4 GW on the HV side |
| Solar resources availability | 2200 kWh/m ² |
| Land availability | All buildable areas identified are larger than 200 ha |
| Land-use | Agricultural activities - Grazing |
| Topography | ≤ 2 % (Level to very gentle slope) |

As discussed in Section 3.1.1.1 above, the solar resource availability for these sites is ≥ 2200 kWh/m². The proximity of the existing Eskom Perseus and Beta Substation (as shown in Figure 3.3 below) and potential available grid capacity (discussed in Table 3.1 above) at these substations

mean that the sites can be connected to the substations and feed the power produced into the national grid. The land portions that have been deemed suitable in terms of land use and topography are shown in green in Figure 3.3. The buildable areas on these land portions (shown in red shading in Figure 3.3 below) have been determined by implementing setbacks of certain factors presented in Table 3.2. The buildable areas of each project will be assessed as part of the Scoping and EIA process.

Table 3.2: Buildable Area setbacks.

| Factor | Setback distance |
|----------------------|---|
| Roads | 95 m |
| National Roads | 500 m |
| Internal Roads | 50 m |
| Rivers | 100 m away from (no perennial rivers have been identified on the sites at this stage) |
| Drainage lines | 50 m |
| Rail | 50 m |
| Transmission | 50 m |
| Transmission =>220kV | 50 m |
| Wetlands | 50 m |
| Buildings | 100 m |
| Land Use | 100 m away from land-uses that would be deemed a 'fatal flaw' such as mining activities |

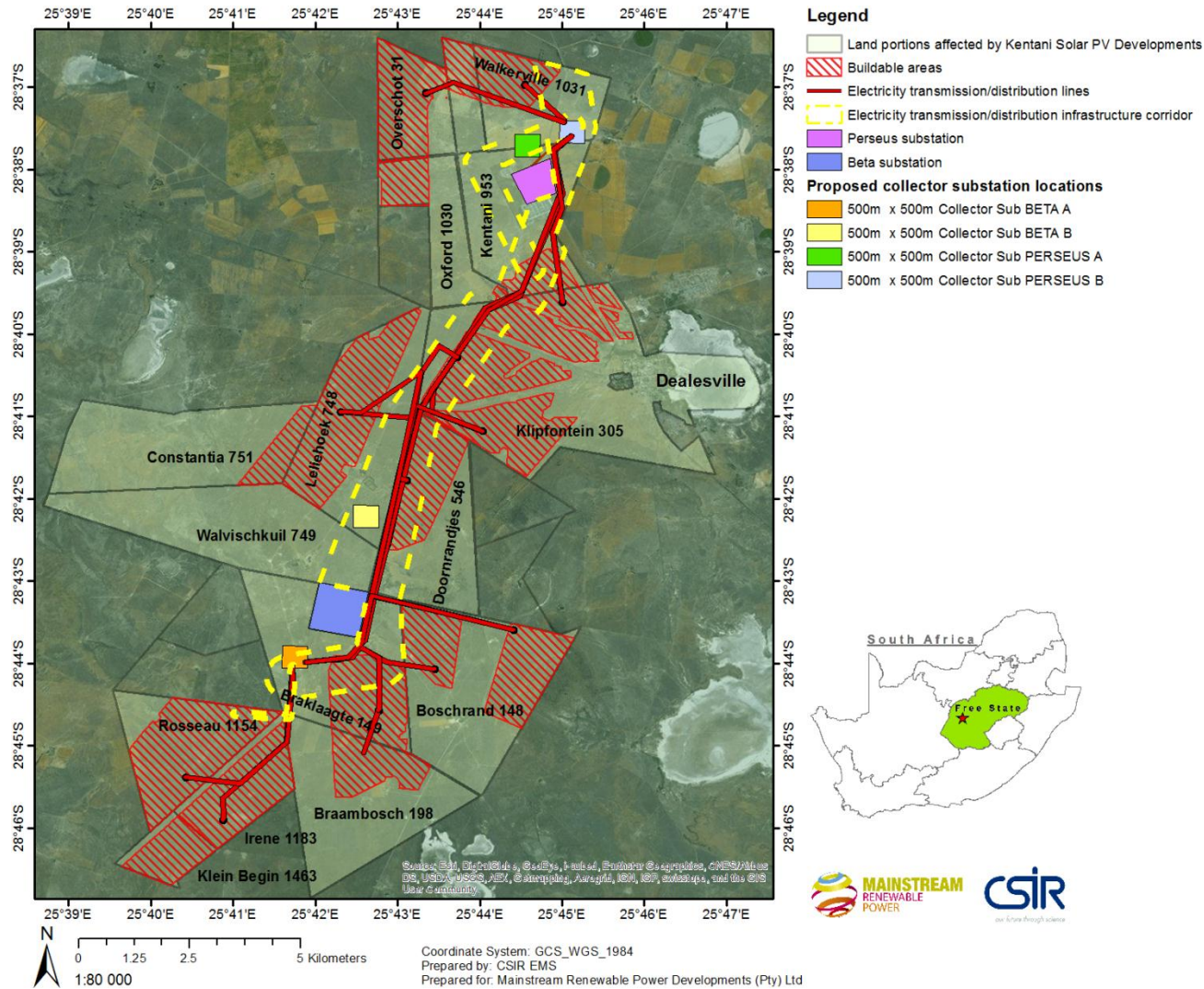


Figure 3.3: Buildable areas on the suitable land portions identified.

3.2. Key components of the proposed Solar Energy Facilities

The solar PV facilities forming part of the Kentani Solar Development will either have a generation capacity of 75 MW or 100 MW. Once a PPA is awarded, the proposed facility will generate electricity for a minimum period of 20 years. The property on which each of the facilities is to be constructed will be leased by Mainstream from the property owner for the life span of the project.

As mentioned in Chapter 1 of this Draft Scoping Report, in order for the solar facilities to operate at optimal efficiency, each solar facility requires an area of approximately 300 ha (for 75 MW solar facility) or 400 ha (for 100 MW solar facility). The generation capacity of each facility is shown in Table 3.3. The total development footprint of each facility will be determined during the EIA and will depend on the size of the buildable areas of the land portions, the generation capacity of the facility (75 MW or 100 MW), environmental constraints (presence of watercourses, heritage features etc.), solar technology (PV or CPV) and the mounting system technology (fixed or tracking) to be used. The possibility therefore exists to construct the facilities in a smaller area but this will reduce the efficiency of the facility. For the Scoping and EIA phases, the buildable areas (i.e. maximum developable land available on a land portion) of each project will be assessed.

Table 3.3: Generation capacity per project

| Project Name | Generation Capacity (MW) |
|--------------------------------|--------------------------|
| Braklaagte-Braambosch Solar PV | 100 |
| Irene Solar PV | 100 |
| Kentani Solar PV | 100 |
| Klipfontein Solar PV | 100 |
| Leliehoek Solar PV | 100 |
| Meeding Solar PV | 100 |
| Boschrand 1 Solar PV | 75 |
| Boschrand 2 Solar PV | 75 |
| Eksteen Solar PV | 75 |
| Klipfontein 1 Solar PV | 75 |
| Klipfontein 2 Solar PV | 75 |
| Sonoblomo Solar PV | 75 |

The projects will utilise PV or CPV technology and fixed or tracking PV mounting systems to generate electricity. 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, Fixed Axis Tracking PV or Dual Axis Tracking PV.

- **Building infrastructure**
 - Offices;
 - Operational control centre;
 - Warehouse/workshop;
 - Ablution facilities;
 - Converter station;
 - Battery Facility; and
 - On-site substation and substation building.

Associated infrastructure

- Transmission and distribution lines;
- Access roads
- Internal gravel roads;
- Fencing;
- Operation and Maintenance Area;
- Laydown Area;
- Stormwater channels; and
- Water pipelines.

3.2.1. Solar field

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

- **Solar Arrays**

The total footprint of each solar facility is estimated to be approximately 300 - 400 ha (based on land required for optimal efficiency). This will include the development of the solar field, the structures of the solar arrays and foundations and building infrastructure. The exact number of solar panels arrays, confirmation of the foundation type and detailed design will follow as the development progresses. The maximum height of the solar panels is approximately 15 m.

- **Photovoltaic (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 3.4).

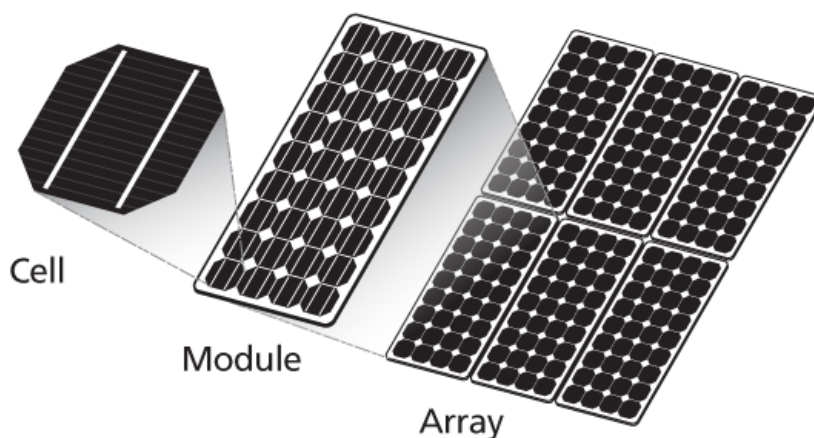


Figure 3.4: Components of the PV installation (Source: SamlexSolar, 2014)

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. The arrays and racks will be anchored into the ground through either concrete foundations or screw or pile foundations (Figure 3.5a). This system may be fixed or may track the movement of the sun.

- **Concentrated Photovoltaic (CPV)**

The basic makeup of a CPV facility is the same as described above for PV. The fundamental difference is the use of optics to focus the light onto the PV cells and a smaller development area is required to achieve the same energy output (Figure 3.5b).

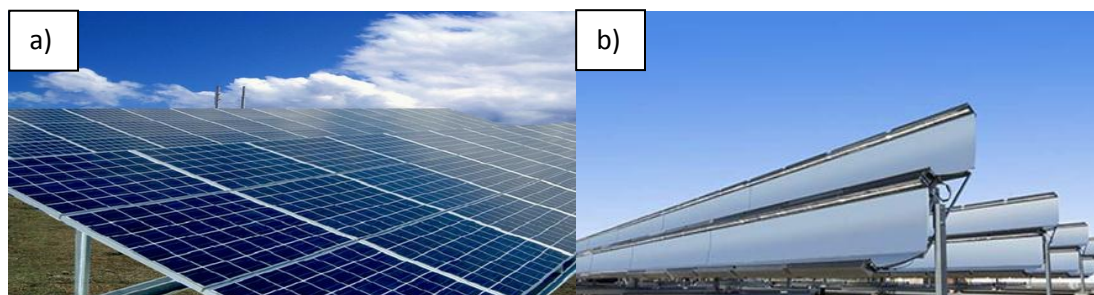


Figure 3.5: Solar a) PV technology; and b) CPV technology.

- **Building infrastructure**

The solar field will require on-site buildings, including an operational and maintenance control centre, an office, warehouse/workshop for spare parts and maintenance equipment, ablution facilities, converter station, on-site substation and substation building and security enclosures. Ablution facilities will be incorporated into the office structure. The buildings will likely be of single storey design, with the largest building (the warehouse/workshop) unlikely to exceed 5 m in height and 50 x 50 m plan dimensions. A security service will be required to guard the main facility and support infrastructure and therefore a guard cabin will also be constructed. The buildings are required to support the functioning of the facility and provide services to personnel that will operate and maintain the facility.

A Battery Facility may be constructed, if it is deemed economically feasible to do so, for each solar facility adjacent to the on-site or collector substation or office building. Currently, the battery technologies being considered are either Lithium-ion Iron-Phosphate Battery or Lead-acid battery system (Solid state batteries). Typically, these battery units have a size of 500 kW/ 500 kWh which means that in order to store energy from a 75 MW facility, 600 of these battery units will need to be installed on site. The total area required for this type of battery is approximately 15 ha. If correctly installed, these facilities do not pose a fire, environmental, release of toxic gas or explosion risk. It should be noted that various energy storage technologies, not just the technology mentioned above, will be considered as the project develops and the various options will be assessed during the EIA phase. Therefore, the development footprint and specifications provided above are only indicative at this stage.

The building infrastructure for both technology types will be the same. Detailed design will follow as the development progresses.

3.2.2. Associated infrastructure

- **Electrical infrastructure (transmission and distribution lines)**

The construction of the supporting electrical infrastructure is part of the co-ordinated EIA process for the Kentani Solar Development. Therefore, activities relating to the construction of electricity infrastructure were included in each of the 12 EA applications.

All the arrays from a project will be wired to a converter station where the Direct Current (DC) will be converted into Alternate Current (AC). The converter station will be connected via medium voltage 33 kV underground cables to one of the following (Figure 3.6):

- Option 1:** A northern or southern collector substation where the voltage will be stepped up and power produced transmitted via a 275/400 kV overhead transmission line into the national grid system via the existing Perseus or Beta substation.
- Option 2:** An on-site substation (one per project) where the voltage will be stepped up and power produced transmitted via a 132 kV overhead or underground transmission line to a northern/southern collector substation from where the voltage will be increased and transmitted into the national grid system via a 275/400 kV overhead line via the existing Perseus or Beta substation.

The connectivity options of the 12 sites to the grid are:

1. Three northern sites connect to the Perseus substation and nine sites connect to the Beta substation; or
2. Six most northern sites connect to the Perseus substation and six southern sites connect to the Beta substation; or
3. Nine northern sites connect to the Perseus substation and three sites connect to the Beta substation.

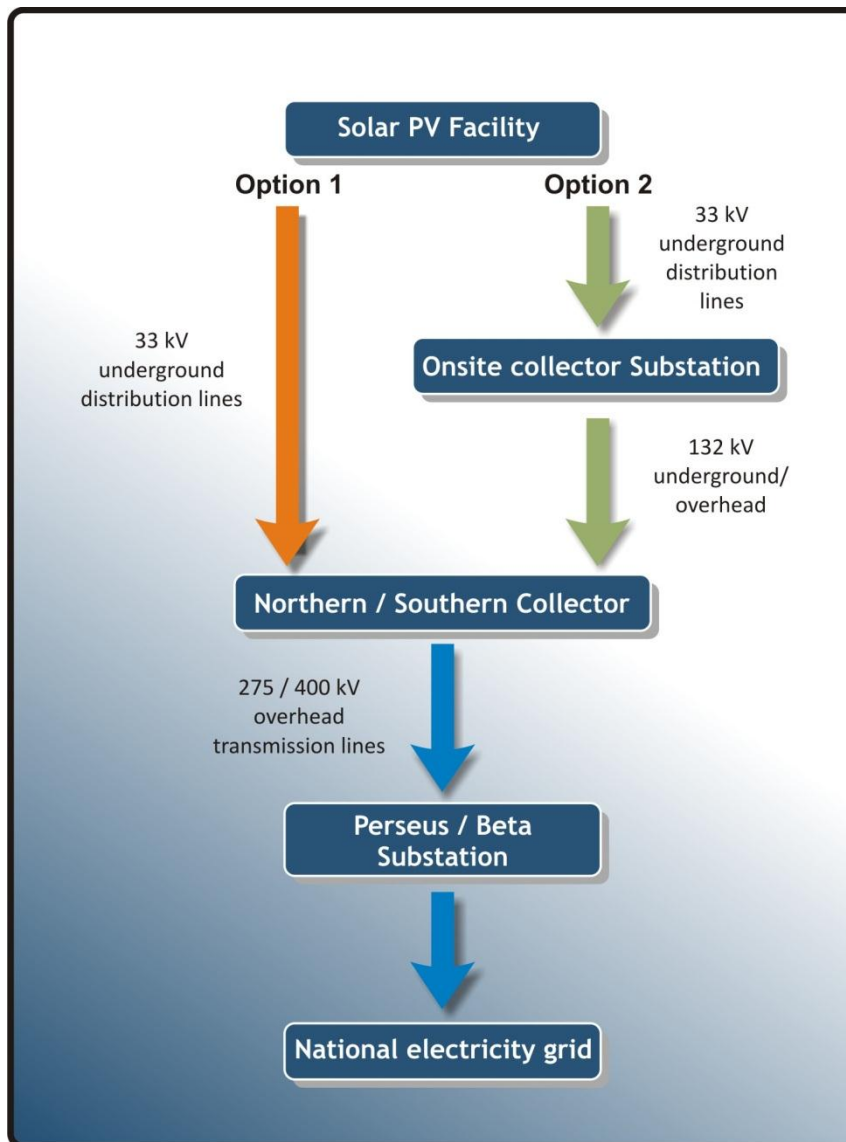


Figure 3.6: Connectivity options for the Kentani Solar Development to the national grid.

The proposed on-site substation will have a maximum footprint of 100 X 100 m and will extend approximately 15 m in height; whilst the proposed northern and southern collector substations will have a maximum footprint of 500 X 500 m with a height of approximately 22 m (including associated power lines at the substation). An electrical infrastructure corridor of approximately 1 km wide will be assessed for the proposed transmission line and collector substations to ensure that the lines and placement of collector substations avoid no-go areas that could potentially be present within the corridor.

- **Roads**

The main access roads will be the R 64, S 322 and the unnamed road between Dealesville to Petrusburg. The R64 extends from Kimberley, which is the most western point of the road, to Bloemfontein in the east. This National Road is designed for minimum daily traffic exceeding 1000 vehicle units. The S 322 is a gravel road between Dealesville and Bultfontein. Existing farm roads will be used to access the site and internal roads will be constructed to each facility. The width of the internal access roads will be 8 - 10 m, whilst the length will be confirmed as the location, design and layout of the facility progresses.

- **Fencing**

For various reasons (security, public protection and lawful requirements), the facility will be secured by enclosing it with security fencing approximately 3 m high. Access points will be managed and monitored by a full time security company. The actual choice of fencing is yet to be determined, but it may be a fully electrified option. The fencing infrastructure for both technology types will be the same. Detailed design will follow as the development progresses.

- **Operation and Maintenance Area**

An Operation and Maintenance (O&M) Area with a maximum footprint of 100 m X 120 m will be present adjacent to or on site. The O&M area will include, inter alia, the operational control centre, ablution facilities and offices.

- **Laydown Area**

The laydown will be 120 X 120 m in extent and will include, inter alia, the warehouse or workshop and temporary work area during the construction phase.

- **Stormwater channels and water pipelines**

Stormwater channels (culverts) will be constructed along the internal access roads to manage stormwater run-off. The size and extent of these culverts will be determined during the EIA phase.

Water pipelines may need to be constructed to transfer water from Dealesville to the proposed solar facilities. The need for these water pipelines and the length thereof will be determined during the EIA phase.

3.3. Water requirements

The water requirements for the construction and operational phase of each of the 12 Kentani Solar PV or CPV developments are indicated in Table 3.4. Water will be sourced from the local municipality, if possible. This will be discussed with the local municipality and written consent will be sought. Other water sources that could be considered include groundwater abstraction. The accumulation of dust on the panels will affect the productivity of the proposed solar facilities, and as a result, the panels require regular cleaning. It is estimated that cleaning will need to take place quarterly; however this regime will be revised should site conditions prove to make this need more onerous. The high level estimate of water required by each facility during the construction phase is approximately 7200 m³ per year and during the operational phase is approximately 2700 m³ per year (Table 3.4).

Table 3.4: Water requirements for the construction and operation of each solar facility forming part of the Kentani Solar PV development (high level estimate per 75 MW project).

| Activity | Annual Quantity (m ³) | Duration (Years) | Total Quantity (m ³) |
|---------------------------------------|-----------------------------------|------------------|----------------------------------|
| Construction Phase (1.5 – 2 years) | 7 200 | 2 | 14 400 |
| Operation Phase (20 years) | 2 700 | 20 | 54 000 |

3.4. Socio-economic: Employment opportunities

Employment opportunities will be created during the construction period for each of the 12 projects. It is not expected that the projects will be undertaken simultaneously, therefore it is envisioned that there will be a steady flow of job opportunities created by the proposed Kentani Solar Development. Employment opportunities will be sourced from the local community where possible.

3.5. Need and Desirability of the project

According to the Western Cape DEA&DP Guideline on Need and Desirability (2010)⁴, the essential aim of investigating the need and desirability of a proposed project revolves around determining:

- Suitability, i.e. is the activity proposed in the right location for the suggested land-use/activity and
- Timing, i.e. is it the right time to develop a given activity?

DEA&DP describes need and desirability as components of the “wise use of land”, where need refers to time, and desirability to place. In other words, need and desirability answer the question of whether the activity is being proposed at the right time and in the right place. DEA&DP’s Guideline on Need and Desirability (2010) provides guidance with a series of questions.

The need and desirability of the proposed solar energy facility is determined in the table below by answering each of the 14 questions (Table 3.5). In each instance the questions is stated first, followed by an answer and a justification for the answer.

⁴ DEA&DP (2010) Guideline on Need and Desirability, EIA Guideline and Information Document Series. Western Cape Department of Environmental Affairs and Development Planning (DEA&DP).

Table 3.5: Need and Desirability of the Kentani Solar Development.

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).

Answer: Yes

Justification: The Free State Province Provincial Growth and Development Plan (PGDP) 2005-2015⁵ states that an opportunity exists to utilise alternative energies more widely and lessen the dependence on wood and paraffin. This opportunity has been identified because of the fact that not all people within the municipal area have access to electricity. Even though these solar facilities will not provide the municipality directly with electricity, the energy produced by the facilities will feed into the national grid. The Tokologo Local Municipality contributes only approximately 1.5% to the electricity economy of the Lejweleputswa District Municipality, which consists of the Tokologo, Tswelopele, Nala, Matjhabeng, and Masilonyana Local Municipalities⁶. In addition, due to the fact that the proposed Kentani Solar Development falls within one of the eight Focus Areas, should the REDZs be approved by Cabinet, Eskom will have a better idea where to focus grid development and electrical infrastructure upgrades. 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 evacuate electricity generated 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.

One of the mayor problems identified within the Free State Province and the Lejweleputswa District Municipality is the low levels of skilled people as well as high levels of poverty and unemployment. Strategies to be undertaken, as per the PGDP, are the development of Skills Development Programmes and capacity building of the youth. The proposed facility will create job opportunities during the construction and operational phases of the project.

Therefore, the proposed solar energy facilities 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.

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?

Answer: Yes

Justification: As stated above, there is a great need in the area for electricity and grid upgrades. In addition to this, as discussed in Section 3.1 of this chapter, the Free State has a very high solar resource availability which provides the province with an opportunity for Solar Renewable projects to be constructed and operate in the area. The need for job opportunities and electricity necessitates that these types of projects be undertaken in the area. The land use of the site is currently for agricultural purposes. Should this project proceed, only 25 - 38 % of the total 9449 ha of the proposed 15 land portions will be developed and it is therefore not expected that this will significantly threaten the agricultural activities present on site.

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 target of 10 000 GWh of Renewable Energy. At a national level, the DoE has set the target of having 17 800 MW from

⁵ Free State Province (2005) Provincial Growth and Development Strategy (PGDS) 2005 - 2014. South Africa.

⁶ Lejweleputswa District Municipality (2012) Integrated Development Plan (IDP) 2012 - 2017. South Africa.

Renewable Energy sources contributing to the national grid by 2030 to ensure the continued uninterrupted supply of electricity. As discussed in Chapter 1 of this report it is Mainstream's intention to submit some of the projects for the IPP and these projects can therefore contribute to the IPP goals and feed into the national grid, which results in this project having national importance.

At a more localised level, the Free State PGDP states that an opportunity exists to utilise alternative energies more widely and lessen the dependence on wood and paraffin. This opportunity has been identified because of the fact that not all people within the municipal area have access to electricity. Even though these solar facilities will not provide the municipality directly with electricity, the energy produced by the facilities 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: Existing roads and the Perseus and Beta Substations will be used by the proponent for the proposed project and, where necessary, supporting infrastructure will be constructed.

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 activity would be provided and maintained by the Applicant. The activity is furthermore proposed on agricultural land with little or no existing and/or planned infrastructure. The opportunity cost of constructing the proposed solar energy facilities might increase the viability of agricultural productivity due to financial advantage of having a solar facilities on agricultural property (farmers will receive payments for lease of the property per quarter or year). The opportunity cost of not constructing the proposed facilities would be the maintenance of the current status quo, which is marginal agriculture.

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.

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

Answer: To be confirmed

Justification: It would be premature to decide on the environmental practicability of the proposed development prior to the completion of the impact assessment phase of this EIA process.

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 go against any of the objectives set within the Free State Growth and Development Strategies (GDPs) and Integrated Development Plans (IDPs) for the Lejweleputswa District Municipality and Tokologo Local Municipality⁷. The proposed project will also be in line with/supportive of the GDSs and IDPs objectives of creating more job opportunities. The proposed solar energy facilities will assist in local job creation during the construction and operational phases of the project (if approved by the DEA). It should however be noted that employment during construction phase will be temporary. During the operational phase of the project (estimated to be 20 years), long-term employment opportunities will be created. Since the construction of the projects will not commence simultaneously, it is expected that there will

⁷ Tokologo Local Municipality (2010) Integrated Development Plan (IDP) 2010 / 2011. South Africa.

be a steady flow of job opportunities.

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: To be confirmed

Justification: The proposed development will require mitigation of potential negative environmental impacts during the construction phase of the project (once-off) rather than active environmental management. An Environmental Management Programme (EMPr) will be developed for each project to ensure that all impacts identified are suitably managed and mitigated.

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 in Section 3.1 above, 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 agricultural land. Although the solar facilities proposed on the property are deemed a commercial land-use and not for agricultural purposes, only 25 - 38 % of the total 9449 ha for the proposed 16 land portions will be developed. The visual impact will be assessed in the Visual Impact Assessment undertaken as part of the EIA phase of this project.

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: Largely neutral in terms of natural sensitivity and potentially negative in terms of cultural areas.

Justification: The EIA process will confirm the impact that these projects will have on the natural environment and cultural environment.

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: To be determined during the EIA phase

Justification: During construction of the proposed solar facility short duration noise and dust emissions might occur due to the transport of construction material and workers to/from the site. During the operational phase, the proposed solar facilities would not generate any noise, odours, emissions or significant fire risks. The socio-economic benefits likely to result from the development of the solar energy facilities (e.g. creation of jobs and regional economic development) would outweigh the issues previously mentioned. Because of the rural location of the facilities, the visual intrusion is expected to be low-medium. The visual impact will be assessed in the Visual Impact Assessment undertaken as part of the EIA phase of this project.

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.

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

Answer: Uncertain

Justification: The potential cumulative impacts associated with the project (i.e. construction of 12 solar facilities) can only be objectively determined at the end of the EIA process. However, these will be assessed as part of the EIA for this project.

Draft Scoping Report for the proposed
construction of Kentani Solar Development
consisting of twelve solar PV or CPV facilities,
Dealesville, Free State

Chapter 4:

Approach to the assessment of alternatives



DRAFT SCOPING REPORT



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4. APPROACH TO THE ASSESSMENT OF ALTERNATIVES



This chapter discusses the alternatives that will be considered as part of the EIA. These alternatives are applicable to all 12 solar facilities. NEMA requires that alternatives to a proposed activity must be considered (NEMA, Section 24). Alternatives are different means of meeting the general purpose and need of a proposed activity. This may include the assessment of site alternatives, activity alternatives, process or technology alternatives, temporal alternatives and/or the no-go alternative. Section 28 (1) (c) of the EIA regulations stipulates that the alternatives introduced in the scoping report must be *feasible and reasonable*. I&APs must also be provided with an opportunity to give inputs into the process of formulating alternatives.

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.

4.1. Assessment of alternatives

4.1.1. No-go alternative

The no-go alternative assumes that the proposed project does not go ahead i.e. it is the option of not constructing the proposed 12 solar facilities. 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 to and will be considered throughout the report. The implications of the “no project” alternative are that:

- The land-use remains only agricultural. No benefits are derived from the implementation of an alternative/additional land-use;
- There is no change to the current landscape. The existing landscape will remain as is;
- There is no development of solar PV energy facilities at the proposed location;
- No additional power will be generated or supplied through means of renewable energy resources by this project at this location. This would have implications on assisting the South African government achieve its proposed renewable energy target;
- Additional power to the local grid will need to be provided via the Eskom grid, with approximately 90% coal-based power generation with associated high levels of CO₂ emissions and water consumption;
- Electricity generation remains constant and the local economy is not diversified;
- Local communities will continue their dependence on agriculture production and the local municipality’s vulnerability to economic downturns increases;

- There is no opportunity for additional employment (albeit temporary) in an area where job creation is identified as a key priority; 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.

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 Section 1.4 of Chapter 1 of this Draft Scoping Report, the purpose of the proposed Kentani Solar Development 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 the development of renewable energy resources in the country and contribution to the increase of energy security, employment creation, local economic development etc.

Hence, while the ‘no-go’ alternative will not result in any negative environmental impacts; it will 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 currently not the preferred alternative.

4.1.2. Land-use alternatives

4.1.2.1. Agriculture

At present the proposed site is zoned for agricultural land-use, and is mainly used for livestock grazing and cultivation (low growing crops). The area investigated during the EIA process for the proposed development is defined as a non-arable and low potential grazing land. Hence, agricultural land use is not a preferred alternative. A detailed Soil and Agricultural Potential specialist study will be conducted during the EIA process in order to assess the potential impacts of the proposed development on soils and agricultural potential for both environmental and economic aspects.

4.1.2.2. Renewable energy facilities

A reasonable and feasible land-use alternative for the proposed project site is the implementation of alternative renewable energy facilities other than the proposed solar PV energy facilities. Possible alternative renewable energy sources include Biomass, Hydro Energy and Wind.

- **Biomass Energy**

According to the South African Renewable Energy Resource Database (SARERD) the project site is identified as having a Biomass Energy Potential of 1 - 50 GJ/ha/yr (see Figure 4.1). The implementation of a Biomass Facility may be feasible, however given the high solar resource availability of this area, solar energy is still deemed to be the preferable renewable energy to be used on site.

- **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 sites as ‘Not Suitable’ (Figure 4.2). The implementation of a Hydro Energy Facility is therefore also considered to be an unfeasible and unreasonable alternative to the implementation of the proposed 12 solar PV energy facilities.

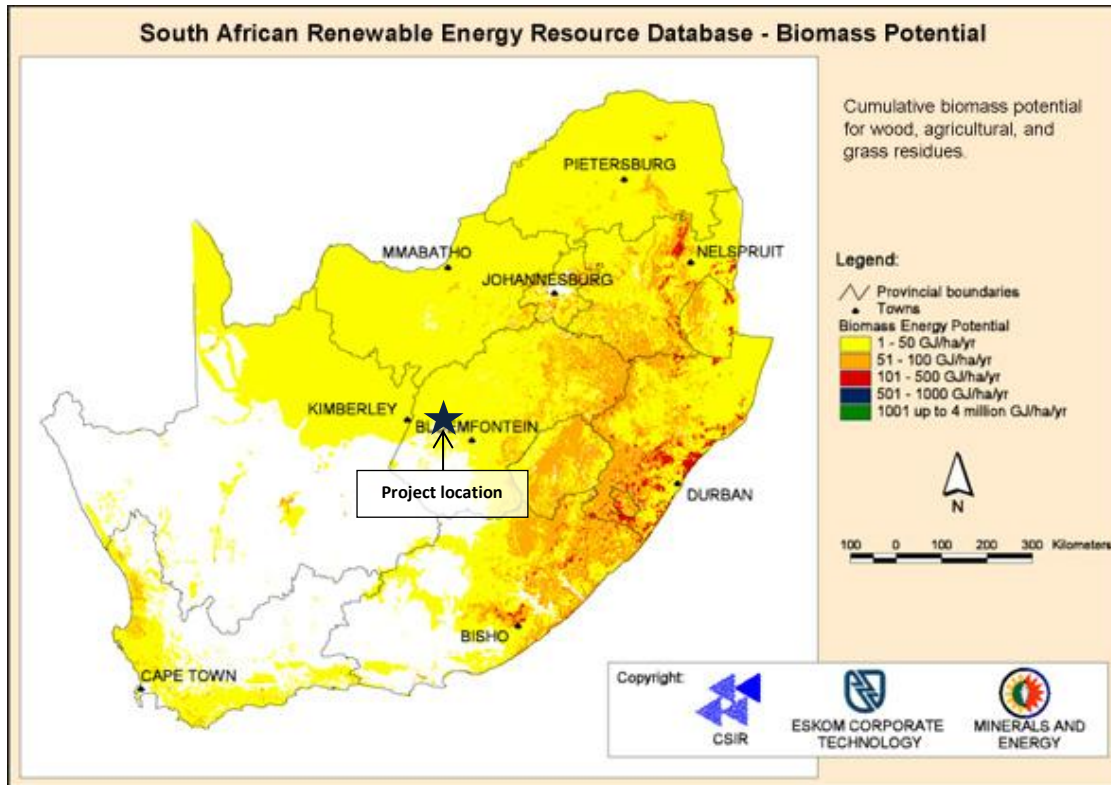


Figure 4.1: Biomass Potential (Source: SARERD).

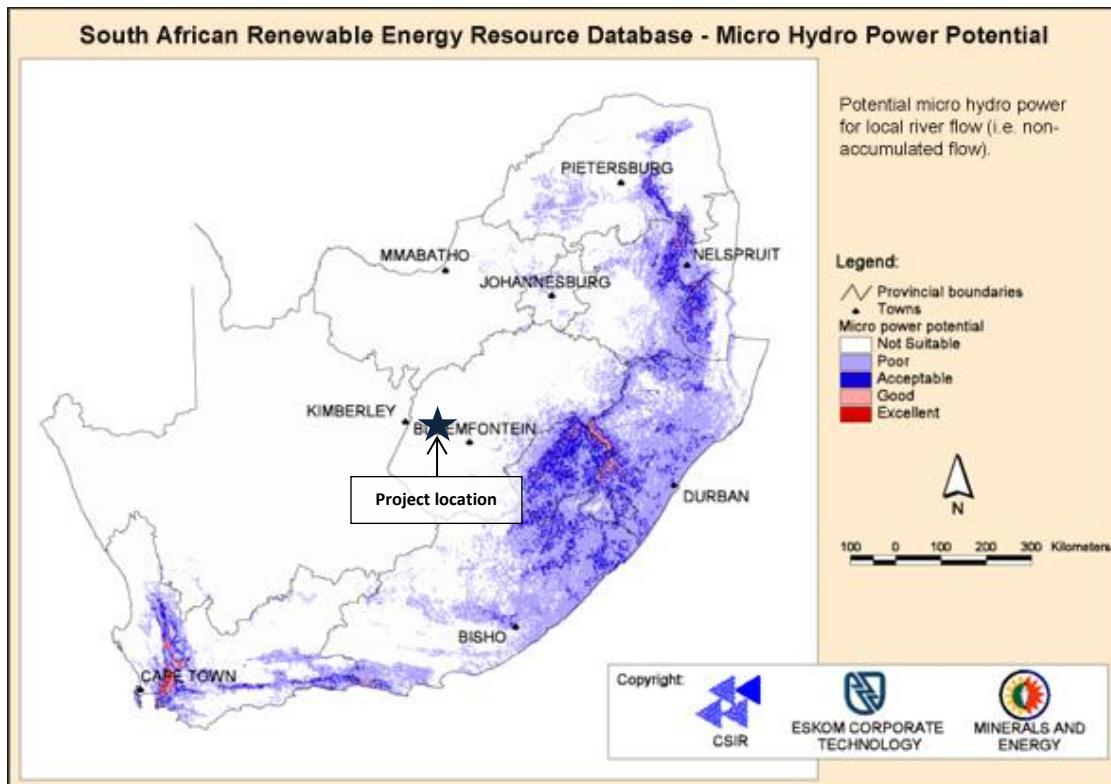


Figure 4.2: Micro Hydro Power Potential (Source: SARERD).

- **Wind energy**

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 (Figure 4.3).

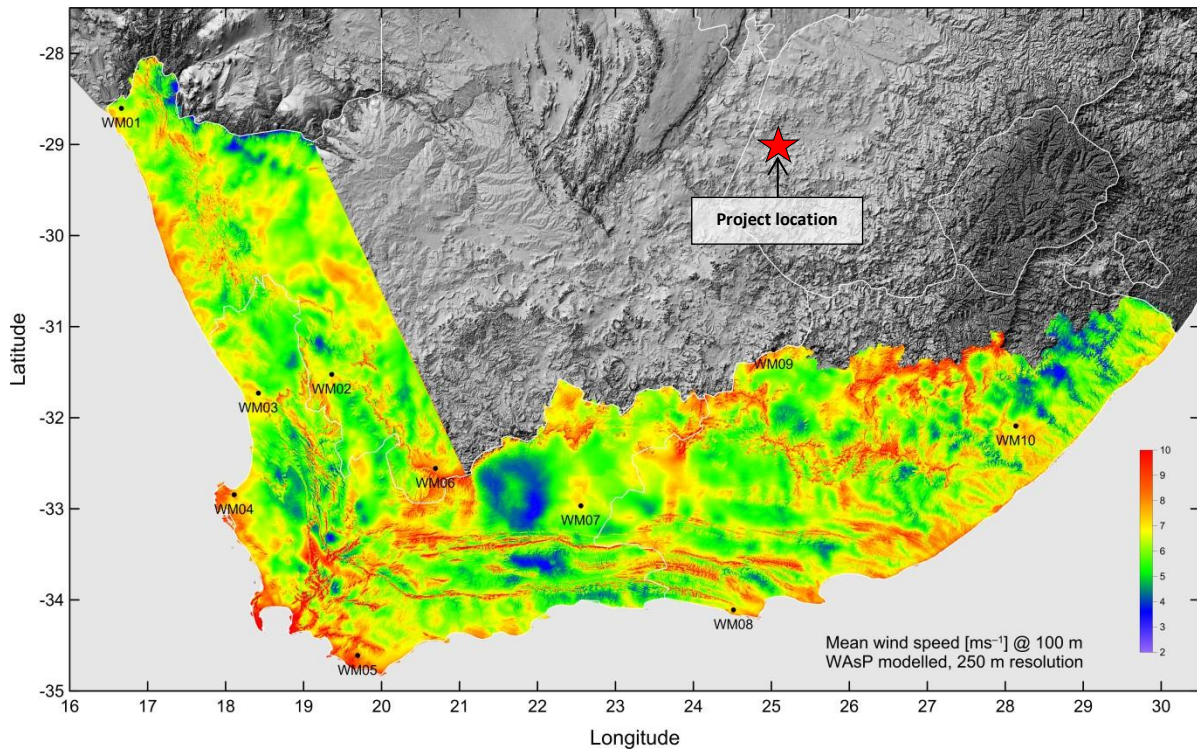


Figure 4.3: Representation of Mean Wind Speed (ms^{-1} at 100 m) (Source: WASA, 2014).

The implementation of a solar energy facility at the proposed project site is therefore 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. Due to the fact that there is a limited area of land available for development, the implementation of a wind energy facility would not make optimum use of that land which is available;
- The total development area required for the implementation of a wind energy project is much higher than that required with a solar energy facility; and
- The proposed solar facility currently falls within the Focus Area 5 demarcated area which means that the proposed facility is in line with the criteria of the DEA SEA in identifying this area as being of strategic importance for Solar PV development (as discussed in Section 3.1.1.2 of this Draft Scoping Report).

Therefore, in terms of project and location compatibility, solar energy is considered to be the most feasible renewable energy land use alternative. Alternative renewable energy technologies will therefore not be considered further in the EIA phase.

4.1.3. Location and site alternatives

4.1.3.1. Solar facilities

As discussed in Section 3.1 of this Draft Scoping Report, the locations and site placements of the projects were selected based on a national level considerations and site specific criteria. National level considerations included the high solar radiation of the Free State and the fact that the proposed site falls within Focus Area 5 as determined during the SEA for the efficient roll-out of Wind and Solar PV in South Africa. On a site specific (local level), these sites were deemed suitable due to the fact that the site selection factors such as land availability, distance to grid, topography, and current land use were all favourable. Buildable areas on these land portions were determined by various setback criteria to ensure that the proposed facilities do not encroach on certain features, including 275 kV transmission lines, restrictive land-use (such as mining), wetlands, roads etc.

Given the location and site selection requirements associated with solar energy facilities and the suitability of the land available on the 15 land portions (see Section 3.1) no other location alternatives for the solar facilities will be considered in the EIA phase.

4.1.3.2. Northern and southern collector substations

As discussed in Chapter 1 and 3 of the Draft Scoping Report, it is proposed that a northern and southern collector substations be constructed to transmit power produced by the solar facilities via 275/400 kV overhead lines to either Perseus or Beta substation. For each of the two collector substations, two alternatives locations are being considered. The indicative locations are shown in the figure below (Figure 4.4). The locations were determined based on the current indicative routing of the distribution and transmission lines and the solar facilities that could potentially connect to the collector substations. The preferred and final site locations of the collector substations will be determined by, inter alia, the environmental conditions on the sites and the preferred distribution and transmission line routing. Therefore, the localities for the northern and southern collector substations will be assessed during the EIA phase.

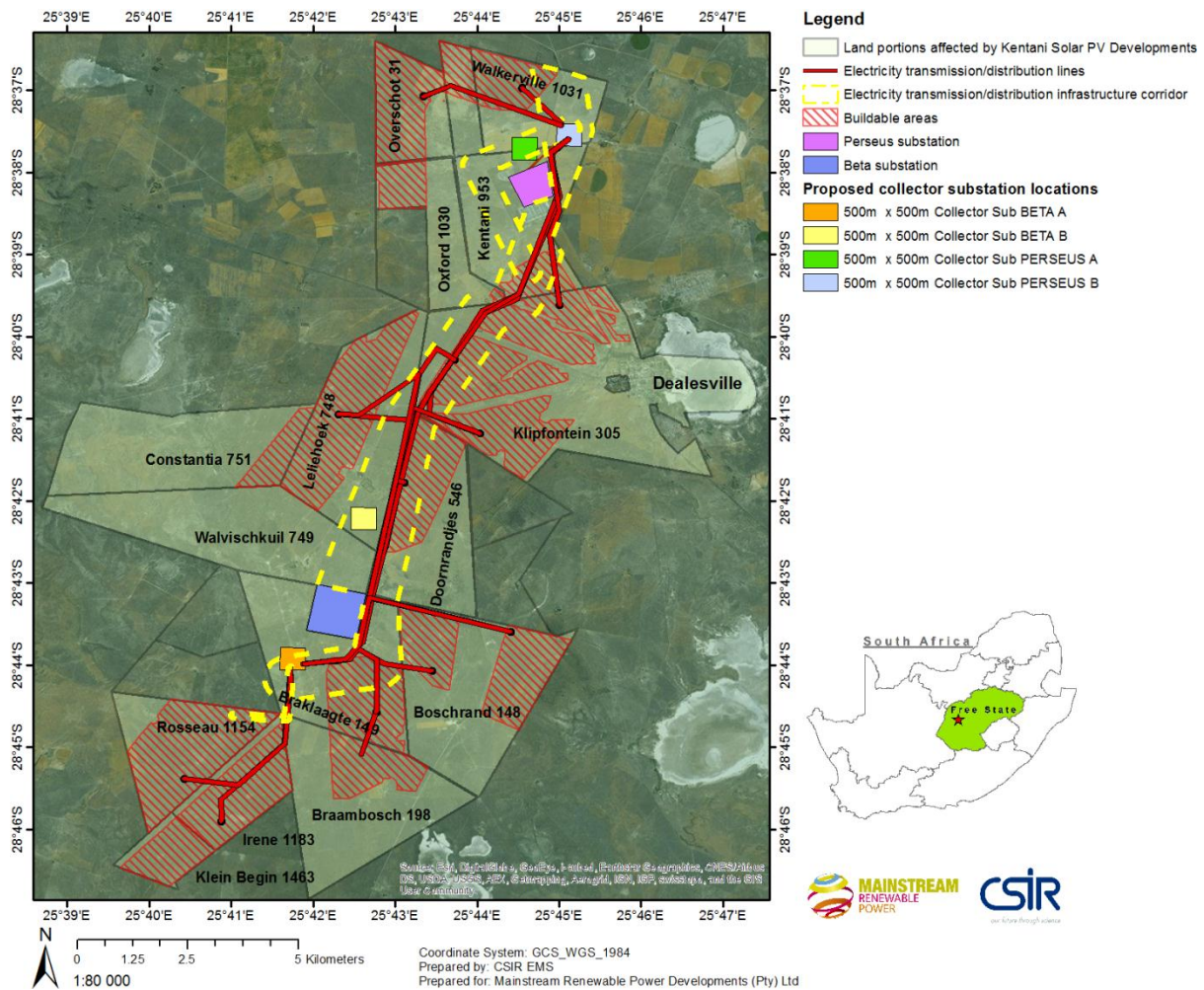


Figure 4.4. Electricity transmission/distribution infrastructure and collector substation site alternatives.

4.1.4. Technology alternatives

4.1.4.1. Solar panel types

Only two technologies will be considered during the EIA phase, i.e. conventional PV and CPV technologies. Due to the larger volume of water required for CSP compared to PV or CPV and the fact that 12 solar energy projects are proposed as part of the Kentani Solar Development, this technology will not be considered during the EIA phase.

As discussed in Section 3.1.1 of Chapter 3, both these technologies are very similar with the fundamental difference being that with CPV, optics are used to focus the light onto the PV cells and a smaller development area is required to achieve the same energy output. The environmental constraints determined within each buildable area, the size of the buildable area and proposed generation capacity of each facility will determine the preferred technology. These factors will inform the detailed design of the solar facilities.

4.1.4.2. *Mounting system*

Solar panels can be mounted in various ways to ensure maximum exposure of the PV panels to sunlight. The two main mounting systems are:

- Single axis tracking PV systems; and
- Fixed axis tracking PV systems.

In a fixed axis tracking system the panels cannot move, whereas in a tracking system the panels follow the sun to ensure maximum exposure to sunlight. Both the mounting systems will be considered during the EIA phase to inform the detailed design of the solar facility.

4.1.4.3. *Battery facility*

As indicated in Section 3.2.1 of the Draft Scoping Report, it is proposed that Solid State Batteries such as, Lithium-ion Iron-Phosphate Battery or Lead-acid Battery systems, be constructed and used on site. Alternative battery facility options that could potentially be utilised on site include Flywheels, Thermal Batteries or Flow Batteries. During the EIA phase, a battery technology alternative assessment will be undertaken to determine what technology is the best practicable and environmental option and best suited for the project.

4.1.5. *Layout alternatives*

A number of layout alternatives will be identified within the proposed project sites. The findings of the specialist studies will be used to inform the site layout and to ensure that those layouts with the least negative environmental impacts and that are financially practical are selected.

4.1.6. *Connectivity alternatives*

As discussed in Section 3.2.2 of Chapter 3 of the Draft Scoping Report, two routing options are being considered by Mainstream to transmit the power produced by the solar facilities to the Perseus or Beta substations. An electrical infrastructure corridor of 1 km wide will be assessed to ensure that the lines and placement of collector substations avoid environmental sensitive or no-go areas that could potentially be present within the corridor. The connectivity options to the Eskom substations are discussed below and will be considered and assessed during the EIA phase:

Option 1: Each solar facility's converter station connects to a northern or southern collector substation where the voltage will be stepped up and power produced transmitted via a 275/400 kV overhead transmission line into the national grid system via the existing Perseus or Beta substation.

Option 2: Each solar facility's converter station connects to an on-site substation (one per project) where the voltage will be stepped up and power produced transmitted via a 132 kV overhead or underground transmission line to a northern/southern collector substation from where the voltage will be increased and transmitted into the national grid system via a 275/400 kV overhead line via the existing Perseus or Beta substation.

The connectivity options of the 12 sites to the grid are:

1. Three northern sites connect to the Perseus substation and nine sites connect to the Beta substation; or
2. Six most northern sites connect to the Perseus substation and six southern sites connect to the Beta substation; or
3. Nine northern sites connect to the Perseus substation and three sites connect to the Beta substation.

Draft Scoping Report for the proposed
construction of Kentani Solar Development
consisting of twelve solar PV or CPV facilities,
Dealesville, Free State

Chapter 5:

Description of the Affected Environment



DRAFT SCOPING REPORT



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5. DESCRIPTION OF THE AFFECTED ENVIRONMENT



This chapter of the Draft Scoping Report provides a description of the biophysical, heritage and socio-economic environment that may be affected by the proposed Kentani Solar Development located in the vicinity of Dealesville in the Free State Province. This information is provided to identify the potential issues and impacts of the proposed project on the environment. The information presented here has been sourced from:

- Scoping inputs 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
- Tokologo Local Municipality and Lejweleputswa District Municipality IDPs, as well as the Free State Province Provincial Growth and Development Strategy (PGDS).

Please note: This chapter will provide an overview of the affected environment but will not provide an actual impact assessment. A detailed impact assessment including individual specialist assessments focused on significant environmental impacts will be provided during the impact assessment phase.

5.1. Background

Figure 5.1 represents the regional setting of the proposed Kentani Solar Development in terms of the surrounding ecosystem features in proximity to the sites and includes all geographic information system (GIS) information required by the DEA for EIAs for proposed solar energy facilities. There are no Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the area proposed for the 12 Kentani Solar Development. However, some National Freshwater Ecosystem Priority Area (FEPA) wetlands and wetland clusters do exist on the site. Furthermore, the 7 projects in the north (Kentani PV, Sonoblomo PV, the Klipfontein PV projects, Leliehoek PV and Eksteen PV) fall within the Vaal-Vet Sandy Grassland vegetation type, which is considered to be an endangered ecosystem (Figure 5.1). The extent of the vegetation and the presence of FEPA wetlands will be confirmed and assessed by the Ecological Specialist.

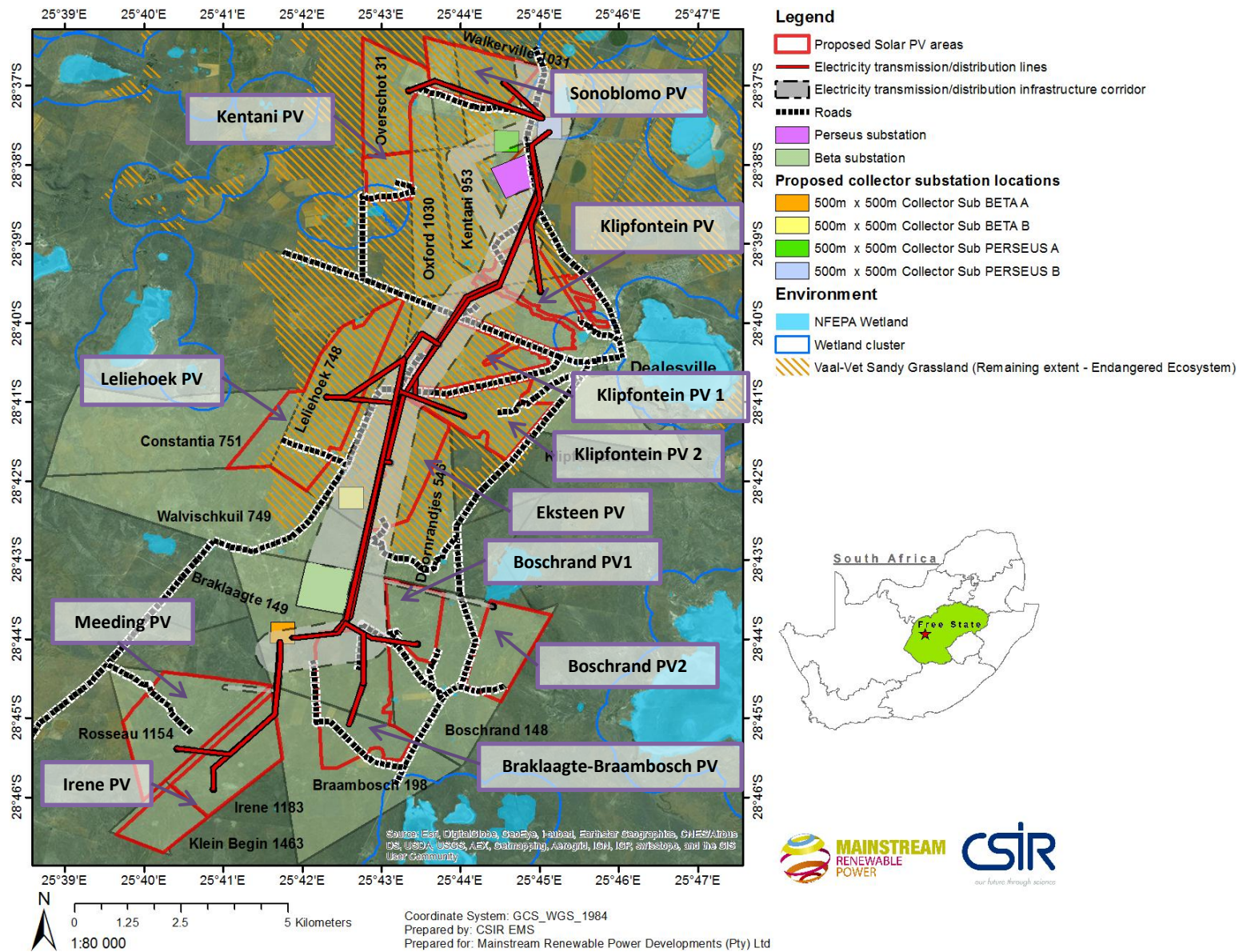


Figure 5.1: Regional map indicating the ecological features present in the vicinity of the project sites.

5.2. Biophysical environment

5.2.1. Climatic conditions

The mean annual rainfall of South Africa is shown in Figure 5.2 below. The climate of the Free State is warm-temperate with a summer rainfall regime. Severe frost may occur in winter. Average rainfall of the area varies from 400 - 600 millimetres (mm) per year. Climate conditions are extreme; very cold in winter and very hot in summer.

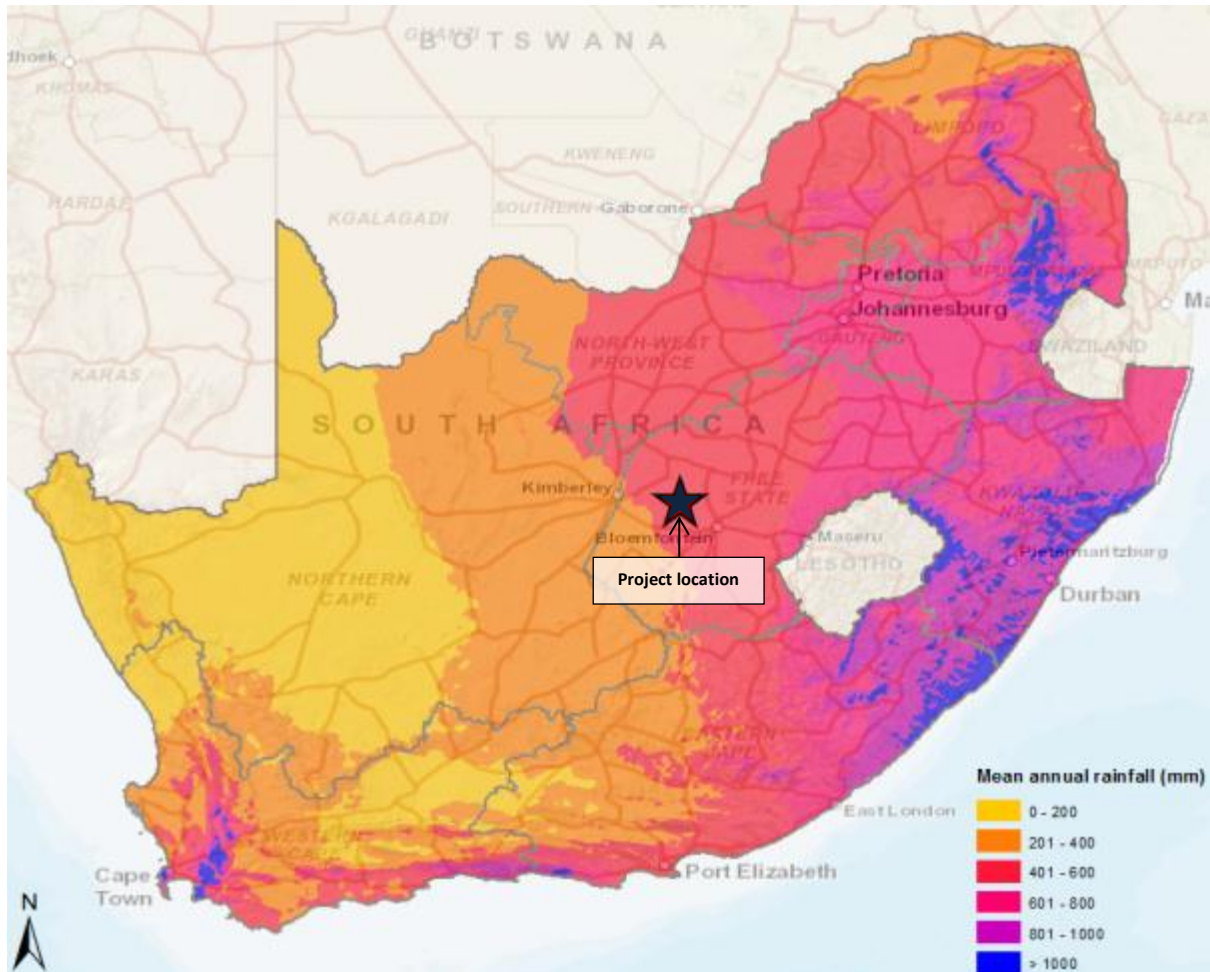


Figure 5.2: Mean annual rainfall (mm) of South Africa (Source: Southern African Geo-Reference Information System, 2007).

The Dealesville area (in which the proposed projects fall) has rainfall levels of 438 mm per annum, with a standard deviation of 112 mm, according to the South African Rain Atlas (Water Research Commission, undated)¹. The average monthly distribution of rainfall is shown in Table 5.1.

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

Table 5.1: Mean monthly rainfall (mm) for the proposed project area near Dealesville in (Water Research Commission, undated).

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Tot |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------------|
| 66 | 68 | 70 | 41 | 17 | 6 | 5 | 8 | 19 | 36 | 46 | 56 | 438 |

Figure 5.3 shows the average monthly climatic chart for the Dealesville area². As shown in the figure, the highest temperatures are reached in the summer months (December to January) and the lowest in the winter months (June to August). The Mean Annual Temperature (MAT) of the area is 16.4 °C, with an mean annual maximum temperature of 31 - 33 °C and an mean annual minimum temperature of -1.9 - 0 °C³. Mean annual evaporation (2423 mm) in this area exceeds the mean annual rainfall (530 mm) (Figure 5.3)

The average daily solar radiation levels in South Africa range between 4.5 and 6.5 kilowatt-hour per square meter (kWh/m²). In South Africa the measured solar radiation is the highest in the Northern Cape, North West Province and the Free State. As discussed in Section 3.1 of this Draft Scoping Report and shown in Figure 3.1, the site was selected because of the high solar radiation levels of the area (2100 kWh/m² per annum, or 5.8 kWh/m² per day).

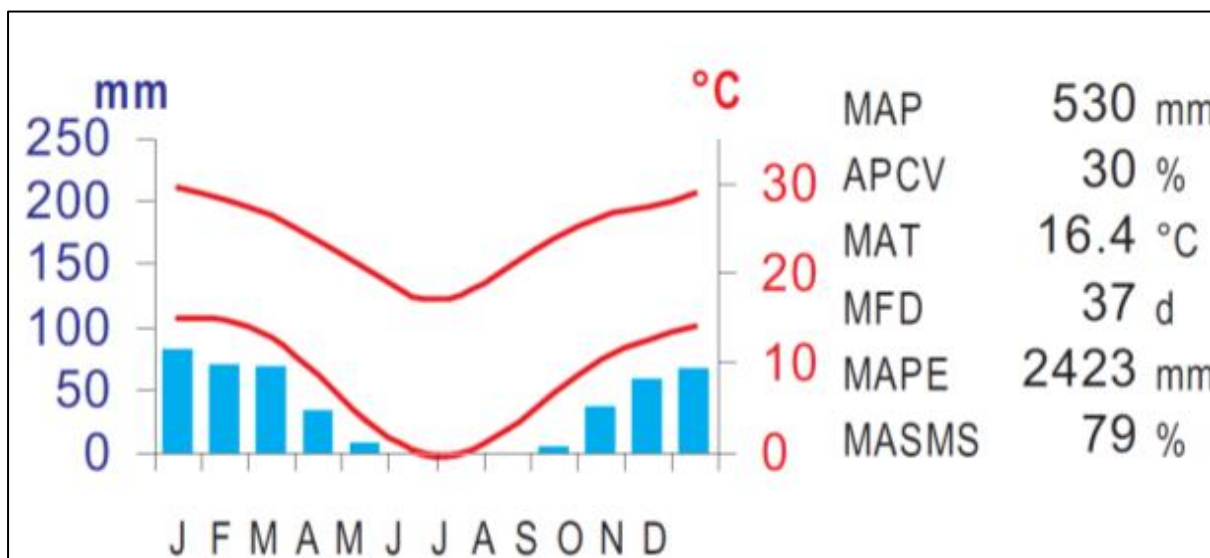


Figure 5.3: Climate chart for the Dealesville area showing the maximum and minimum temperatures (lines) and the average rainfall for every month (Source: Schulze, 1997).

[MAP = Mean Annual Precipitation (mm); APCV = Annual Precipitation Coefficient of Variation (%); MAT = Mean Annual Temperature (°C); MFD = Mean Frost Days (days); MAPE = Mean Annual Evaporation (mm); MASMS = Mean Annual Soil Moisture Stress (%)]

² Schulze, R.E (1997) South African Atlas of Agrohydrology and Climatology. Report TT82/96. Water Research Commission, Pretoria.

³ Agricultural Research Council - Institute for Soil, Climate and Water (ARC-ISCW)

One of the most important climate parameters for agriculture in the South African context is moisture availability, which is the ratio of rainfall relative to evapotranspiration. Moisture availability is classified into 6 categories across the country (Table 5.2). The proposed development site falls within class 5 which is described as a severe limitation to agriculture (Lanz, 2014)⁴.

Table 5.2: 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 |

5.2.2. Topography

The proposed development is located on a terrain unit of level plains with some relief at an altitude of between 1,250 and 1,310 meters. Slopes across the area are less than 1%. The topography of the study area is flat to gently undulating with occasional Karoo koppies (Figure 5.4 and Figure 5.5). Features that influence the topography of the region include the Modder River just south of the proposed development sites and a large number of endorheic pans in the surrounding landscape.

5.2.3. Geology and soil potential

The underlying geology is shale and mudstone of the Ecca Group covered by wind-blown sand and surface limestone. Dolerite intrusions occur within the study area.

The land type classification is a nationwide survey that groups areas of similar soil, terrain and climatic conditions into different land types. The proposed development is on two land types, Ae46 in the north and Db3 in the south. Ae46 comprises predominantly moderately deep to deep, sands to loamy sands of the Hutton soil form on underlying rock or hard-pan carbonate. These soils fall into the Calcic and Oxidic soil groups according to the classification of Fey (2010)⁵. Db3 comprises shallow to deep sandy clay loams of the Valsrivier and Swartland soil forms on underlying clay, and shallow loamy sands of the Mispah soil form on underlying hard-pan carbonate or rock. These soils fall into the Duplex, Calcic, and Lithic soil groups according to the classification of Fey (2010). A summary detailing soil data for the land type is provided in Table 5.3. The land has low to moderate water erosion hazard, mainly due to the low slope, but land type Ae46 is susceptible to wind erosion because of the sandy texture of the soil.

⁴ Sourced from: Scoping Phase Input for Agricultural and Soils Impact Assessment for the Proposed Mainstream Solar PV near Dealesville, Free State Province (Lanz, 2014)

⁵ Fey, M. 2010. Soils of South Africa. Cambridge University Press, Cape Town.

Table 5.3: Land type soil data for the site listing all soil series that occupy 3 or more percent of the land type.

| Land type | Land capability class | Soil series (forms) | Depth (cm) | Clay % A horizon | Clay % B horizon | Depth limiting layer | % of land type | |
|-----------|-----------------------|---------------------|------------|------------------|------------------|----------------------|----------------|--|
| Ae46 | 5 | Hutton | >120 | 4-12 | 6-15 | R, ca | 49 | |
| | | Hutton | 60-120 | 8-15 | 15-30 | R, ca | 23 | |
| | | Hutton | >120 | 2-4 | 3-6 | | 4 | |
| | | Mispah | 10-30 | 8-20 | | ca, R | 4 | |
| | | Shortlands | >120 | 10-20 | 25-40 | | 3 | |
| Db3 | 5 | Valsrivier | >120 | 25-35 | 40-60 | | 40 | |
| | | Swartland | 10-20 | 20-35 | 40-60 | so | 24 | |
| | | Mispah | 10-25 | 10-20 | | ca | 18 | |
| | | Mispah / Hutton / | | | | | | |
| | | Glenrosa | 10-30 | 10-20 | 10-30 | R, ca | 7 | |

Land capability classes: 5 = non-arable, moderate potential grazing land; Depth limiting layers: R = hard rock; so = partially weathered bedrock; ca = hardpan carbonate.



Figure 5.4: Topographic cross-section (grey line) from south to north [within 10 km (purple line)] of the proposed site.



Figure 5.5: Topographic cross-section from west to east (grey line) within 10 km of the proposed site (purple line).

5.2.4. Agricultural capability and sensitivity

Land capability is the combination of soil suitability and climate factors. The area has a land capability classification, on the 8 category scale, of Class 5 - non-arable, moderate potential grazing land. The limitations to agriculture are predominantly climatic low moisture availability with high variability of rainfall but also include soil depth. The potential maize yield on AGIS is low at 1.56 tons per hectare in the east and 1.35 in the west. The natural grazing capacity (2007 assessment) is 11-20 hectares per large stock unit (Lanz, 2014).

Current land use and development at the site

The farm is located within a grain farming agricultural region, but most of the development site has had no history of cultivation, probably due to soil limitations. Small parts of the site in the north have had some cultivation in the past (Lanz, 2014).

Agricultural sensitivity

Agricultural potential is likely to vary across the site. Those parts that have been cultivated are likely to be better and therefore to have higher agricultural sensitivity. In order to limit agricultural impacts the placement of the facilities should be sited off potentially arable land (Lanz, 2014).

5.2.5. Aquatic environment

The baseline information on the aquatic ecology of the study area has been compiled by Dr. Brain Colloty from Scherman Colloty & Associates⁶.

Two main stem rivers are found within these catchments (C52K & C52H) (Figure 5.6). They are the:

- Leeu River; and
- Modder River.

The proposed development area comprise of systems associated with rivers, streams and pan ecosystems. The latter systems are usually devoid of any trees with strict riparian affiliations due to the largely ephemeral nature of the pans within the region. However, the larger rivers systems, such as those listed above have a higher Mean Annual Runoff and thus contain a woody layer component within the riparian floodplain areas which are dominated by *Acacia karroo* and *Searsia lancea* species. The presence of additional species will be confirmed during the site visits. It should be noted that the major rivers systems are highly degraded with a Present Ecological State Score of F (acceptable transformation) (Figure 5.6).

Wetland classification methods and preliminary results

Several water bodies and aquatic systems are shown with preliminary delineations, indicated in Figure 5.7. Based on the 6 levels of the National Wetland Classification System, these systems are typical of Inland Systems (Level 1), within the Highveld Ecoregion (Level 2). The aquatic landscape units (Level 3) include valley floors (riparian / palustrine) or depression hydrogeomorphic units (Level 4). Several of these have been indicated in the National Wetland Inventory and the National Freshwater Priority Ecosystems Areas (NFEPA) database (Nel *et al.*, 2011). This will be confirmed during the EIA phase of this study. As discussed in Section 3.1.2 of Chapter 3 of the Draft Scoping Report, the buildable areas were determined by, inter alia, a 50 m setback from wetlands.

⁶ Ecological Scoping Dealesville PV Facilities, (Scherman Colloty & Associates, 2014)

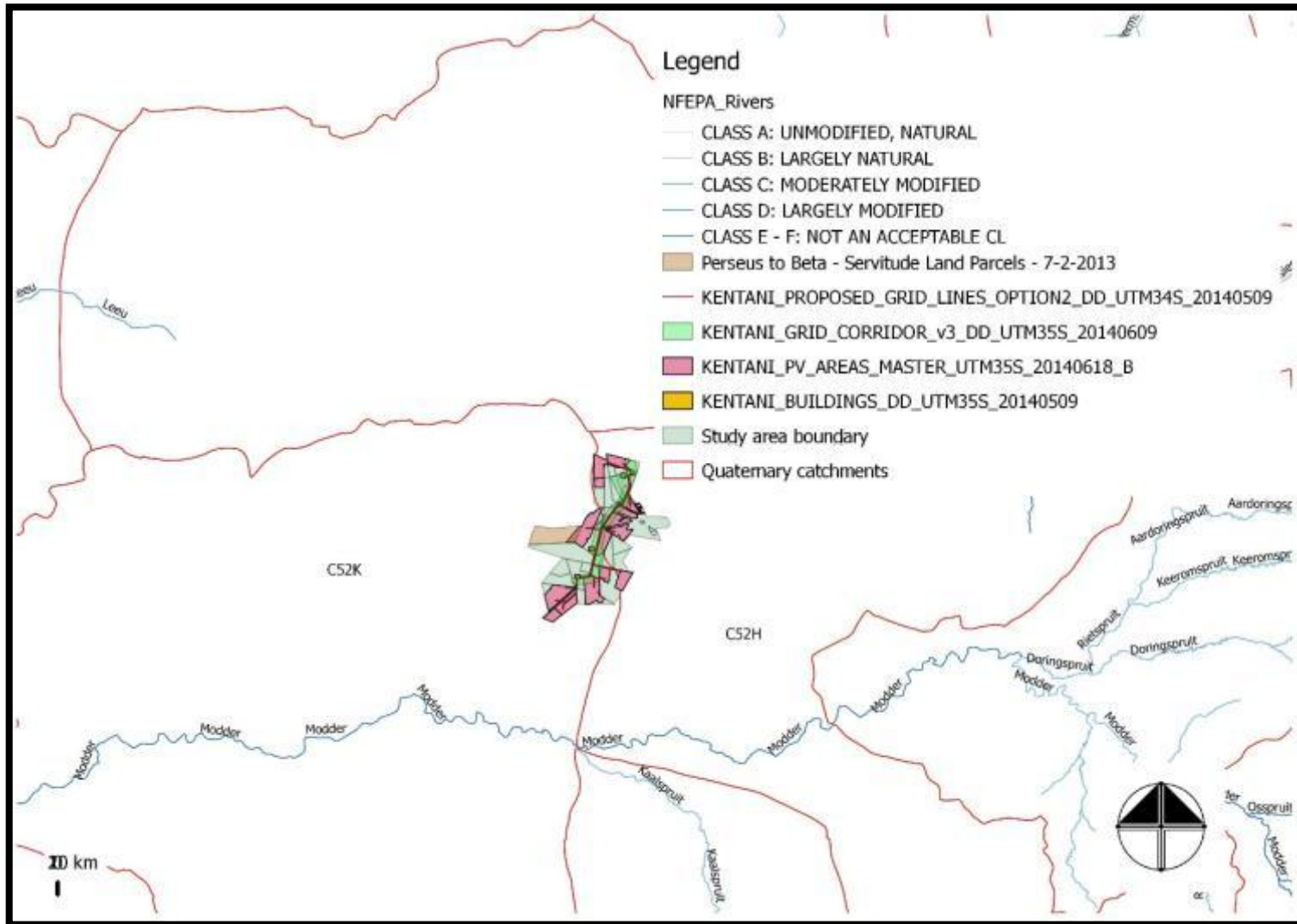


Figure 5.6: Project locality map indicating various quaternary catchments and major rivers (NFEPA & DWA)

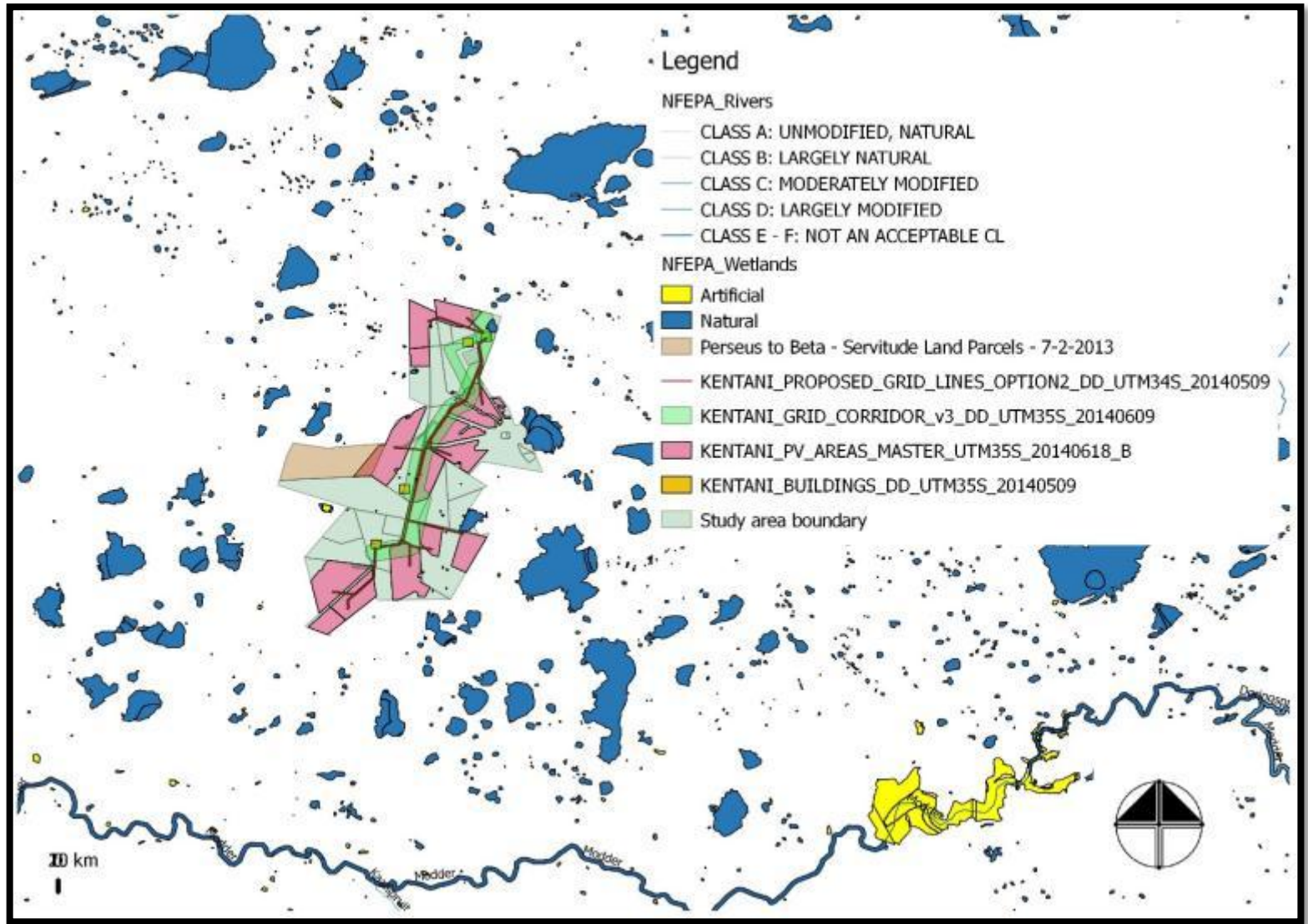


Figure 5.7: The study area in relation to the potential wetland areas.

5.2.6. Terrestrial environment

5.2.7. Flora

5.2.7.1. Description of vegetation present in study area

The study area falls within three biomes and four vegetation types (Table 5.4), of which the grassland biome encompasses the largest area. Vaal-Vet Sandy Grassland (endangered), Western Free State Clay Grassland and Highveld Salt Pans are found within the boundaries of the farms proposed for the Kentani Solar PV Development (Figure 5.8). In terms of South African conservation planning, there are no identified Critical Biodiversity Areas or Ecological support areas within the proposed study area.

Table 5.4: Biomes and vegetation units present in the area of the proposed Kentani Solar PV Development.

| Vegetation Unit | Biome | Bioregion | Threat status |
|-----------------------------------|-------------------|---------------------------|------------------|
| Highveld Salt Pans | Azonal Vegetation | Inland Saline Vegetation | Least threatened |
| Vaal-Vet Sandy Grassland | Grassland Biome | Dry Highveld Grassland | Endangered |
| Western Free State Clay Grassland | Grassland Biome | Dry Highveld Grassland | Least threatened |
| Vaalbos Rocky Shrubland | Savanna Biome | Eastern Kalahari Bushveld | Least threatened |

Dry Highveld Grassland

The Dry Highveld Grassland bioregion of the Grassland biome is found on the central plateau of South Africa. The vegetation patterns of these grasslands are predominantly determined by annual rainfall, which decreases from east to west (Mucina & Rutherford, 2006).

Western Free State Clay Grassland

The Western Free State Clay Grassland vegetation unit is found on flat, low-lying areas around Bloemfontein in the Free State province. These grasslands are species-poor and contain many Highveld Salt Pans imbedded in the landscape (Mucina & Rutherford, 2006). Important plant species which may be found in this vegetation type are listed in Table 5.5. More than 20 % of this vegetation type has been transformed by agricultural activities (maize and wheat cultivation) (Mucina & Rutherford, 2006).

Table 5.5: Important plant taxa characterising the Western State Clay Grassland (Mucina & Rutherford, 2006).

| | | |
|-------------------------|---|-------------------------------|
| Graminoids (grasses) | <i>Aristida adscensionis</i> (dominant) | <i>Eragrostis curvula</i> |
| | <i>Aristida bipartita</i> (dominant) | <i>Eragrostis micrantha</i> |
| | <i>Cynodon dactylon</i> (dominant) | <i>Eragrostis obtusa</i> |
| | <i>Eragrostis chloromelas</i> (dominant) | <i>Eragrostis plana</i> |
| | <i>Eragrostis lehmanniana</i> (dominant) | <i>Eragrostis superba</i> |
| | <i>Panicum coloratum</i> (dominant) | <i>Eragrostis trichophora</i> |
| | <i>Themeda triandra</i> (dominant) | <i>Heteropogon contortus</i> |
| | <i>Aristida congesta</i> | <i>Setaria nigrirostris</i> |
| | <i>Cymbopogon pospischilii</i> | <i>Tragus berteronianus</i> |
| | <i>Digitaria eriantha</i> | <i>Tragus koelerioides</i> |
| Herbs | <i>Eragrostis bicolor</i> | <i>Tragus racemosus</i> |
| | <i>Berkheya onopordifolia</i> var. <i>onopordifolia</i> | <i>Nidorella microcephala</i> |
| | <i>Chamaesyce inaequilatera</i> | <i>Platycarpha parvifolia</i> |
| | <i>Gnaphalium declinatum</i> | <i>Salvia stenophylla</i> |
| | <i>Indigofera alternans</i> | <i>Selago paniculata</i> |
| Geophytic herbs | <i>Kohautia cynanchica</i> | <i>Stachys spathulata</i> |
| | <i>Bulbine narcissifolia</i> | <i>Oxalis depressa</i> |
| Succulent herbs | <i>Tripteris aghillana</i> var. <i>integrifolia</i> | |

| | | |
|------------------|--|------------------------------|
| Low shrubs | <i>Lycium cinereum</i> (dominant) | <i>Gnidia polycephala</i> |
| | <i>Pentzia globosa</i> (dominant) | <i>Helichrysum dregeanum</i> |
| | <i>Amphiglossa triflora</i> | <i>Melolobium candicans</i> |
| | <i>Aptosinum elongatum</i> | <i>Nenax microphylla</i> |
| | <i>Berkheya annectens</i> | <i>Rosenia humilis</i> |
| | <i>Felicia filifolia</i> subsp. <i>filifolia</i> | <i>Selago saxatilis</i> |
| | <i>Felicia muricata</i> | |
| Succulent Shrubs | <i>Hertia pallens</i> | |

Vaal-Vet Sandy Grassland

The Vaal-Vet Sandy Grassland is an endangered vegetation type of which 63 % has been extensively transformed by maize and wheat cultivation, and the remaining 37 % is experiencing high grazing pressure from cattle and sheep (Mucina & Rutherford, 2006). The ecological structure, function and composition of endangered vegetation units are in danger of undergoing significant degradation as a result of human activities (National Environmental Management: Biodiversity Act (10 of 2004)). A mere 0.3 % of this vegetation types is represented in statutory conservation areas (Bloemhof Dam, Schoonspruit, Sandveld, Faan Meintjies, Wolwespruit and Soetdoring Nature Reserves) (Mucina & Rutherford, 2006). This vegetation type is characterised by plains dotted slightly by undulating hills supporting low-tussock grasses and a strong karoid element (Mucina & Rutherford, 2006). Important plant species which may be found in this vegetation type are listed in Table 5.6.

Table 5.6: Important plant taxa characterising the Vaal-Vet Sandy Grassland (Mucina & Rutherford, 2006).

| | | |
|---|---|---|
| Graminoids (grasses) | <i>Anthephore pubescens</i> (dominant) | <i>Setaria sphacelata</i> (dominant) |
| | <i>Aristida congesta</i> (dominant) | <i>Themeda triandra</i> (dominant) |
| | <i>Chloris virgata</i> (dominant) | <i>Tragus berteronianus</i> (dominant) |
| | <i>Cymbopogon caesius</i> (dominant) | <i>Brachiaria serrate</i> |
| | <i>Cynodon dactylon</i> (dominant) | <i>Cymbopogon pospichilii</i> |
| | <i>Digitaria argyrograpta</i> (dominant) | <i>Digitaria eriantha</i> |
| | <i>Elionurus muticus</i> (dominant) | <i>Eragrostis curvula</i> |
| | <i>Eragrostis chloromelas</i> (dominant) | <i>Eragrostis obtusa</i> |
| | <i>Eragrostis lehmanniana</i> (dominant) | <i>Eragrostis superba</i> |
| | <i>Eragrostis plana</i> (dominant) | <i>Panicum coloratum</i> |
| | <i>Eragrostis trichophora</i> (dominant) | <i>Pogonarthria squarrosa</i> |
| | <i>Heteropogon contortus</i> (dominant) | <i>Trichoneura grandiglumis</i> |
| | <i>Panicum gilvum</i> (dominant) | <i>Triraphis andropogonoides</i> |
| | Herbs | <i>Stachys spathulata</i> |
| <i>Barleria macrostegia</i> | | <i>Monsonia burkeana</i> |
| <i>Berkheya onopordifolia</i> var. <i>onopordifolia</i> | | <i>Rhynchosia adenodes</i> |
| <i>Chamaesyce inaequilatera</i> | | <i>Selago densiflora</i> |
| <i>Geigeria aspera</i> var. <i>aspera</i> | | <i>Vernonia oligocephala</i> |
| <i>Helichrysum caespitium</i> | | <i>Lessertia phillipsiana</i> (endemic taxon) |
| <i>Hermannia depressa</i> | | |
| Geophytic herbs | <i>Bulbine narcissifolia</i> | <i>Ledebouria marginata</i> |
| Succulent herbs | <i>Tripteris aghillana</i> var. <i>integrifolia</i> | |
| Low shrubs | <i>Felicia muricata</i> (dominant) | <i>Helichrysum dregeanum</i> |
| | <i>Pentzia globosa</i> (dominant) | <i>Helichrysum paronychioides</i> |
| | <i>Anthospermum rigidum</i> subsp. <i>pumilum</i> | <i>Ziziphus zeyheriana</i> |

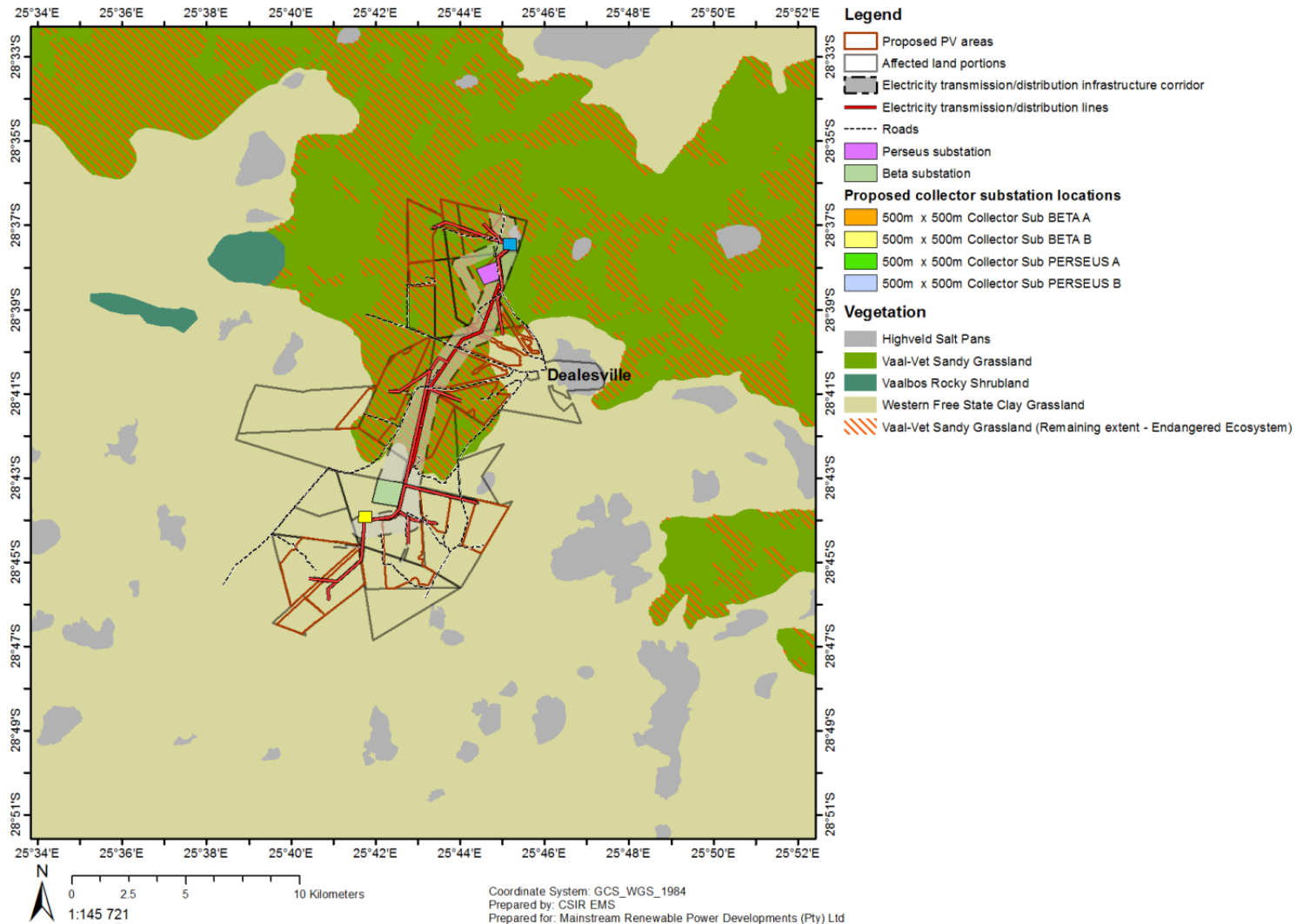


Figure 5.8: Vegetation map of the study area for the proposed Kentani Solar PV Development near Dealesville, Free State.

Eastern Kalahari Bushveld

South African Savannas consist of a herbaceous layer dominated by grass and a disjunct woody layer consisting of trees and shrubs (Mucina & Rutherford, 2006).

Vaalbos Rocky Shrubland

This vegetation exists on slopes, elevated hills, and ridges mainly supporting a less prominent graminoid layer with dominant evergreen shrubs and small trees (Mucina & Rutherford). Important plant species which may be found in this vegetation type are listed in Table 5.7.

Table 5.7: Important plant taxa characterising the Vaalbos Rocky Shrubland (Mucina & Rutherford, 2006).

| | | |
|----------------------|--|--|
| Small trees | <i>Boscia albitrunca</i> | <i>Searsia lancea</i> |
| | <i>Cussonia paniculata</i> | |
| Tall shrubs | <i>Euclea crispa</i> subsp. <i>Crispa</i> (dominant) | <i>Diospyros austro-africana</i> |
| | <i>Olea europaea</i> subsp. <i>africana</i> (dominant) | <i>Diospyros lycioides</i> subsp. <i>lycioides</i> |
| | <i>Tarchonanthus camphoratus</i> (dominant) | <i>Ehretia rigida</i> subsp. <i>rigida</i> |
| | <i>Ziziphus mucronata</i> (dominant) | <i>Gymnosporia polycantha</i> |
| | <i>Buddleja saligna</i> | <i>Rhigozum obovatum</i> |
| | <i>Cadaba aphylla</i> | <i>Searsia burhcellii</i> |
| Low shrubs | <i>Asparagus suavelens</i> | <i>Lycium pilifolium</i> |
| | <i>Hermannia comosa</i> | <i>Pentzia globosa</i> |
| | <i>Lantana rugosa</i> | <i>Searcia ciliata</i> |
| Succulent shrubs | <i>Cotyledon orbiculata</i> var. <i>orbiculata</i> | <i>Kalanchoe paniculata</i> |
| | <i>Crassula nudicaulis</i> | <i>Lycium cinereum</i> |
| Graminoids (grasses) | <i>Aristida adscensionis</i> | <i>Eustachys paspaloides</i> |
| | <i>Aristida congesta</i> | <i>Fingerhuthia africana</i> |
| | <i>Digitaria eriantha</i> var. <i>eriantha</i> | <i>Heteropogon contortus</i> |
| | <i>Elionurus muticus</i> | <i>Hyparrhenia hirta</i> |
| | <i>Enneapogon scoparius</i> | <i>Stipagrostis uniplumis</i> |
| | <i>Eragrostis lehmanniana</i> | <i>Themeda triandra</i> |
| | <i>Eragrostis obtusa</i> | |
| Herbs | <i>Chascanum pinnatifidum</i> | <i>Hibiscus pusillus</i> |
| | <i>Harpagophytum procumbens</i> subsp. <i>procumbens</i> | |
| Geophytic herbs | <i>Albuca setosa</i> | <i>Haemanthus humilis</i> subsp. <i>Humilis</i> |
| | <i>Cheilanthes eckloniana</i> | <i>Pallaea calomelanos</i> |
| Succulent herbs | <i>Aloe grandidentata</i> | <i>Stapelia grandiflora</i> |

Inland Saline Vegetation

The Inland Saline Vegetation bioregion of South Africa is characterised by saline soils and are usually found in areas that may experience prolonged droughts (Mucina & Rutherford, 2006). The Highveld Salt Pans is one of the most extensive salt pan systems in South Africa.

Highveld Salt Pans

The Highveld Salt Pans are found in depressions on plateaus and usually contain temporary (sometimes permanent) bodies of water (Mucina & Rutherford, 2006). The interiors of drained pans may contain vegetation whilst floating macrophyte vegetation can be found if water is present (Mucina & Rutherford, 2006). Salt pan edges are characterised by sparse grassy and shrub vegetation (Mucina & Rutherford, 2006). Important plant species which may be found in this vegetation type are listed in Table 5.8.

Table 5.8: Important plant taxa characterising the Highveld Salt Pans (Mucina & Rutherford, 2006).

| | | |
|-------------------------|--|--|
| Low shrubs | <i>Atriplex vestita</i> | <i>Nestlera conferta</i> |
| | <i>Felicia filifolia</i> | <i>Pentzia globosa</i> |
| | <i>Felicia muricata</i> | <i>Pentzia incana</i> |
| | <i>Nenax microphylla</i> | |
| Succulent shrubs | <i>Salsola glabrescens</i> (dominant) | <i>Suaeda fruticosa</i> |
| | <i>Lycium cinereum</i> | <i>Titanopsis hugoslechteri</i> |
| | <i>Malephors herrei</i> | |
| Graminoids (grasses) | <i>Chloris virgata</i> (dominant) | <i>Cyperus rigidifolius</i> |
| | <i>Cynodon dactylon</i> (dominant) | <i>Echinochloa holubii</i> |
| | <i>Cynodon transvaalensis</i> (dominant) | <i>Eleocharis palustris</i> |
| | <i>Cyperus laevigatus</i> (dominant) | <i>Enneapogon desvauxii</i> |
| | <i>Cyperus marginatus</i> (dominant) | <i>Eragrostis urvula</i> |
| | <i>Diplachne fusca</i> (dominant) | <i>Eragrostis micrantha</i> |
| | <i>Eragrostis bicolor</i> (dominant) | <i>Eragrostis obtusa</i> |
| | <i>Eragrostis chloromelas</i> (dominant) | <i>Eragrostis stapfii</i> |
| | <i>Eragrostis plana</i> (dominant) | <i>Fuirena coeruleascens</i> |
| | <i>Hemarthria altissima</i> (dominant) | <i>Fuirena pubescens</i> |
| | <i>Juncus rigidus</i> (dominant) | <i>Juncus exsertus</i> |
| | <i>Panicum coloratum</i> (dominant) | <i>Scirpoides dioecus</i> |
| | <i>Panicum laevifolium</i> (dominant) | <i>Sporobolus albicans</i> |
| | <i>Panicum schinzi</i> (dominant) | <i>Sporobolus fimbriatus</i> |
| | <i>Setaria incrassate</i> (dominant) | <i>Sporobolus ioclados</i> |
| | <i>Andropogon eucomus</i> | <i>Sporobolus tenellus</i> |
| | <i>Aristida adscensionis</i> | <i>Tragus berteronianus</i> |
| | <i>Brachiaria marlothii</i> | <i>Tragus racemosus</i> |
| | <i>Cyperus longus</i> | |
| Megagraminoids | <i>Cyperus congestus</i> | <i>Typha latifolia</i> |
| | <i>Phragmites australis</i> | |
| Herbs | <i>Altenanthera sessilis</i> | <i>Phylo nodiflora</i> |
| | <i>Amaranthus praetermissus</i> | <i>Platycarpha parvifolia</i> |
| | <i>Aponogeton rehmannii</i> | <i>Pterodiscus speciosus</i> |
| | <i>Atriplex suberecta</i> | <i>Senecio reptans</i> |
| | <i>Chenopodium mucronatum</i> | <i>Rorippa fluviatilis</i> var. <i>caledonica</i> (Highveld endemic taxon) |
| | <i>Gnaphalium declinatum</i> | <i>Gnaphalium simii</i> (endemic taxon) |
| | <i>Mollugo cerviana</i> | |
| Succulent herbs | <i>Zygophyllum simplex</i> | |

5.2.7.2. Baseline sensitivity mapping & preliminary assessment

A draft ecological sensitivity map of the site was produced by integrating the available ecological and biodiversity information available in literature with desktop land cover mapping of the project area.

Input layers

There is little spatially explicit biodiversity and ecology information available for the region. The National Vegetation Map (Mucina and Rutherford, 2006) and the NEFPA Wetland map (Nel et al., 2011) are the two key available input layers. Both of these data sets are intended for national / provincial scale analysis rather than local scale sensitivity mapping; significant field based refinement of the terrestrial and aquatic habitat layers will therefore be conducted at the EIA phase of the project.

Land cover is the most reliable proxy of biodiversity and can readily be mapped from high resolution aerial colour photographs available for the site. Areas with no natural habitat remaining (dryland and irrigated crop areas, fallow lands, urban areas, quarries, homesteads, woodlots), previously cultivated areas with some natural vegetation, and primary natural areas were mapped at 1:10 000 scale off 2010 digital aerial imagery (NGI, 2010) in a GIS environment (Figure 5.9).

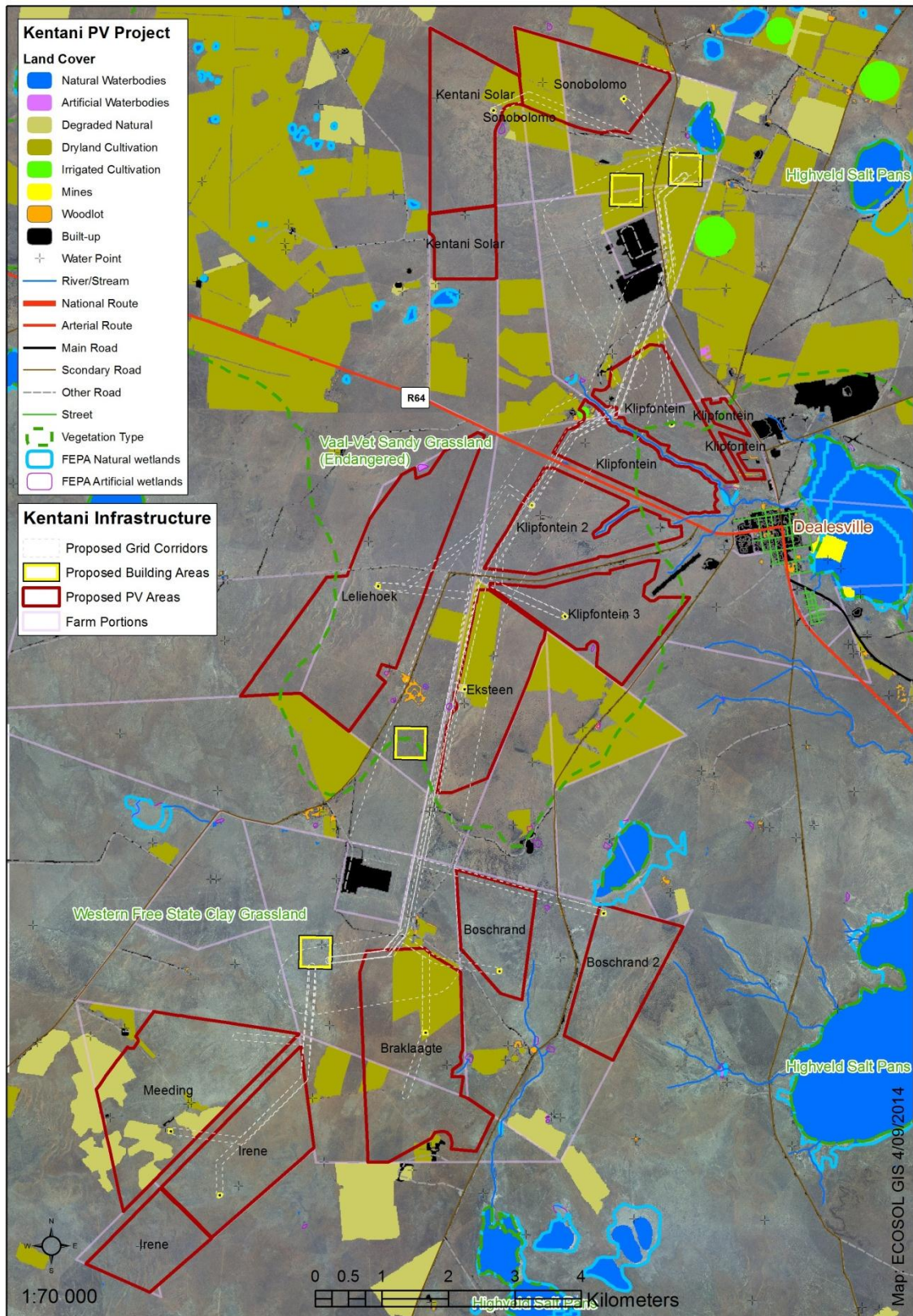


Figure 5.9: Land cover map of the study site based on 2010 colour aerial photographs (NGI, 2010) and the FEPA wetlands layer (Nel et al., 2011), showing degraded habitat, and areas with no natural habitat remaining. The national vegetation layer (Mucina and Rutherford, 2006) and proposed site infrastructure footprints are overlaid.

Sensitivity Categories

The ecological sensitivity of the different units identified in the mapping procedure was rated according to the following scale and shown in Table 5.9:

- **Low** - Units with a low sensitivity where there is likely to be a negligible impact on ecological processes and terrestrial biodiversity. This category is reserved specifically for areas where the natural vegetation has already been transformed, usually for intensive agricultural purposes such as cropping. Most types of development can proceed within these areas with little ecological impact. There were however no Low Sensitivity areas within the study area.
- **Medium**- Areas of natural or previously transformed land where the impacts are likely to be largely local and the risk of secondary impact such as erosion low. Development within these areas can proceed with relatively little ecological impact provided that appropriate mitigation measures are taken.
- **High** - Areas of natural or transformed land where a high impact is anticipated due to the high biodiversity value, sensitivity or important ecological role of the area. Development within these areas is undesirable and should only proceed with caution as it may not be possible to mitigate all impacts appropriately.
- **Very High** - Critical and unique habitats that serve as habitat for rare/endangered species or perform critical ecological roles. These areas are essentially no-go areas from a developmental perspective and should be avoided at all costs.

Table 5.9: Features used to develop draft sensitivity map for the site.

| Feature | Source | Sensitivity |
|---|--|-------------|
| Natural wetland | NFEPA | Very High |
| Natural areas in endangered vegetation OR FEPA wetland cluster; AND within wetland buffer (100m) / river buffer (50m) | NFEPA (Nel et al., 2011), Land Cover (this study), National Vegetation Map (Mucina and Rutherford, 2006), Threatened Habitats List DEA, 2011), 1:50 000 river data (NGI, 2011) | Very High |
| Artificial wetland | NFEPA (Nel et al., 2011) | High |
| Natural areas in endangered vegetation OR wetland cluster | NFEPA (Nel et al., 2011), Land Cover (this study), National Vegetation Map (Mucina and Rutherford, 2006), Threatened Habitats List DEA, 2011) | High |
| Degraded areas in endangered vegetation OR wetland cluster; AND within wetland buffer (100m) / river buffer (50m) | NFEPA (Nel et al., 2011), Land Cover (this study), National Vegetation Map (Mucina and Rutherford, 2006), Threatened Habitats List DEA, 2011), 1:50 000 river data (NGI, 2011) | High |
| Other natural areas AND within wetland buffer (100m) / river buffer (50m) | NFEPA (Nel et al., 2011), Land Cover (this study), National Vegetation Map (Mucina and Rutherford, 2006), 1:50 000 river data (NGI, 2011) | High |
| Degraded areas in endangered vegetation OR wetland cluster | NFEPA (Nel et al., 2011), Land Cover (this study), National Vegetation Map (Mucina and Rutherford, 2006), Threatened Habitats List DEA, 2011) | Medium |
| Other Natural Areas | Land Cover (this study) | Medium |
| Transformed areas | Land Cover (this study) | Low |

Site Sensitivity Assessment

The draft sensitivity map for the proposed Kentani solar Development site is illustrated below in Figure 10. The Very High sensitivity parts of the site include the drainage lines well as wetlands. These areas should be maintained in a natural to near-natural condition; therefore, this area should be avoided as much as possible by the development. The sensitivity map contains a large amount of areas of high sensitivity associated with nationally listed threatened ecosystem: Vaal-Vet Sandy Grassland. Extensive loss of natural habitat should be avoided in these areas. Although the sensitivity map depicts a large amount of High sensitivity areas within the site, this should be considered a conservative assessment (worst-case) and the actual sensitivity of these areas requires validation in the field.

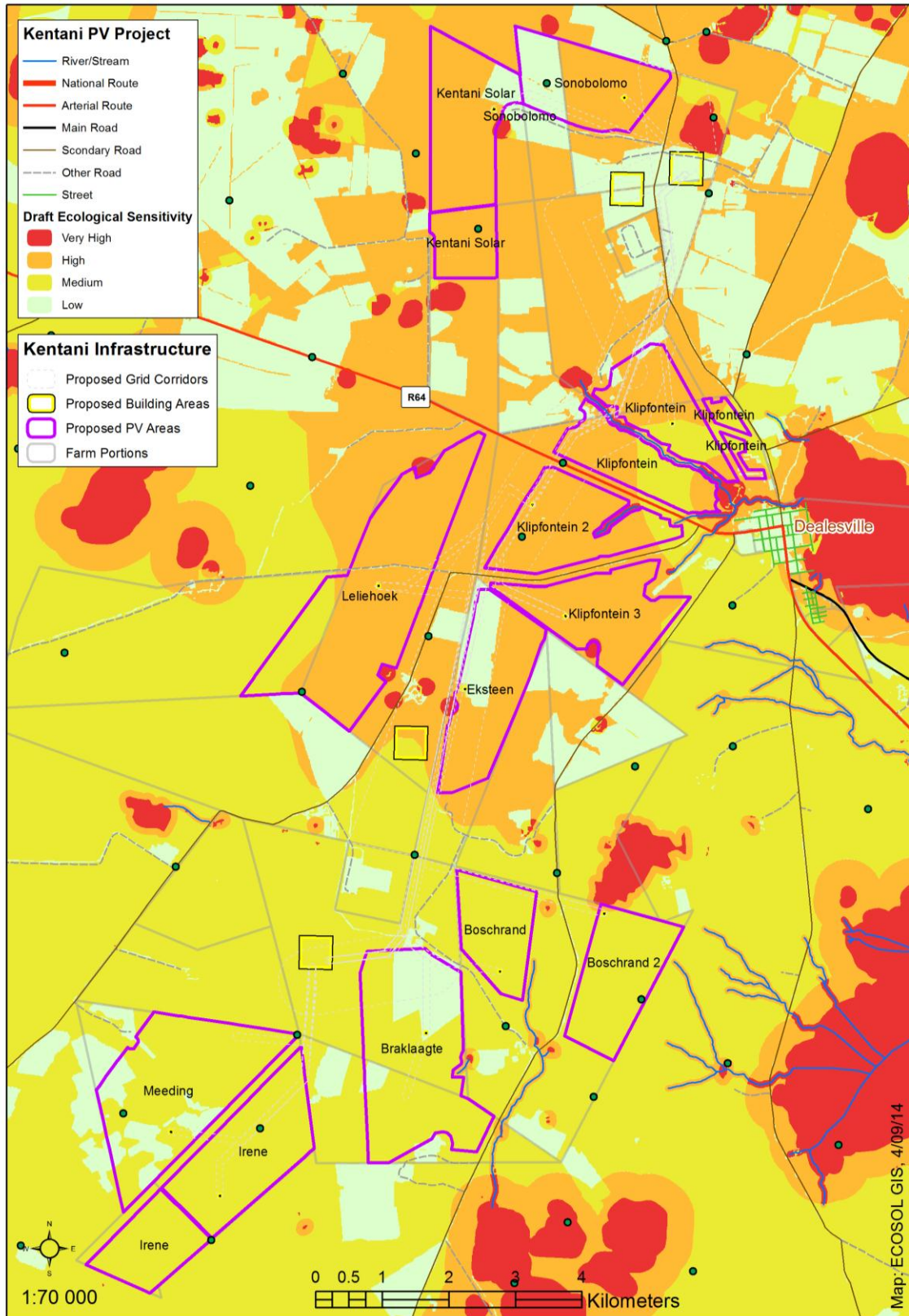


Figure 5.10: Draft ecological Sensitivity map of the proposed Kentani Photo-voltaic Energy Facility site. Very High sensitivity areas should be avoided as much as possible, while the Medium and Low sensitivity areas should be targeted as much as possible.

5.2.8. Fauna

Several important faunal species (Butterflies, Amphibians, Reptiles & Mammals) are known to occur within the study area and shown in Table 5.10. The presence of these species will be assessed during site visit undertaken during the EIA phase. The majority of the species potentially present within the study area are listed as “Least Concern” from a conservation concern standpoint, the only exception being the Amphibian *Pyxicephalus adspersus* (Giant Bullfrog) which is listed as “Near Threatened” and has a probability of occurring within the study area due to the presence of the pans/depressions that occur adjacent to the site. For Mammals, *Atelerix frontalis* (South African Hedgehog) is listed as “Near Threatened” and *Hippotragus equinus* (Roan Antelope) is listed as “Vulnerable”.

According to the SABAP2 data (Animal Demography Unit, University of Cape Town, 2014), 309 potential bird species are associated with the habitats within the study area. The species composition is dominated by both grassland and wetland (water bird species) associated with depressions (salt pans). The importance of the study area will thus be evaluated with regard the potential habitat for these species within the study area within the EIA phase.

Species known to occur with conservation concern include the following:

1. Great flamingo (*Phoenicopterus roseus*) - Near Threatened
2. Lesser flamingo (*Phoeniconaias minor*) - Near Threatened
3. Blue korhaan (*Eupodotis caerulescens*) - Near Threatened
4. Blue crane (*Anthropoides paradiseus*) - Vulnerable
5. Northern Black korhaan (*Afrotis afraoides*) - Endemic
6. Secretarybird (*Saggittarius serpentarius*) - Near Threatened

Table 5.10: Expected faunal species that have been recorded within the Quarter Degree Square (2825) (Source Animal Demography Unit, 2014)

| Species previously recorded within the QDS (2825) | | | | | | | |
|---|-----------------------|-------------------|---------------------|---------------------------|--------------------|-------------|-----------------------|
| LEPIDOPTERA (BUTTERFLIES) | | | | | | | |
| Family | Genus | Species | Subspecies | Common name | Red list category | No. records | Endemic to the region |
| HESPERIIDAE | <i>Spialia</i> | <i>mafa</i> | <i>mafa</i> | Mafa sandman | Least Concern (LC) | 1 | |
| LYCAENIDAE | <i>Aloeides</i> | <i>gowani</i> | | Gowan's copper | Least Concern (LC) | 1 | Yes |
| LYCAENIDAE | <i>Azanus</i> | <i>ubaldus</i> | | Velvet-spotted babul blue | Least Concern (LC) | 1 | |
| LYCAENIDAE | <i>Brephidium</i> | <i>metophis</i> | | Tinktinkie blue | Least Concern (LC) | 3 | |
| LYCAENIDAE | <i>Chrysochrysis</i> | <i>chrysaor</i> | | Burnished opal | Least Concern (LC) | 1 | Yes |
| LYCAENIDAE | <i>Cigaritis</i> | <i>ella</i> | | Ella's bar | Least Concern (LC) | 5 | |
| LYCAENIDAE | <i>Cigaritis</i> | <i>mozambica</i> | | Mozambique bar | Least Concern (LC) | 1 | |
| LYCAENIDAE | <i>Cigaritis</i> | <i>natalensis</i> | | Natal bar | Least Concern (LC) | 3 | |
| LYCAENIDAE | <i>Cigaritis</i> | <i>phanes</i> | | Silvery bar | Least Concern (LC) | 1 | |
| LYCAENIDAE | <i>Cupidopsis</i> | <i>jobates</i> | <i>jobates</i> | Tailed meadow blue | Least Concern (LC) | 1 | |
| LYCAENIDAE | <i>Eicochrysops</i> | <i>messapus</i> | <i>mahallakoena</i> | Cupreous blue | Least Concern (LC) | 4 | |
| LYCAENIDAE | <i>Harpenderis</i> | <i>notoba</i> | | Salvia mountain blue | Least Concern (LC) | 38 | |
| LYCAENIDAE | <i>Lepidochrysops</i> | <i>ortygia</i> | | Koppie blue | Least Concern (LC) | 6 | Yes |
| LYCAENIDAE | <i>Lepidochrysops</i> | <i>patricia</i> | | Patricia blue | Least Concern (LC) | 1 | |
| LYCAENIDAE | <i>Lepidochrysops</i> | <i>plebeia</i> | <i>plebeia</i> | Twin-spot blue | Least Concern (LC) | 1 | |
| LYCAENIDAE | <i>Leptomyrina</i> | <i>henningi</i> | <i>henningi</i> | Henning's black-eye | Least Concern (LC) | 2 | |
| LYCAENIDAE | <i>Leptotes</i> | <i>pirithous</i> | <i>pirithous</i> | Common zebra blue | Least Concern (LC) | 1 | |

| LYCAENIDAE | <i>Lycaena</i> | <i>clarki</i> | | Eastern sorrel copper | Least Concern (LC) | 3 | Yes |
|-------------------|------------------------|---------------------|-------------------|------------------------------|--------------------------|--------------------|-----------------------------|
| LYCAENIDAE | <i>Tarucus</i> | <i>sybaris</i> | <i>linearis</i> | Dotted blue | Least Concern (LC) | 11 | |
| LYCAENIDAE | <i>Thestor</i> | <i>protumnus</i> | <i>aridus</i> | Boland skolly | Least Concern (LC) | 1 | |
| LYCAENIDAE | <i>Zizeeria</i> | <i>knysna</i> | <i>knysna</i> | African grass blue | Least Concern (LC) | 1 | |
| NYMPHALIDAE | <i>Acraea</i> | <i>neobule</i> | <i>neobule</i> | Wandering donkey acraea | Least Concern (LC) | 1 | |
| NYMPHALIDAE | <i>Danaus</i> | <i>chrysippus</i> | <i>orientis</i> | African monarch, Plain tiger | Least Concern (LC) | 6 | |
| NYMPHALIDAE | <i>Junonia</i> | <i>hierta</i> | <i>cebrene</i> | Yellow pansy | Least Concern (LC) | 1 | |
| NYMPHALIDAE | <i>Ypthima</i> | <i>asterope</i> | <i>hereroica</i> | African ringlet | Least Concern (LC) | 2 | |
| PAPILIONIDAE | <i>Papilio</i> | <i>demodocus</i> | <i>demodocus</i> | Citrus swallowtail | Least Concern (LC) | 1 | |
| PIERIDAE | <i>Belenois</i> | <i>aurota</i> | | Brown-veined white | Least Concern (LC) | 5 | |
| PIERIDAE | <i>Colias</i> | <i>electo</i> | <i>electo</i> | African clouded yellow | Least Concern (LC) | 2 | |
| PIERIDAE | <i>Colotis</i> | <i>euipe</i> | <i>omphale</i> | Smoky orange tip | Least Concern (LC) | 1 | |
| PIERIDAE | <i>Colotis</i> | <i>evenina</i> | <i>evenina</i> | Orange tip | Least Concern (LC) | 2 | |
| PIERIDAE | <i>Colotis</i> | <i>lais</i> | | Kalahari orange tip | Least Concern (LC) | 1 | |
| PIERIDAE | <i>Pinacopteryx</i> | <i>eriphia</i> | <i>eriphia</i> | Zebra white | Least Concern (LC) | 2 | |
| PIERIDAE | <i>Teracolus</i> | <i>subfasciatus</i> | | Lemon traveller | Least Concern (LC) | 1 | |
| AMPHIBIANS | | | | | | | |
| Family | Genus | Species | Subspecies | Common name | Red list category | No. records | Atlas region endemic |
| Bufonidae | <i>Amietophrynus</i> | <i>gutturalis</i> | | Guttural Toad | Least Concern | 6 | |
| Bufonidae | <i>Amietophrynus</i> | <i>poweri</i> | | Power's Toad | Least Concern | 4 | |
| Bufonidae | <i>Amietophrynus</i> | <i>rangeri</i> | | Raucous Toad | Least Concern | 4 | |
| Bufonidae | <i>Poyntonophrynus</i> | <i>vertebralis</i> | | Southern Pygmy Toad | Least Concern | 4 | |
| Hyperoliidae | <i>Kassina</i> | <i>senegalensis</i> | | Bubbling Kassina | Least Concern | 19 | |

| Pipidae | <i>Xenopus</i> | <i>laevis</i> | | Common Platanna | Least Concern | 4 | |
|-----------------|---------------------|-------------------|-----------------|------------------------------|----------------------------|-------------|----------------------|
| Pyxicephalidae | <i>Amietia</i> | <i>angolensis</i> | | Common or Angola River Frog | Least Concern | 12 | |
| Pyxicephalidae | <i>Amietia</i> | <i>fuscigula</i> | | Cape River Frog | Least Concern | 2 | |
| Pyxicephalidae | <i>Cacosternum</i> | <i>boettgeri</i> | | Common Caco | Least Concern | 29 | |
| Pyxicephalidae | <i>Pyxicephalus</i> | <i>adpersus</i> | | Giant Bull Frog | Near Threatened | 4 | |
| Pyxicephalidae | <i>Tomopterna</i> | <i>cryptotis</i> | | Tremelo Sand Frog | Least Concern | 19 | |
| Pyxicephalidae | <i>Tomopterna</i> | <i>natalensis</i> | | Natal Sand Frog | Least Concern | 1 | |
| Pyxicephalidae | <i>Tomopterna</i> | <i>tandyi</i> | | Tandy's Sand Frog | Least Concern | 1 | |
| REPTILES | | | | | | | |
| Family | Genus | Species | Subspecies | Common name | Red list category | No. records | Atlas region endemic |
| Agamidae | <i>Agama</i> | <i>aculeata</i> | <i>aculeata</i> | Common Ground Agama | Least Concern (SARCA 2014) | 1 | |
| Agamidae | <i>Agama</i> | <i>aculeata</i> | <i>distanti</i> | Distant's Ground Agama | Least Concern (SARCA 2014) | 4 | Yes |
| Agamidae | <i>Agama</i> | <i>atra</i> | | Southern Rock Agama | Least Concern (SARCA 2014) | 43 | |
| Amphisbaenidae | <i>Monopeltis</i> | <i>capensis</i> | | Cape Worm Lizard | Least Concern (SARCA 2014) | 34 | |
| Atractaspididae | <i>Aparallactus</i> | <i>capensis</i> | | Black-headed Centipede-eater | Least Concern (SARCA 2014) | 8 | |
| Atractaspididae | <i>Atractaspis</i> | <i>bibronii</i> | | Bibron's Stiletto Snake | Least Concern (SARCA 2014) | 2 | |
| Colubridae | <i>Boaedon</i> | <i>capensis</i> | | Brown House Snake | Least Concern (SARCA 2014) | 37 | |
| Colubridae | <i>Dasypeltis</i> | <i>scabra</i> | | Rhombic Egg-eater | Least Concern (SARCA 2014) | 27 | |

| | | | | | | | |
|------------|------------------------|---------------------|-----------------|--------------------------|----------------------------|----|-----|
| Colubridae | <i>Lamprophis</i> | <i>aurora</i> | | Aurora House Snake | Least Concern (SARCA 2014) | 2 | Yes |
| Colubridae | <i>Lycodonomorphus</i> | <i>rufulus</i> | | Brown Water Snake | Least Concern (SARCA 2014) | 1 | |
| Colubridae | <i>Lycophidion</i> | <i>capense</i> | <i>capense</i> | Cape Wolf Snake | Least Concern (SARCA 2014) | 23 | |
| Colubridae | <i>Prosymna</i> | <i>bivittata</i> | | Two-striped Shovel-snout | Least Concern (SARCA 2014) | 5 | |
| Colubridae | <i>Psammophis</i> | <i>notostictus</i> | | Karoo Sand Snake | Least Concern (SARCA 2014) | 4 | |
| Colubridae | <i>Psammophis</i> | <i>trinasalis</i> | | Fork-marked Sand Snake | Least Concern (SARCA 2014) | 13 | |
| Colubridae | <i>Psammophylax</i> | <i>tritaeniatus</i> | | Striped Grass Snake | Least Concern (SARCA 2014) | 35 | |
| Colubridae | <i>Pseudaspis</i> | <i>cana</i> | | Mole Snake | Least Concern (SARCA 2014) | 11 | |
| Cordylidae | <i>Karusasaurus</i> | <i>polyzonus</i> | | Karoo Girdled Lizard | Least Concern (SARCA 2014) | 54 | |
| Elapidae | <i>Elapsoidea</i> | <i>sundevallii</i> | <i>media</i> | Highveld Garter Snake | Not listed | 1 | |
| Elapidae | <i>Naja</i> | <i>nivea</i> | | Cape Cobra | Least Concern (SARCA 2014) | 12 | |
| Gekkonidae | <i>Chondrodactylus</i> | <i>bibronii</i> | | Bibron's Gecko | Least Concern (SARCA 2014) | 29 | |
| Gekkonidae | <i>Lygodactylus</i> | <i>capensis</i> | <i>capensis</i> | Common Dwarf Gecko | Least Concern (SARCA 2014) | 2 | |
| Gekkonidae | <i>Pachydactylus</i> | <i>capensis</i> | | Cape Gecko | Least Concern (SARCA 2014) | 42 | |
| Gekkonidae | <i>Pachydactylus</i> | <i>mariquensis</i> | | Marico Gecko | Least Concern (SARCA 2014) | 5 | Yes |
| Lacertidae | <i>Nucras</i> | <i>holubi</i> | | Holub's Sandveld Lizard | Least Concern (SARCA 2014) | 19 | |

| | | | | | | | |
|---------------|-----------------------|----------------------|---------------------|--------------------------------|----------------------------|----|-----|
| Lacertidae | <i>Nucras</i> | <i>intertexta</i> | | Spotted Sandveld Lizard | Least Concern (SARCA 2014) | 4 | |
| Lacertidae | <i>Pedioplanis</i> | <i>lineocellata</i> | <i>lineocellata</i> | Spotted Sand Lizard | Least Concern (SARCA 2014) | 4 | |
| Pelomedusidae | <i>Pelomedusa</i> | <i>subrufa</i> | | Marsh Terrapin | Least Concern (SARCA 2014) | 1 | |
| Scincidae | <i>Acontias</i> | <i>gracilicauda</i> | | Thin-tailed Legless Skink | Least Concern (SARCA 2014) | 5 | Yes |
| Scincidae | <i>Afroablepharus</i> | <i>wahlbergii</i> | | Wahlberg's Snake-eyed Skink | Least Concern (SARCA 2014) | 1 | |
| Scincidae | <i>Trachylepis</i> | <i>capensis</i> | | Cape Skink | Least Concern (SARCA 2014) | 11 | |
| Scincidae | <i>Trachylepis</i> | <i>punctatissima</i> | | Speckled Rock Skink | Least Concern (SARCA 2014) | 22 | |
| Scincidae | <i>Trachylepis</i> | <i>punctulata</i> | | Speckled Sand Skink | Least Concern (SARCA 2014) | 4 | |
| Scincidae | <i>Trachylepis</i> | <i>sulcata</i> | <i>sulcata</i> | Western Rock Skink | Least Concern (SARCA 2014) | 4 | |
| Scincidae | <i>Trachylepis</i> | <i>varia</i> | | Variable Skink | Least Concern (SARCA 2014) | 14 | |
| Scincidae | <i>Trachylepis</i> | <i>variegata</i> | | Variegated Skink | Least Concern (SARCA 2014) | 1 | |
| Testudinidae | <i>Homopus</i> | <i>femorialis</i> | | Greater Padloper | Least Concern (SARCA 2014) | 2 | Yes |
| Testudinidae | <i>Psammobates</i> | <i>oculifer</i> | | Serrated Tent Tortoise | Least Concern (SARCA 2014) | 7 | |
| Testudinidae | <i>Stigmochelys</i> | <i>pardalis</i> | | Leopard Tortoise | Least Concern (SARCA 2014) | 8 | |
| Typhlopidae | <i>Rhinotyphlops</i> | <i>lalandei</i> | | Delalande's Beaked Blind Snake | Least Concern (SARCA 2014) | 12 | |

CHAPTER 5 - DESCRIPTION OF THE AFFECTED ENVIRONMENT

| Varanidae | <i>Varanus</i> | <i>albigularis</i> | <i>albigularis</i> | Rock Monitor | Least Concern (SARCA 2014) | 9 | |
|------------------|---------------------|---------------------|--------------------|--------------------------|----------------------------|--------------------|-----------------------------|
| Varanidae | <i>Varanus</i> | <i>niloticus</i> | | Water Monitor | Least Concern (SARCA 2014) | 2 | |
| Viperidae | <i>Bitis</i> | <i>arietans</i> | <i>arietans</i> | Puff Adder | Least Concern (SARCA 2014) | 2 | |
| MAMMALS | | | | | | | |
| Family | Genus | Species | Subspecies | Common name | Red list category | No. records | Atlas region endemic |
| Bovidae | <i>Hippotragus</i> | <i>equinus</i> | | Roan Antelope | Vulnerable | 2 | |
| Bovidae | <i>Tragelaphus</i> | <i>strepsiceros</i> | | Kudu | Least Concern | 1 | |
| Cercopithecidae | <i>Papio</i> | <i>ursinus</i> | | Chacma Baboon | Least Concern | 1 | |
| Erinaceidae | <i>Atelerix</i> | <i>frontalis</i> | | South African Hedgehog | Near Threatened | 1 | |
| Leporidae | <i>Pronolagus</i> | <i>rupestris</i> | | Smith's Red Rock Rabbit | Least Concern | 2 | |
| Molossidae | <i>Tadarida</i> | <i>aegyptiaca</i> | | Egyptian Free-tailed Bat | Least Concern | 6 | |
| Muridae | <i>Desmodillus</i> | <i>auricularis</i> | | Short-tailed Gerbil | Least Concern | 1 | |
| Orycteropodidae | <i>Orycteropus</i> | <i>afer</i> | | Aardvark | Least Concern | 1 | |
| Vespertilionidae | <i>Neoromicia</i> | <i>capensis</i> | | Cape Serotine Bat | Least Concern | 30 | |
| Vespertilionidae | <i>Pipistrellus</i> | <i>hesperidus</i> | | African Pipistrelle | Least Concern | 1 | |

5.2.9. Protected Areas

The Soetdoring Nature Reserve, which incorporates the Krugersdrift Dam, is more than 20 km from the proposed development sites, but according to the DEA⁷ protected areas database there are a number of private nature reserves and game farms within a 50 km radius (Figure 5.11), including:

- Nielsview Nature Reserve;
- Steenbokkraal Nature Reserve;
- Blandfort Game Lodge;
- Blenheim Hunting Farm;
- Rooikraal Game Ranch.

⁷ <https://www.environment.gov.za/mapsgraphics#protectedareas>

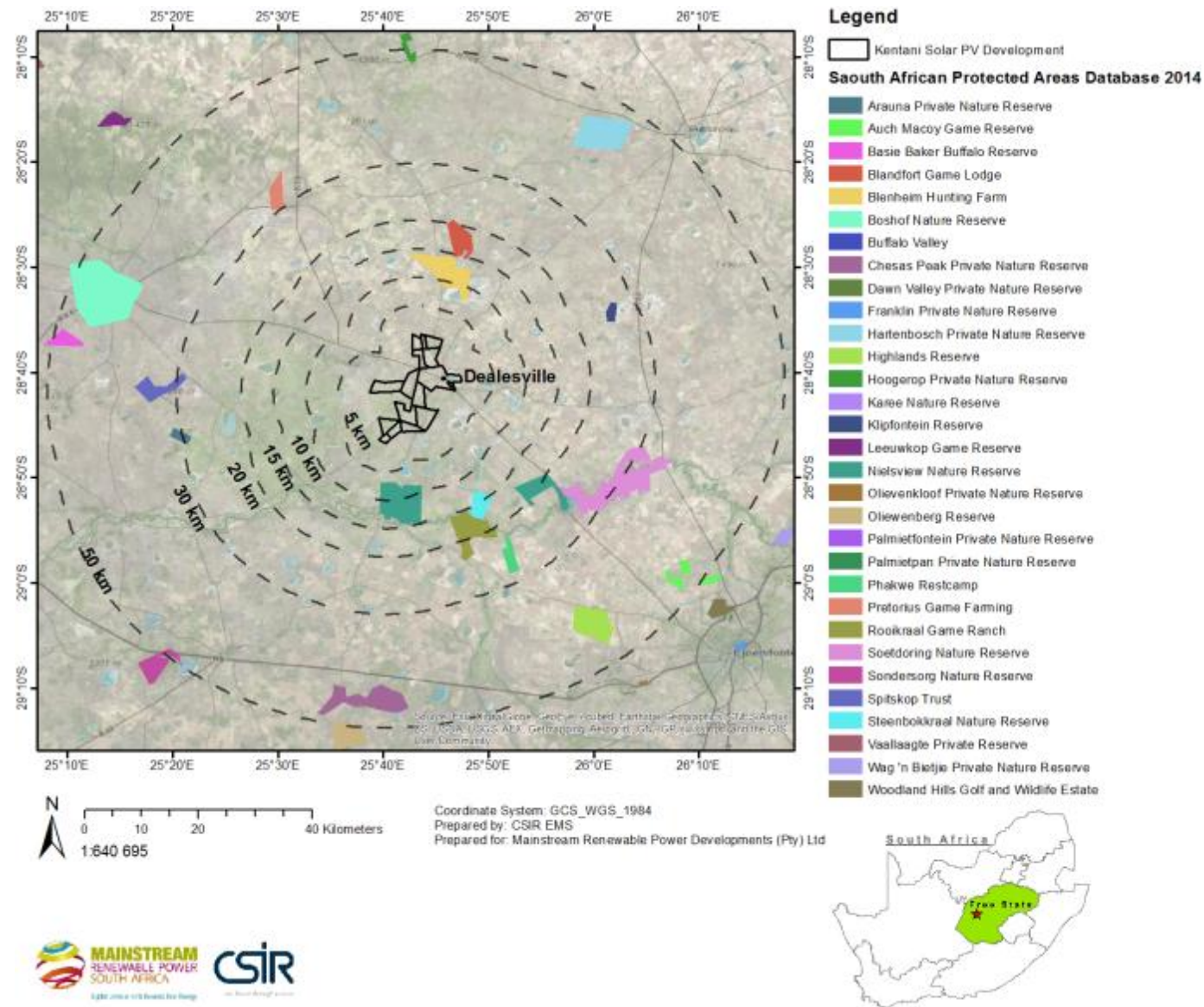


Figure 5.11: Protected Areas present within 50 km of the proposed Kentani Solar Development

5.3. Heritage profile

Limited heritage work has been carried out in the vicinity of Dealesville. However, based on the available information, the following heritage profile has been compiled⁸.

5.3.1. Palaeontology

In terms of palaeontology, the study area is mapped on South African Heritage Resources Information System (SAHRIS) as being underlain by geological rock units with varying sensitivity. Although there are no areas of very high sensitivity, the area does include patches of high and moderate sensitivity. Some areas are known to be unfossiliferous and thus of no sensitivity at all. Figure 5.12 shows the palaeontological sensitivity of the study area.

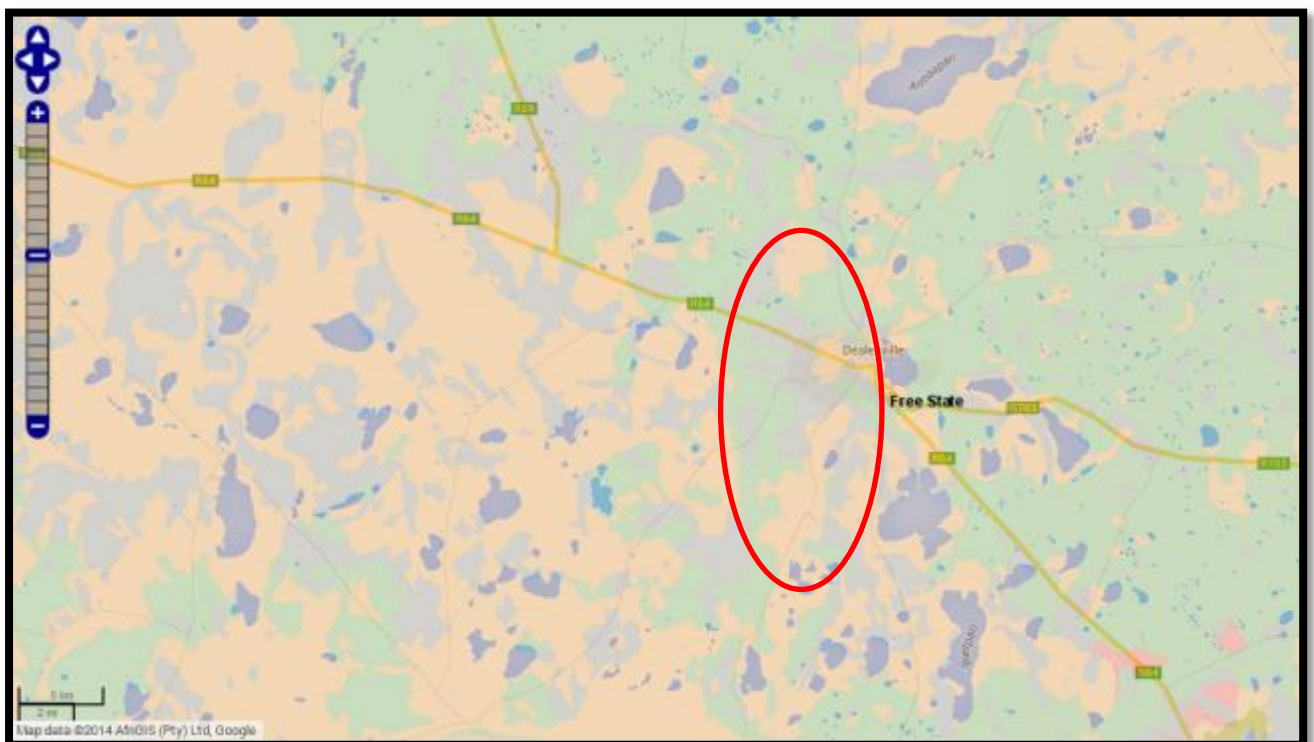


Figure 5.12: Palaeontological sensitivity map of the Dealesville area (shown within the red oval). Orange = high sensitivity, Green = moderate sensitivity, Grey = zero sensitivity. Note that the dark grey patches are pans showing through the sensitivity layer (these are generally within the orange areas).

There are some important fossil sites in the greater region and thus the chance of finding material of significance does exist. Florisbad is a very well-known fossil locality lying some 35 km to the east of the present study area. Here an early human cranium was recovered in 1932 (Dreyer 1935; Rightmire 1978) while mid-Pleistocene fauna and Middle Stone Age (MSA) stone artefacts have also been recovered (Brink 1987; Dreyer 1938). Because of its importance in terms of both palaeontology and archaeology, Florisbad has been declared a Provincial Heritage Site (SAHRIS n.d.).

⁸ Sourced from: Scoping Inputs for the Mainstream Dealesville PV Developments (Orton, 2014)

5.3.2. Archaeology

Stone Age material occurs widely across southern Africa, while the Iron Age, which only occurred within the last 2000 years, is present only in the eastern parts where summer rainfall allowed for the raising of summer crops. Stone-walled settlements dating to the Iron Age have been widely documented in parts of the Free State and adjacent Northern Cape (Maggs 1976a, 1976b) but the Iron Age appears to be absent from the immediate study area and its surrounds. Later Stone Age (LSA) stone-built dwellings occur along the Riet River to the west (Humphreys 1972, 2009). With the exception of the rich MSA deposits of Florisbad (Kuman et al. 1999), archaeological resources appear to be quite rare in this flat, open and well-grassed landscape. Archaeological material is, however, more common along the major rivers where artefacts are revealed in the river terrace gravels. Webley (2010) surveyed an area to the southeast of the present study area and reported a complete absence of any archaeological material of any sort. She further noted that stone suitable for the manufacture of flaked tools was not present and that the quantity of other rock available on the surface was insufficient to allow for the construction of stone dwellings. Hutten's (2011) survey of land to the north of Boshoff showed similar results but in that case a pan was present with a large scatter of MSAs and LSAs present alongside it. This demonstrates the preference to settle close to water sources that is prevalent across much of the relatively dry interior of southern Africa.

5.3.3. Built environment

Historical resources will be primarily associated with farmsteads, although most are likely to be fairly recent, perhaps dating to the late 19th or early 20th centuries. The town of Dealesville is relatively recent, dating to 1899 (Raper n.d.). It was laid out on the farm Klipfontein belonging to John Henry Deale and was awarded municipal status in 1914. The second Anglo-Boer War (1899-1902) played a significant role in South African History, particularly in the interior of the country. Many battles were fought between the British and Boer forces. Significant battles in proximity to the present study area include the Battles of Modder River and Magersfontein 100 km to the southwest and west respectively, the Battle of Paardeberg 60 km to the southwest and the Battle of Driefontein just outside Bloemfontein, some 60 km to the southeast. Graves, graveyards and memorials across the central interior of South Africa serve as reminders of the war.

5.3.4. Cultural landscape

The impacts associated with the cultural landscape will probably be of low significance and, in general, visual impacts to the landscape are not expected to be significant. The visual impacts will be assessed as part of the Visual Impact Assessment undertaken as part of the EIA.

5.4. Socio-economic environment

The description of the Socio-Economic Environment of the study area is based on specialist input from Dr Hugo van Zyl from the Independent Economic Researchers⁹.

5.4.1. Current land uses

The proposed facility would cover several farms which are zoned as Agriculture. These farms and those surrounding it, engage primarily in livestock farming and cultivation of crops such as maize, where water and soil resources allow for this. Farming is also the key productive land use in the wider areas surrounding the site (see the Section 5.2.4 above for details on agriculture in the area).

Aside from farming, salt production is a relatively prominent land use and salt works can be found at Dealesville and Soutpan. A number of other salt pans that are not used for commercial purposes are also to be found in the area.

Tourism land uses (often in combination with farming activities) are also found in the wider area. Salt pans and thermal springs such as Florisbad/Baden-Baden are key attractions in the area and the nearest formally conserved area is the Soetdoring Nature Reserve on the banks of the Krugersdrift Dam approximately 30km south-east of Dealesville. Game farms offering hunting can also to be found.

5.4.2. Demographics

According to the 2011 Census, the total population in the Lejweleputswa District was 627, 593 persons while that of the Tokologo Local Municipal (TLM) area was 28,982 (Table 5.11). For Tokologo this is down from roughly 32,455 in 2001 and represents a significant annual decline of 1.13% over the period. The overall population of the Free State essentially remained the same over the period and therefore well below the national average. The 2011 population of Dealesville was 5,477 with the majority of people living in Tswaraganang. Boshof had a population of 3,853 and approximately 4,651 people live in Seretse adjacent to Boshof.

Table 5.11: Population numbers in the wider study area in 2011

| Population group | Free State | Lejweleputswa District | Tokologo | Boshof | Seretse | Dealesville (incl. Tswaraganang) | Tswaraganang |
|------------------|------------------|------------------------|---------------|--------------|--------------|----------------------------------|--------------|
| Black African | 2,405,315 | 557,926 | 24,479 | 2,227 | 4,449 | 4,867 | 4,298 |
| Coloured | 83,833 | 11,864 | 1,328 | 730 | 160 | 71 | 35 |
| Indian or Asian | 10,397 | 2,243 | 197 | 12 | 26 | 96 | 12 |
| White | 238,959 | 54,199 | 2,880 | 848 | 11 | 397 | 3 |
| Other | 6,787 | 1,361 | 98 | 36 | 5 | 16 | 5 |
| Total | 2,745,291 | 627,593 | 28,982 | 3,853 | 4,651 | 5,447 | 4,353 |

Source: Census 2011

⁹ EIA of 12 Solar Energy Projects Proposed by Mainstream near Dealesville, Free State: Socio-Economic Input to Scoping, (Van Zyl, 2014)

5.4.3. Employment and sectors

Unemployment is a major challenge in the area and it is likely that the relatively weak economy will result in further pressure on employment. Unemployment in the Tokologo Municipality was estimated at approximately 27% in 2011 which is roughly the same as the 2001 rate (Table 5.12). Unemployment levels in Dealesville (including Tswaraganang) were somewhat higher at 32% whilst those in Seretse were particularly high at 49%.

Table 5.12: Unemployment in the wider study area in 2011

| Employment status | Free State | Lejweleputswa District | Tokologo | Boshof | Seretse | Dealesville (incl. Tswaraganang) | Tswaraganang |
|---------------------|------------|------------------------|------------|------------|------------|----------------------------------|--------------|
| Employed | 649,500 | 143,129 | 6,614 | 625 | 613 | 930 | 670 |
| Unemployed | 313,771 | 82,252 | 2,504 | 291 | 579 | 442 | 383 |
| % unemployed | 33% | 36% | 27% | 32% | 49% | 32% | 36% |

Source: Census 2011

Table 5.13 reports on the division between formal and informal employment in 2011. It shows that 27% of those people with jobs in Dealesville / Tswaraganang were in the informal sector which is a substantially larger portion than for the Lejweleputswa District or Free State province at 15% and 17% respectively.

Table 5.13: Formal versus informal employment in the wider study area in 2011

| Employment per sector | Free State | Lejweleputswa District | Tokologo | Boshof | Seretse | Dealesville (incl. Tswaraganang) | Tswaraganang |
|-------------------------------------|------------|------------------------|------------|------------|------------|----------------------------------|--------------|
| Formal sector | 455307 | 104013 | 4065 | 477 | 470 | 599 | 402 |
| Informal sector | 93576 | 17903 | 1067 | 86 | 64 | 218 | 162 |
| % informal sector employment | 17% | 15% | 21% | 15% | 12% | 27% | 29% |

Source: Census 2011

Unfortunately the 2011 Census did not collect data on employment levels per industry or sector. The 2001 Census statistics contained in Table 5.14 are still, however, instructive in this regard. They show the clear dominance of the agricultural sector in the area in terms of employment provision (53% of employment).

Table 5.14: Employment per industry in the wider study area in 2001

| Sector | Free State | Lejweleputswa District | Tokologo |
|---|-------------|------------------------|-------------|
| Agriculture; hunting; forestry and fishing | 19% | 18% | 53% |
| Mining and quarrying | 8% | 26% | 3% |
| Manufacturing | 9% | 4% | 2% |
| Electricity; gas and water supply | 1% | 1% | 0% |
| Construction | 4% | 3% | 1% |
| Wholesale and retail trade; repairs; hotels and restaurants | 13% | 12% | 6% |
| Transport; storage and communication | 4% | 3% | 1% |
| Financial; insurance; real estate and business services | 6% | 4% | 2% |
| Community; social and personal services | 20% | 14% | 9% |
| Private households | 16% | 15% | 22% |
| Extraterritorial organisations | 0% | 0% | 0% |
| Representatives of foreign governments | 0% | 0% | 0% |
| Total | 100% | 100% | 100% |

Source: Census 2001

5.4.4. Income levels

Table 5. 15 reports on household income levels in the study area for 2011. In the local area near the site, these were lower than the provincial averages with approximately 51% of households in the Tokologo having incomes below R19,600 per year in 2011 which was the same proportion as for Dealesville / Tswaraganang. By comparison, households in Boshof had a lower percentage of households in this income category (41%) while Seretse had a similar proportion (47%).

Table 5. 15: Household incomes in the study area in 2011

| Annual household income level | Free State | Lejweleputswa District | Tokologo | Boshof | Seretse | Dealesville (incl. Tswaraganang) | Tswaraganang |
|-------------------------------|------------|------------------------|----------|--------|---------|----------------------------------|--------------|
| No income | 12% | 15% | 10% | 12% | 14% | 12% | 13% |
| R 1 - R 4800 | 6% | 5% | 5% | 4% | 7% | 7% | 7% |
| R 4801 - R 9600 | 9% | 8% | 8% | 7% | 10% | 8% | 8% |
| R 9601 - R 19 600 | 21% | 20% | 28% | 18% | 26% | 24% | 24% |
| R 19 601 - R 38 200 | 21% | 20% | 25% | 20% | 24% | 25% | 26% |
| R 38 201 - R 76 400 | 13% | 14% | 11% | 15% | 10% | 11% | 12% |
| R 76 401 - R 153 800 | 8% | 8% | 6% | 11% | 5% | 7% | 6% |
| R 153 801 - R 307 600 | 6% | 6% | 4% | 7% | 3% | 4% | 3% |
| R 307 601 - R 614 400 | 3% | 3% | 2% | 3% | 1% | 1% | 1% |
| R 614 001 - R 1 228 800 | 1% | 1% | 0% | 1% | 0% | 0% | 0% |
| R 1 228 801 - R 2 457 600 | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| R 2 457 601 or more | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Total | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

Source: Census 2011

Figure 5.13 shows the trend in the dependency ratio within the Tokologo Municipality over time which declined from 64.9% in 1996 to 58.9% in 2011. This implies that the proportion of the total population in the working age group (15-65 years) has been gradually increasing relative to the young (0-14 years) and the elderly (15-65 years).

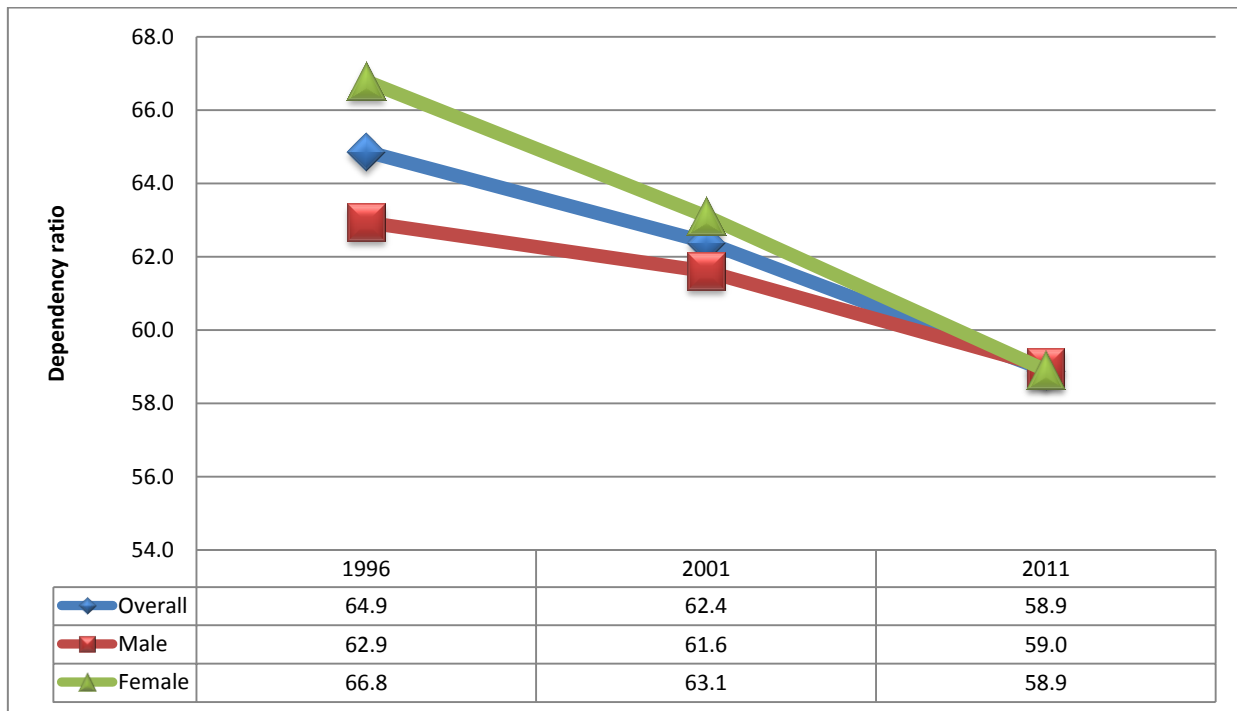


Figure 5.13: Tokologo dependency ratio by gender (TLM, 2014 using Statistics SA data)

5.4.5. Education levels

Table 5.16 reports on the portion of the total population per highest education level achieved for 2011. Approximately 11% of people in the Tokologo Municipality and Dealesville / Tswaraganang had completed Grade 12 which was below the District and provincial proportions of 16% and 17% respectively. By comparison, 14% of people in Boshof had completed Grade 12 while only 9% had achieved this level in Seretse.

Table 5.16: Highest education level achieved in 2011

| Highest education level achieved | Free State | Lejweleputswa District | Tokologo | Boshof | Seretse | Dealesville (incl. Tswaraganang) | Tswaraganang |
|----------------------------------|------------|------------------------|----------|--------|---------|----------------------------------|--------------|
| No schooling | 5% | 5% | 13% | 10% | 14% | 12% | 13% |
| Some primary | 16% | 16% | 19% | 15% | 22% | 20% | 21% |
| Completed primary | 4% | 4% | 5% | 3% | 5% | 4% | 5% |
| Some secondary | 38% | 40% | 34% | 27% | 37% | 35% | 38% |
| Grade 12/Std 10 | 17% | 16% | 11% | 14% | 9% | 11% | 11% |
| Higher | 6% | 5% | 3% | 4% | 2% | 2% | 1% |
| Other | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Unspecified | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Not applicable | 13% | 14% | 15% | 27% | 12% | 14% | 11% |
| Total | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

Source: Census 2011

Figure 5.14 shows the highest education levels achieved over time for people in Tokologo. Between 1996 to 2011 those receiving matric certificates increased from 5.4% to 12.6%. On the other hand, there was a decrease in proportion of people who attained some form of higher education from 2.2% in 1996 to 0.6% in 2011.

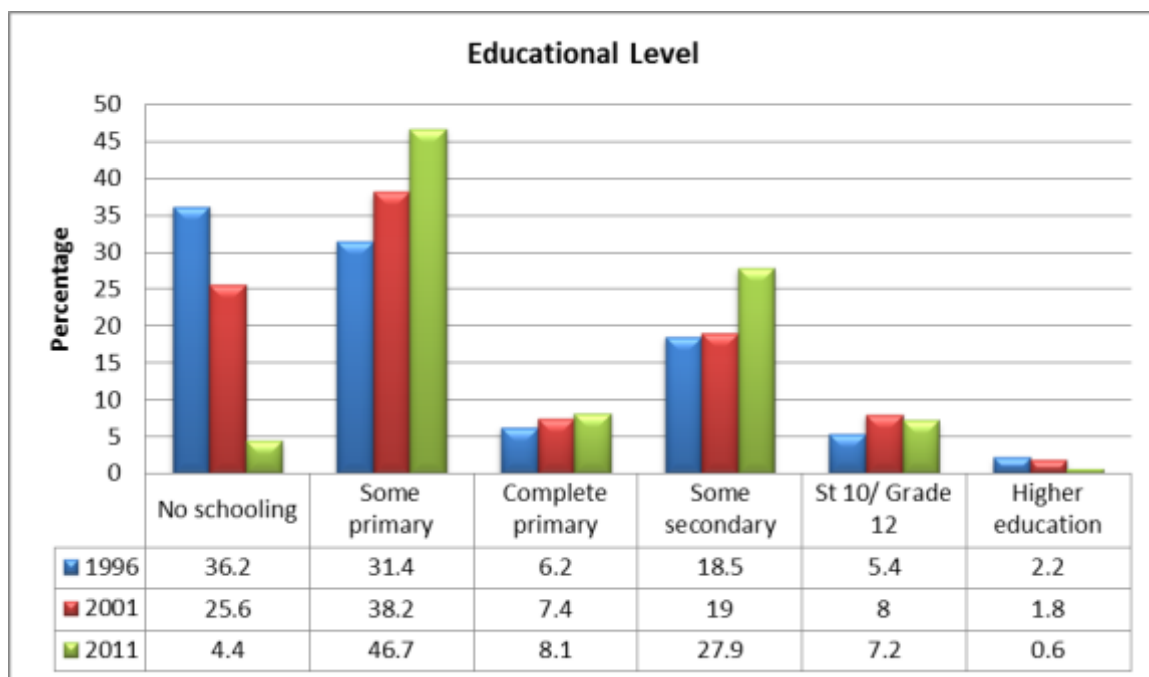


Figure 5.14: Tokologo education levels over time (TLM, 2014 using Statistics SA data)

5.4.6. Availability of municipal services

The availability of basic services such as housing, piped water, sewage, electricity can be used to indicate overall welfare levels to a degree. With this in mind, this section focuses on service levels for two indicators in the form of housing and piped water. Figure 5.15, shows the percentage of households in Tokologo per dwelling type between 1996 and 2011. The number of households living in informal dwellings decreased significantly over this period while those in formal dwellings increased from 66% in 1996 to 84% in 2011.

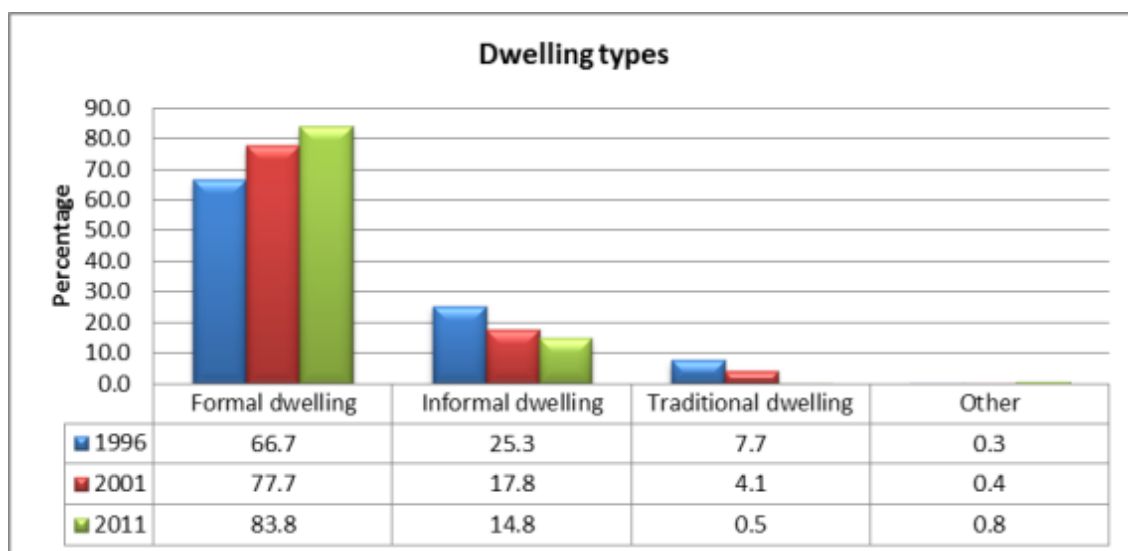


Figure 5.15: Tokologo Municipality percentage of households per dwelling type (1996 to 2011) (TLM, 2014 using Statistics SA data)

Figure 5.16, shows the percentage of households in Tokologo Municipality with access to piped water between 1996 and 2011. The number of households with piped water delivered to their properties increased dramatically from 32% in 1996 to 87% in 2011.

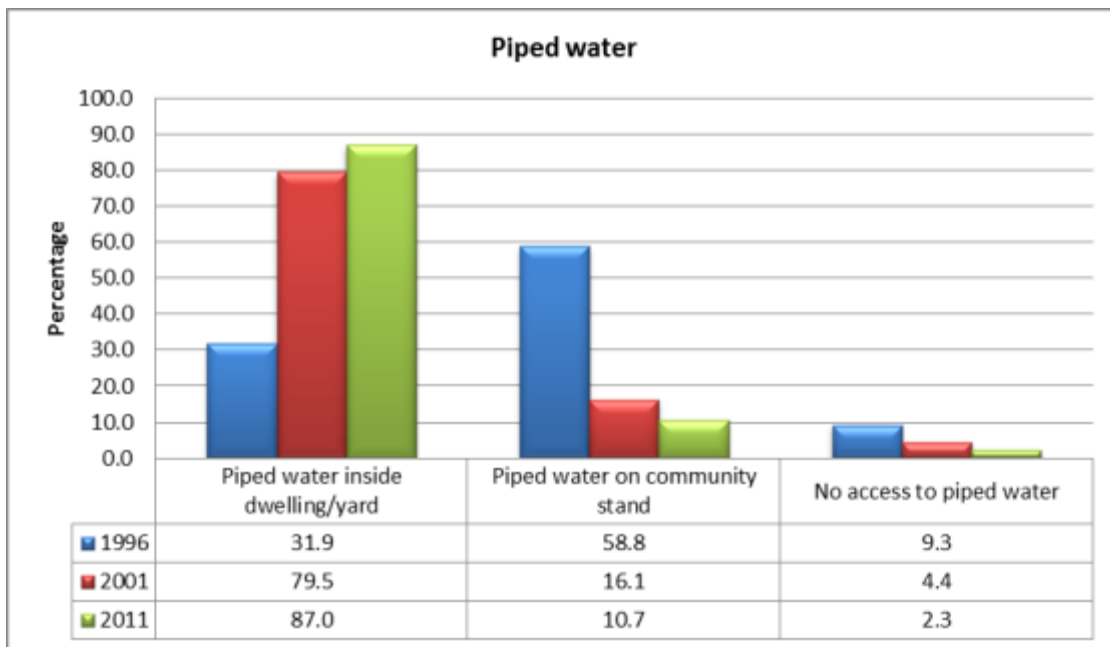


Figure 5.16: Tokologo Municipality percentage of households with access to piped water (1996 to 2011) (TLM, 2014 using Statistics SA data)

5.4.7. Socio-economic growth and development priorities

In terms of future economic development goals, the 2014/2015 Integrated Development Plan (IDP) of the Tokologo Municipality is most instructive. In this Plan, the municipality clearly recognises the need to accelerate growth and service delivery. In its mission statement it strives to provide a better life for all residents within its area of jurisdiction through (TLM, 2014):

- “Creating conditions for economic growth and sustainability
- Improving access to basic services
- Promoting social upliftment through improved education, skills development and job opportunities
- Ensuring cooperative, transparent and democratic governance through community participation and involvement
- Create a healthy and safe environment and
- Improving sport and recreation facilities”

The development perspective section of the IDP focused on economic development and job creation provide a further set of aims as follows (TLM, 2014):

- “To develop and diversify the local economy on a sustainable manner to increase the overall competitive advantage thereof.

- The focus is on the development and diversification of the following three sectors - agriculture, manufacturing and tourism
- To stimulate local economic development to reverse the current trends of decline and lack in diversity of the economy “the growth economic pie”
- To providing assistance, training and information to entrepreneurs in the area to enable them to develop and manage their businesses in an economically viable manner
- To address local factors that affect economic growth - factors that make conducting business in the area attractive and effortless as possible. This includes an attractive physical and commercial environment
- To act on the development opportunities originating from the various corridors running through the area, as well as other business zones and development zones.”

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consisting of twelve solar PV or CPV facilities,
Dealesville, Free State

Chapter 6:

Identification of Issues and Potential Impacts



DRAFT SCOPING REPORT



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6. IDENTIFICATION OF ISSUES AND POTENTIAL IMPACTS



The purpose of this chapter is to present a synthesis of the key issues and potential impacts that have been identified thus far in the Scoping process. These issues and impacts have been identified via the environmental status quo of the receiving environment (environmental, social-economic and heritage features present on the project sites), a review of environmental impacts from other similar solar projects and input from specialists that form part of the EIA team. The Terms of References (ToR) for the specialist studies have been developed (based on the relevant issues and impacts discussed within this chapter) are incorporated into the Plan of Study for the EIA (Chapter 7).

6.1. Soils and Agricultural Potential

The following have been identified as potential impacts on agricultural resources and productivity. All the soil and agriculture impacts are local in extent i.e. they are confined to the site.

- Loss of agricultural land use due to direct occupation by the infrastructural footprint of the development for the duration of the project (all phases). This will take affected portions of land out of agricultural production;
- Soil erosion by wind or water due to alteration of the land surface characteristics. Alteration of surface characteristics may be caused by construction related land surface disturbance, vegetation removal, panel surfaces and the establishment of hard standing areas, surfaces and roads. Erosion will cause loss and deterioration of soil resources and may occur during all phases of the project;
- Loss of topsoil due to poor topsoil management (burial, erosion, etc.) during construction related soil profile disturbance (levelling, excavations, road surfacing etc.) and resultant decrease in that soil's capability for supporting vegetation;
- Generation of alternative land use income through rental for energy facility. This will provide farming enterprises with increased cash flow and rural livelihood, and thereby improve the financial sustainability of farming on site; and
- Cumulative impacts due to the regional loss of agricultural resources and production as a result of other developments on agricultural land in the region.

The significance of the soil and agricultural impacts may be reduced by the limited agricultural capability of the area, although loss of potentially arable land will have higher significance than land that is only suitable for grazing.

6.1.1. Assessment to be undertaken during the EIA phase of the project

A Soil and Agricultural Potential study will be undertaken by Johann Lanz (soil scientist) in order to assess the potential impacts of the proposed development on soils and agricultural potential for both environmental and economic aspects on the site.

6.2. Visual Impacts

Dealesville is a service centre for the surrounding agricultural community and is located within 10 km of the proposed development sites. It is a small village on the provincial road between Bloemfontein and Kimberley (R64). The R59 connects Dealesville with Hertzogville to the north. There are two large substations (765 kV) in the study area, namely Beta and Perseus, with high voltage transmission lines traversing the landscape.

➤ *Construction phase*

There are various aspects of the construction phase that will contribute to the visual impact caused by the development:

- Areas will be cleared of vegetation for the solar field, equipment laydown areas and buildings, although regrow is encouraged following construction and only cut back to limit shading;
- Construction activities and equipment associated with construction of the development, including access roads and buildings;
- An increase in traffic can be expected on rural roads, particularly large construction and freight vehicles;
- The nightscape will potentially be affected by security and construction lighting at night;
- Dust generation during the construction phase will draw attention to the development over a wide area (i.e. increase the visibility of construction activities); and
- There is also potentially an increase in the risk of veld fires occurring during this phase which will have a similar visual effect to dust generation.

Key issues during the construction phase are:

- Potential visual intrusion of construction activities on the existing views of sensitive visual receptors in the rural landscape.
- Potential visual intrusion of a large area cleared of vegetation on the existing views of sensitive visual receptors.
- Potential visual impact of night lighting during the construction phase on the nightscape of the region.

➤ *Operational phase*

A number of elements of the photovoltaic solar plants will potentially intrude on the existing views of visual receptors. In particular the very large solar fields (thousands of 3 to 15 m high solar panels potentially covering an area of up to 400 hectares per project), tall structures such as substations and overhead distribution lines connecting the plant with the national power grid at Perseus or Beta substations.

Key issues related to the operational phase of the development are:

- Potential landscape impact of introducing a large solar plant into a rural agricultural landscape;
- Potential visual intrusion of a large solar field on the existing views of sensitive visual receptors in Dealesville;

- Potential visual intrusion on views and viewpoints on game farms and private nature reserves in the region surrounding the proposed sites;
- Potential impact of night lighting of the development on the surrounding nightscape;
- Potential cumulative visual impact of 12 photovoltaic solar plants and two large Eskom substations on the existing rural agricultural landscape; and
- Potential cumulative visual impact of 12 photovoltaic solar plants and two large Eskom substations on the existing views and viewpoints of sensitive visual receptors in the region.

The desktop study of potential visual impacts suggests that the main contributions to the significance of the visual impact for this project will centre on the solar field, on-site substation, collector substation and energy storage facility during the operational phase of each plant.

6.2.1. Assessment to be undertaken during the EIA phase of the project

During the EIA phase, a Visual Impact Assessment will be conducted by Henry Holland, from MapThis Trust, that includes a site investigation in order to assess the potential visual impacts of the proposed development on the surrounding communities and regional setting.

6.3. Aquatic Ecology

Several waterbodies, including wetlands, rivers and pans are present within the study area. A preliminary recommendation, based on the observed water bodies, is that a 50 m buffer be placed around all the delineated water courses/rivers. The proposed buffer recommendations are based on National guidelines that will be discussed in detail within the EIA report. The appropriate buffer zones will be determined following the site visit undertaken during the EIA phase.

The proposed facility layout will be assessed with regard to potential construction and operation impacts on the aquatic environment, with the following key issues being assessed:

- The potential loss of aquatic habitat (physical destruction);
- Loss of ecosystem services;
- Habitat fragmentation (loss of support areas); and
- Sedimentation and erosion.

6.3.1. Assessment to be undertaken during the EIA phase of the project

During the EIA phase, an Aquatic Impact Assessment will be undertaken by Dr. Brian Colloty, from Scherman Colloty and Associates.

6.4. Terrestrial Ecology

Solar energy facilities require relatively large areas of land for the placement of PV panels and associated infrastructure. Issues relevant to the impacts on the ecology of the area include impacts on biodiversity, impacts on sensitive habitats, impacts on ecosystem functions, secondary and cumulative impacts on the ecology of the region and impacts on the economic use of the vegetation.

Activities associated with the proposed Kentani Solar Development that could potentially have an impact on the terrestrial ecology (i.e. flora and fauna) of the area include:

- Clearing of threatened vegetation for construction for the solar facilities and associated infrastructure;
- Establishment and construction of an internal road access network;
- Construction of distribution and transmission lines;
- Storage of chemicals and materials required for construction and operation of machinery/vehicles;
- Operation of construction camps; and
- Cleaning PV panels and management of site.

The proposed facility layout will be assessed with regard to potential construction and operation impacts on the terrestrial environment, with the following key issues being assessed:

- Loss of natural vegetation

Construction of infrastructure will lead to a direct loss of vegetation, which leads to a localised or more extensive reduction in overall vegetation. Should the vegetation already be transformed to some extent, the loss can lead to increased vulnerability of the vegetation and habitats and an elevation in the conservation status (for example from least threatened to vulnerable). As a result of an area being cleared of vegetation, there may be an increase in surface water runoff and erosion into streams and rivers.

- Habitat fragmentation - loss of biodiversity

Continuous development leads to greater habitat fragmentation, with progressively smaller patches of habitat created as a result. As the proportion of suitable habitats decreases, area and isolation effects start influencing the population size of resident species. Habitat fragmentation also has the potential to affect plant reproduction, for example, by affecting pollinators, the neighbourhood of potential mates, the availability of resources, and microclimate. The fragmentation of sensitive habitats which contain threatened, protected and/or endemic species further reduces the area they are able to occupy as well as their population sizes. As a result fragmentation leads to a decline in the numbers of these species and an eventual loss of biodiversity.

- Impacts on species of special concern

Plant species are affected through vegetation clearing as well as an overall loss of habitat. For species that are not threatened or classified as species of special concern, a loss of individuals or localised populations is not likely to alter the overall conservation status of the species. However, a loss of individuals or populations of threatened species (which is the case for a large portion of the site) could lead to a change in the conservation status of a species (reducing its chance of survival) and could even result in extinction.

- Establishment of declared weeds and alien invader plants

Areas where the soil has been disturbed through construction activities will be prone to invasion by alien invasive plant species. There is the risk that alien species could possibly invade the proposed project sites, and if left uncontrolled, be allowed to spread onto surrounding farmland.

6.4.1. Assessment to be undertaken during the EIA phase of the project

During the EIA phase, a Terrestrial Impact Assessment will be undertaken by Andrew Skowno and Simon Todd. This assessment will include impact assessments on the vegetation present in the project area and faunal ecology.

6.5. Heritage Resources

Palaeontology

There are some important fossil sites in the greater region and thus the chance of finding material of significance does exist. Florisbad is a very well-known fossil locality lying some 35 km to the east of the present study area. Here an early human cranium was recovered in 1932 (Dreyer 1935; Rightmire 1978) while mid-Pleistocene fauna and MSA stone artefacts have also been recovered (Brink 1987; Dreyer 1938). Because of its importance in terms of both palaeontology and archaeology, Florisbad has been declared a Provincial Heritage Site (SAHRIS n.d.).

Archaeology

Archaeological resources are expected to be associated primarily with water sources and since these are usually excluded from development on ecological grounds, this is not likely to be significant. No pans are evident in the study area and one water course is evident from aerial photography running from northwest to southeast immediately northwest of Dealesville. Although stone artefacts in general are expected to be rare, some isolated artefacts may be found on the surface. Anglo-Boer War relics may be present in the study area, but isolated finds are likely to be of low significance. It is not expected that heritage resources of high significance will be encountered in the study area.

Built environment and the cultural landscape

Historical resources will be primarily associated with farmsteads, although most are likely to be fairly recent, perhaps dating to the late 19th or early 20th centuries. The town of Dealesville is relatively recent, dating to 1899 (Raper n.d.). It was laid out on the farm Klipfontein belonging to John Henry Deale and was awarded municipal status in 1914.

The cultural landscape and visual impacts are not likely to be of high significance. The visual impacts will be assessed as part of the Visual Impact Assessment undertaken as part of the EIA.

6.5.1. Assessment to be undertaken during the EIA phase of the project

During the EIA Phase, a Heritage Impact Assessment (HIA) will be undertaken by Dr. Jayson Orton from ASHA Consulting PTY (Ltd) (ASHA) and Dr Lloyd Rossouw whom will be subcontracted by ASHA, who will undertake the desktop Palaeontological Impact Assessment (PIA).

6.6. Socio-economic

The key socio-economic issues include:

- Potential impacts on eco-tourism (e.g. due to visual impact on sense of place);
- Creation of temporary jobs during construction;
- Skills training for local workers during construction;
- Creation of long-term jobs during operations and skills training; and
- Potential for sourcing materials locally (during both construction and operations).

6.6.1. Assessment to be undertaken during the EIA phase of the project

A Socio-Economic Impact Assessment will be undertaken by Dr. Hugo van Zyl from Independent Economic Researchers.

6.7. Energy Storage Facility

As discussed within Chapter 3 and 4 of the Draft Scoping Report, currently, Mainstream is proposing to install Lithium Ion batteries for each project. As discussed in Chapter 4, the different energy storage technology options that could be used will be considered and assessed during the EIA phase of the project. The benefit of having energy storage facilities on site is the ability of these facilities to store surplus energy during non-peak periods so that it can be utilised during peak periods¹. Battery storage facilities are used throughout the world for the storage and supply of energy. The main issues associated with the construction and operation of energy storage facilities on site are detailed below:

- Visual impact;
- Fire, explosion, and release of toxic gas risks; and
- Leakage of battery materials during the construction and operational phases (soil and groundwater contamination and waste management).

Visual impact

The Visual Impact Assessment (discussed in Section 6.2 of this Chapter) will consider the visual impacts that these facilities may have.

Fire, explosion, and release of toxic gas risks

Proper installation in accordance with the design specifications of the energy facility will ensure that these risks are negligible.

Leakage of battery materials during the construction and operational phases (soil and groundwater contamination and waste management).

Leakage may occur during:

- Transportation of the batteries to site

Transportation of the hazardous acid substances constituting the proposed battery type to and from the site may cause unintentional spills or leakage.

- Operation of the batteries

Should the battery not be correctly installed on-site, the possibility exists that the batteries may leak. This would cause hazardous substances to potentially cause soil, surface- and groundwater contamination.

- Battery replacement

Improper handling of batteries during replacement may also result in leakage and contamination.

Based on the potential issues associated with the transportation, operation and replacement of the batteries, it is imperative that during transportation, the necessary transportation requirements be adhered to and that the batteries are placed within demarcated enclosed or banded areas. The

¹ Daim, T.U., Li, X., Kim, J., and Simms, S. 2012. Evaluation of energy storage technologies for integration with renewable electricity: Quantifying expert opinions. Elsevier 3: 29-49

facilities must be constructed, operated and handled according to the relevant South African National Standards (SANS) specifications and requirements. Appropriate management measures in terms of management of spills, leakage and waste generated and disposal methods of the waste will be discussed within the EIA reports and measures included within each facility's EMPr.

6.7.1. Assessment to be undertaken during the EIA phase of the project

The type of technology that will be used for this project will determine the necessary management measures that would need to be put into place to manage all the potential issues associated with such a facility and will determine what waste (if any) is generated and appropriate disposal thereof, battery replacement requirements, transportation requirements etc. Therefore, during the EIA phase, the preferred technology's design specifications, risks and impacts associated with this technology, and appropriate handling measures of the battery will be assessed and appropriate management measures included within each facility's EMPr.

The impact that the construction, operation and decommissioning of the facilities will have in terms of visual, heritage, ecology etc. will be assessed by the specialists as part of their respective specialist studies.

6.8. Air quality and dust

The air quality of the area is generally very good given that the area is predominantly agricultural and rural in character. The absence of heavy industries also contributes to the good air quality. During the construction phase some of the vegetation will be destroyed by machinery on site, although vegetation clearing of the whole site will not occur. As a result, certain areas of bare soil will be exposed to winds that will generate dust is likely to be generated (this will be enhanced by the movement of construction vehicles on site). The generation of dust is expected to be short-term and restricted primarily to the construction phase of development. Standard dust control interventions used in civil construction projects must be applied in order to minimise the impact of dust on surrounding receptors. It must also be noted that the presence of dust reduces the effectiveness of the PV panels during operation and it is therefore in the operator's best interests to minimise dust emanating from the proposed project sites during the operational phase of the development.

6.8.1. Assessment to be undertaken during the EIA phase of the project

Given the above actions, the impact of the proposed projects on air quality is considered negligible and does not require a specialist study during the EIA process. Management actions will be incorporated into the EMPr which will be prepared as part of the Impact Assessment phase and will form part of the EIA Report.

6.9. Water usage

Water will be required during the construction phase of development predominantly for human consumption (i.e. workers on the site will need water for drinking and ablution facilities). In addition, the maintenance of solar panels will require water for the washing of panels during the operational phase of development. It is anticipated that cleaning will take place on a quarterly basis depending on annual rainfall, however, the cleaning regime may need to be revised should site conditions make the cleaning regime more onerous i.e. more frequent.

The project applicant intends to source the required water from the local municipality. If this is not feasible, alternative options would be to tanker in the required water or borehole abstraction.

Details regarding the sourcing of water for use in panel cleaning will be determined as the project design progresses.

Dry water courses and drainage lines occurring within the proposed project sites, run the risk of being impacted on by the proposed projects. The potential impact of wash-water on these features will be considered during the EIA phase.

6.9.1. Assessment to be undertaken during the EIA phase of the project

Given the minimal quantity of water required for the panels' quarterly washing activities, the impact of the proposed projects on water usage is considered to be low. Appropriate management actions will be incorporated into the EMPr that will form part of the EIA Report.

6.10. Waste generation

Solid waste will be generated during the construction phase of development and is likely to consist of biodegradable waste (i.e. cleared vegetation), general waste (paper, packaging, plastics, food waste) and construction related waste such as metal off cuts, etc. During the operational phase, general waste is expected to be generated from food wastes, packaging, paper, etc. Solid waste that might be produced during routine maintenance must be disposed of at the closest registered landfill. There is no known solid waste that could be classified as hazardous in terms of the National Environmental Management: Waste Act (Act No. 59 of 2008) (NEMWA). The associated impact is therefore considered negligible provided that an appropriate waste management plan is efficiently implemented.

The proposed projects that form part of the Kentani Solar Development will need to undergo routine maintenance which will necessitate the use of gear oils, hydraulic oils, grease and other lubricants. Accidental spillage of small amounts of oil for machinery maintenance or from vehicles may contaminate the soil. Management and mitigation measures to ensure optimal use and recycling of material and to minimize the possibility of soil pollution on site will be included in the EMPr. Waste may also be generated by the energy storage facilities during maintenance or replacement of the batteries. This waste disposal requirements will depend on the technology being used (as discussed in Section 6.7) and will be included within the projects' EMPRs.

Waste water will also be generated from human activities (e.g. hand washing on the site), and water used for construction purposes (e.g. for washing tools). Sewage will also be generated on site (portable ablutions). The sewage would be then treated at the municipal sewage works. The alternative is to install a contained system on site that will need to be cleared periodically.

6.10.1. Assessment to be undertaken during the EIA phase of the project

Given the existing knowledge about the anticipated waste outputs and the management measures to be put in place, waste generation is not considered to require a specialist study and will not be considered further in the EIA process. Appropriate waste management actions will be incorporated into the project specific EMPr that will form part of the EIA Report.

6.11. Noise emissions

The operation of the proposed Kentani Solar Development will not generate any significant sources of noise. In essence the operation will be silent as no moving parts are used. Noise will be generated mainly from temporary maintenance and non-routine operations. The potential impacts of these temporary activities on noise emission is not known at this stage, however it is most likely that the noise level will be under the threshold of acceptable emission targets.

A potential key issue is noise generated by the construction activities, workers and vehicles on the site. The town of Dealesville is the nearest large scale receptors. It is predicted that any low level noise resulting from construction activities will be negligible.

6.11.1. Assessment to be undertaken during the EIA phase of the project

Noise impacts will therefore not be addressed further in this EIA process. To avoid potential night-time noise impacts, it is recommended that the construction activities should take place only during the day.

6.12. Traffic generation

As discussed in Chapter 3 of the Draft Scoping Report, the main access roads that will be used are the R64, S322 and the unnamed road between Dealesville to Petrusburg. The R64 is a Regional Road and extends from Kimberley, which is the most western point of the road, to Bloemfontein in the east. This National Road is designed for minimum daily traffic exceeding 1000 vehicle units. The S322 and unnamed road, are Secondary Roads. A secondary road is normally designed for a maximum daily traffic limit of 500 vehicles. Existing farm roads will be used to access the site and internal roads will be constructed to each facility. The width of the internal access roads will be 8 - 10 m, whilst the length will be confirmed as the location, design and layout of the facility progresses.

Three traffic counts for roads surrounding the project site are available from the South African National Roads Agency Limited (SANRAL) database (Figure 6.1). The location of the traffic counts and the relevant Average Daily Traffic (ADT) and Average Daily Truck Traffic (ADTT) are shown in Table 6.1.

It is currently estimated that during the peak of the construction phase, a project will require 300 - 350 workers on site. The amount of people on site daily during the operational phase will be considerably less. As noted previously, it is planned that these projects will be undertaken in phases, therefore, not all the projects will be in the construction phase at the same time.

Table 6.1: Available traffic counts of roads within the project area.

| Location | Count taken | ADT | ADTT |
|----------|-------------|-----|------|
| A | 2006 | 13 | 3 |
| B | 2006 | 126 | 29 |
| C | 2006 | 86 | 18 |

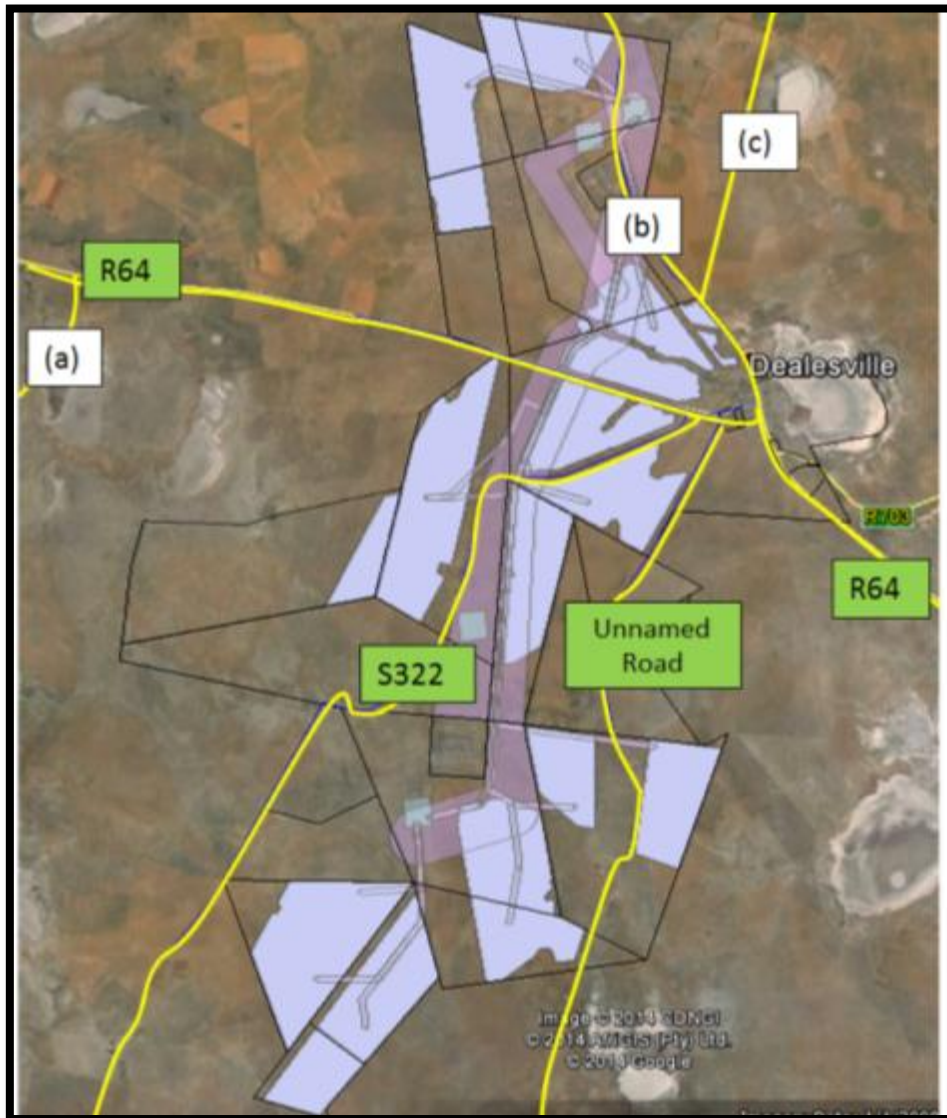


Figure 6.1: Main roads to be used and traffic counts available for roads in the Dealesville area

6.12.1. Assessment to be undertaken during the EIA phase of the project

The anticipated traffic loads on both the R64 and S322 roads 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 are considered acceptable. To this end, no further traffic assessments will be undertaken during the EIA phase.

6.13. Potential risks associate with the Decommissioning Phase

The key issues regarding decommissioning are:

- Generation of waste;
- Potential termination of the employment opportunities associated with the solar energy facility; and

- Necessity to rehabilitate or restore the solar energy facility development footprint.

Generation of waste

At this stage, it can be assumed that the generation of waste is a potential direct impact. The removal of the supporting infrastructure (e.g. the energy storage facility, cabling, fencing and control rooms, etc.) will generate waste. Recommendation regarding the management of decommissioning wastes will be included in the EMPr, e.g. where feasible, waste must be re-used or recycled. For example, steel support structures may be suitable for re-use elsewhere or recycled to form new products. The amount of waste will be limited and is not expected to significantly reduce the capacity of the closest operational landfill.

Potential termination of the employment opportunities associated with the solar energy facility

With respect to socio-economic aspects, the jobs that were offered within the solar energy facility will be terminated. At the approach of the decommissioning phase, staff employed at the facility and contracted service providers must be given adequate notice so that they may seek alternative employment.

Necessity to rehabilitate or restore the solar energy facility development footprint

With respect to ecology and vegetation issues, the development footprint must be returned to an ecological functional state. The strategy for rehabilitating or restoring the development footprint will be developed in the course of the EIA, for incorporation into the project EMPr.

6.14. Cumulative impacts

The cumulative impacts will be assessed by considering impacts that the combined 12 proposed solar facilities (should all the project be authorised) will have during construction, operational and decommissioning phases on the receiving environment consisting of the biophysical, heritage and socio-economic environment. Cumulative impacts associated with these types of projects include inter alia:

- Increase in 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;
- Social upliftment; and
- Upgrade of infrastructure and contribution of renewable energy into the National Grid.

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Chapter 7:

Plan of Study for the Environmental Impact Assessment



DRAFT SCOPING REPORT

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7. PLAN OF STUDY FOR THE ENVIRONMENTAL IMPACT ASSESSMENT



This chapter presents the Plan of Study for the Environmental Impact Assessment (PSEIA), which is based on the outcomes of the Scoping Phase (to date) and provides the ToR for the specialist studies that have been identified, the alternatives that will be considered and assessed and the PPP that will be undertaken during the EIA phase. The project schedule is also included within this chapter, showing key dates and milestones.

7.1. Identification of issues

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 PSEIA sets out the process to be followed in the EIA phase and is shaped by the findings of the scoping process. The EIA phase consists of three parallel and overlapping processes:

- Consultation process where the authorities and the public's inputs are integrated and presented in the Draft and Final EIA Reports (Sections 7.2 and 7.4);
- PPP whereby findings of the EIA phase are communicated, discussed and responses documented (Section 7.3); and
- Specialist studies that provide additional information to address the issues identified in the scoping phase (Sections 7.5 and 7.6).

7.2. Overview of Approach to Preparing the EIA Report and EMPr

It is proposed that the EIA process will be undertaken in an integrated manner i.e. a single Draft EIA Report and a single Final EIA Report will be compiled for the Kentani Solar Development. Within the Draft and Final EIA reports, each of the 12 facilities' impacts will be assessed and discussed individually by the EIA team. This approach will ensure that the management, monitoring and mitigation measures that are required for each solar project are included within each proposed project's Draft Environmental Management Programme (EMPr). Therefore, 12 Draft EMPrs will be included within the EIA reports. The elements within the EIA process where there is overlap between the different projects, such as project description and PPP, will be discussed together.

The results of the specialist studies and other relevant project information will be synthesised and integrated into the Draft EIA Report. The Draft EIA Report will be released for a 40-day I&AP and authority review period, as outlined in Sections 7.3 and 7.4.

All registered I&APs on the project database will be notified in writing of the release of the Draft EIA Report for a 40-day commenting period. It is proposed that during this commenting period one public meeting will be organised or, following stakeholders' requests, several focus group meetings with key I&APs. The purpose of these meetings will be to provide an overview of the outcome and recommendations from the specialist studies, as well as provide opportunity for comment. Comments raised through written correspondence (emails, comment forms) and at meetings (public meeting and/or focus group meetings) will be captured in a Comments and Responses Trail for inclusion in the Final EIA Report. It should be noted that the Final EIA Report will be released for a 21-day public review period. Comments on the Final EIA Report should be submitted directly to the DEA, with a copy of the comments submitted to the EAP.

As discussed above, the Draft EIA Report will include 12 Draft EMPs for each of the solar projects containing project specific mitigation, management and monitoring requirements, which will be prepared in compliance with the relevant regulations and the relevant Eskom guidelines. These EMPs will be based broadly on the environmental management philosophy presented in the international standard; ISO 14001, which embodies an approach of continuous improvement. Actions in the EMPs will be drawn primarily from the management actions identified in the specialist studies for the construction and operational phases of the project. If the solar facility 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.

7.3. Public Participation Process

The key steps in the PPP for the EIA phase are described below. This approach will be confirmed with the provincial and national environmental authorities through their review of the PSEIA. As discussed in Chapter 1 and Section 7.2 of Chapter 7 of this Draft Scoping Report, the 12 Solar PV projects collectively form the Kentani Solar Development and therefore the integrated Scoping and EIA Reports will be compiled for all twelve projects during the EIA process. Therefore, the PPP will be also be integrative, i.e. all adverts, site notices, notification letters etc. will serve to notify the public and organs of state of the availability of the availability of the Scoping and EIA Reports containing information on the abovementioned twelve projects and will provide I&APs with an opportunity to comment on the reports. This process is outlined in Figure 2.1 included in Chapter 2 of the Draft Scoping Report. This approach is proposed because of the close proximity of the sites (i.e. the proposed projects will take place in the same geographical area), the streamlining of the PPP, ensuring transparency of the process and providing I&APs with a holistic picture of the proposed development.

Task 1: Review of Draft EIA Report and EMP

The first stage in the process will entail the release of a Draft EIA Reports for a 40-day public and authority review period. Relevant organs of state and I&APs will be informed of the review process in the following manner:

- Placement of one advertisement in Volksblad and Mangaung Express newspapers to notify potential I&APs of the availability of the Draft EIA Reports;
- A letter to all registered I&APs (including authorities), with notification of the 40-day public review period for the Draft EIA Reports and invitation to attend the Public Meeting or Focus Group Meetings, if required;
- Public Meeting or Focus Group Meetings with I&APs (e.g. affected and surrounding landowners) on the Draft EIA Reports, where key findings of the Impact Assessment Reports will be communicated and I&APs will have the opportunity to provide comments and engage with the EIA team and project proponent; and
- Meeting(s) with key authorities involved in decision-making for this EIA.

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

- Copies of the reports will be placed at the Dealesville and Boshof local libraries;
- Relevant organs of state and registered I&APs will be provided with hard copy of the report or a CD with the report on it; and
- Report will be placed on the project website: www.csir.co.za/eia/kentanisolar

Task 2: Comments and Responses Trail

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

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

The comments received will be compiled into a Comments and Responses Trail for inclusion in the Final EIA Report. The Comments and Responses Trail will indicate the nature of the comment, as well as when and who raised the comment. The comments received will be considered by the EIA team and appropriate responses provided by the relevant member of the team and/or specialist. The response provided will indicate how the comment received has been considered in the Final EIA Report and in the project design or EMPs for the projects.

Task 3: Compilation of Final EIA Reports for submission to authorities

The Final EIA Report, including the Comments and Responses Trail and EMP, will be submitted to the authorities (i.e. the DEA) for decision making. I&APs will be given a reasonable period (i.e. 21-days) to comment on the changes to the Final EIA Report. This 21-day comment period will run in parallel with the authority decision-making phase (however this will be confirmed with the DEA during the EIA Phase). A notification letter will be sent to all I&APs on the project database notifying them of the submission and availability of the Final EIA Report. The Final EIA Report will be distributed as follows:

- A Copy of the report will be placed at the Dealesville and Boshof local libraries;
- Relevant organs of state and registered I&APs will be provided with hard copies of the reports or a CD with the reports on it; and
- Report will be placed on the project website: www.csir.co.za/eia/kentanisolar

The following comments on the Final EIA Report and EMPs will be documented:

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

Comments on the Final EIR should be submitted directly to the DEA, with a copy of the comments submitted to the EAP.

Task 4: Submission of comments received on the Final EIA Reports

Following the 21-day commenting period, the EAP will notify the DEA of the end of the commenting period and confirm the comments that were received on the Final EIA Report. The DEA will then review the Final EIA Report and determine whether to accept or reject the Final EIA Report.

Task 5: Environmental Authorisation (EA) and Appeal Period

All I&APs on the project database will receive notification of the issuing of the EAs and the appeal period. The current NEMA Regulations stipulate that I&APs need to be informed within 12 days after receipt of the environmental decision. All registered I&APs will be informed of the outcome of the environmental decisions on the 12 projects and the appeal procedure and its respective timelines.

I&APs need to lodge their intent to appeal within 20 days of receipt of notification of environmental decision. I&APs thereafter need to submit their appeal within 30 days.

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

- A letter will be sent to all I&APs (including organs of state) including information on the Appeal Period and where to obtain a copies of the EAs;
- Advertisements will be placed in the local newspaper notifying I&APs of the EAs;
- The EAs to be placed on the project website: www.csir.co.za/eia/kentanisolar; and
- All I&APs on the project database will be notified of the outcome of the appeal period in writing.

7.4. Authority consultation during the EIA phase

Authority consultation is integrated into the PPP, with additional one-on-one meetings held with the lead authorities, where necessary. It is proposed that the DEA as well as other lead authorities will be consulted at various stages during the EIA process. At this stage, the following authorities (Table 7.1) have been identified for the purpose of this EIA process. Additional authorities might be added to this list as the EIA process proceeds.

Table 7.1: Authorities to be consulted during the EIA process of the Kentani Solar Development.

| National Authorities |
|---|
| Eskom Holdings SOC Ltd |
| National Department of Agriculture, Forestry & Fisheries |
| National Department of Environmental Affairs |
| National Energy Regulator of South Africa (NERSA) |
| South African Civilian Aviation Authority |
| South African Heritage Resource Agency |
| South African National Parks (SANParks) |
| South African National Road Agency Limited |
| Provincial Authorities (Free State) |
| Department of Agriculture and Rural Development |
| Department of Cooperative Governance, Traditional Affairs & Human Settlements |
| Department of Economic Development, Tourism and Environmental Affairs |
| Department of Police, Roads and Transport |
| Department of Public Works |
| Department of Social Development |
| Department of Water Affairs of Free State Province |
| Department of Energy of the Northern Cape Province |
| Free State Heritage Resources Authority |
| Local Authorities (Municipalities) |
| Lejweleputswa District Municipality |
| Tokolologo Local Municipality |

The authority consultation process for the Scoping Process is outlined in Chapter 2, Section 2.8. Table 7.2 below indicates the proposed consultation schedule for the EIA phase.

Table 7.2: Authority communication schedule.

| Stage in EIA phase | Form of consultation |
|--|---|
| During the EIA process | Site visit for authorities, if required. |
| During preparation of Draft EIA Report and EMPs | Communication with the DEA on the outcome of Specialist Studies and EMPs. |
| On submission of Final EIA Report and Draft EMPs | 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. |

7.5. Approaches to Specialist Studies and Impact Assessment

7.5.1. Generic Terms of Reference of the Impact Assessment

The identification of potential impacts should include 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 will include:

- 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.
- Understanding the activity in sufficient detail to understand its consequences; and
- Identification of significant impacts which are likely to occur if the activity is undertaken.

As per the DEAT Guideline 5: Assessment of Alternatives and Impacts the following methodology is to be applied to the predication and assessment of impacts. Potential impacts should be 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 will be assessed by identifying other solar energy project proposals 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 Boven Solar PV1 project) that have been approved (i.e. positive Environmental Authorisation (EA) has been issued) or currently underway
- **Spatial extent** - The size of the area that will be affected by the impact:
 - Site specific;
 - Local (<2 km from site);
 - Regional (within 30 km of site);
 - National; or
 - International (e.g. Greenhouse Gas emissions or migrant birds).
- **Intensity** -The anticipated severity of the impact:
 - High (severe alteration of natural systems, patterns or processes);
 - Medium (notable alteration of natural systems, patterns or processes); or
 - Low (negligible alteration of natural systems, patterns or processes).

- **Duration** -The timeframe during which the impact will be experienced:
 - Temporary (less than 1 year);
 - Short term (1 to 6 years);
 - Medium term (6 to 15 years);
 - Long term (the impact will cease after the operational life of the activity); or
 - Permanent (mitigation will not occur in such a way or in such a time span that the impact can be considered transient).
- **Reversibility of impacts** -
 - High reversibility of impacts (impact is highly reversible at end of project life);
 - Moderate reversibility of impacts;
 - Low reversibility of impacts; or
 - Impacts are non-reversible (impact is permanent).
- **Irreplaceability of resource loss caused by impacts** -
 - 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 occurring:
 - Improbable (little or no chance of occurring);
 - Probable (<50% chance of occurring);
 - Highly probable (50 - 90% chance of occurring); or
 - Definite (>90% chance of occurring).
- **Significance** - Will the impact cause a notable alteration of the environment?
 - Low to very low (the 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);
 - Medium (the 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); or
 - High (the impacts 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).
- **Status** - Whether the impact on the overall environment will be:
 - Positive - environment overall will benefit from the impact;
 - Negative - environment overall will be adversely affected by the impact; 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.

With respect to the Management Actions and Monitoring of the Impacts (to be included within the EMPr):

- Where negative impacts are identified, mitigatory measures will be identified to avoid or reduce negative impacts. Where no mitigatory measures are possible this will be stated;
- Where positive impacts are identified, augmentation measures will be identified to potentially enhance positive impacts; and
- Quantifiable standards for measuring and monitoring mitigatory measures and enhancements will be set. This will include a programme for monitoring and reviewing the recommendations to ensure their ongoing effectiveness.

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

- Impacts will be evaluated for the construction and operation phases of the development. The assessment of impacts for the decommissioning phase will be 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 will be 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 will, where possible, take 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; and
- The impact assessment will attempt 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 7.3 is to be used by specialists and EAP for the rating of impacts.

Draft Scoping Report

Table 7.3: Example of assessment of impacts table.

| Nature of impact | Spatial Extent | Duration | Intensity | Probability | Reversibility | Irreplaceability | Mitigation/ Management Actions | Significance and Status | | Confidence level |
|--|--|--|---|---|---------------|------------------|--|--|--|---|
| | | | | | | | | Without Mitigation | With Mitigation | |
| CONSTRUCTION PHASE (EXAMPLE) | | | | | | | | | | |
| Scenario 1: Vegetation loss during construction | | | | | | | | | | |
| 1.1 Loss of vegetation cover during the construction of internal roads, on-site substation or collector substation | Local, i.e. less than 2 km from PV Solar Energy Facility | Long term, i.e. the impact will cease after the operational life span of the project | High, since there will be severe alteration of the natural system | Highly probable, since construction of the infrastructure cannot progress if vegetation is not cleared. | Moderate | High | Demarcate the construction footprint with tape and ensure workers stay within this area, wherever practical. Educate workers on the need to stay on paths and established tracks wherever practical. | Medium, since impact could be mitigated Negative impact | Low, since the areas will be rehabilitated after construction Negative impact | High, since the prediction is made on available information |

7.6. Terms of Reference for the Specialist Studies

The ToR for the specialist studies will consist of the generic assessment requirements and the specific issues identified for each discipline, as discussed in Chapter 7 of this report. The ToR will be updated to include relevant comments received on the Draft and Final Scoping Reports. Besides the specialist studies described below, additional studies, if required, may be commissioned as a result of issues raised during the Scoping process. Additional issues, identified through public and authority consultation during the Scoping phase will be included in the final ToR for specialists.

The following specialist studies have been identified based on the issues and potential impacts associated with the project. The ToR for each specialist study is discussed in detail below. The specialist studies and associated specialists are shown in Table 7.4 below:

Table 7.4: Specialist studies and associates specialists.

| Name | Organisation | Specialist study |
|-------------------------------------|--|---|
| <i>Johann Lanz</i> | Private consultant | Soil and Agricultural Impact Assessment |
| <i>Henry Holland</i> | MapThis Trust | Visual Impact Assessment |
| <i>Dr. Brian Colloty</i> | Scherman Colloty & Associates cc | Aquatic Impact Assessment |
| <i>Dr. Jayson Orton</i> | ASHA Consulting (Pty) Ltd | Heritage Impact Assessment |
| <i>Dr. Lloyd Rossouw</i> | Subcontracted by ASHA Consulting (Pty) Ltd | Palaeontological Impact Assessment |
| <i>Dr. Hugo van Zyl</i> | Independent Economic Researchers | Socio-economic Impact Assessment |
| <i>Andrew Skowno and Simon Todd</i> | Ecosol GIS and Simon Todd Consulting | Terrestrial Impact Assessment |

7.6.1. Soil and Agricultural Potential Assessment

7.6.1.1. Issues to be addressed

The significance of agricultural impacts is influenced by the agricultural capability of the area, although loss of potentially arable land will have higher significance than land that is only suitable as grazing land. The following have been identified as potential impacts on agricultural resources and productivity. All these impacts are local in extent, confined to the site:

- Loss of agricultural land use due to direct occupation by the infrastructural footprint of the development for the duration of the project (all phases). This will take affected portions of land out of agricultural production.
- Soil erosion by wind or water due to alteration of the land surface characteristics. Alteration of surface characteristics may be caused by construction related land surface disturbance, vegetation disturbance, panel surfaces and the establishment of hard standing areas, surfaces and roads. Erosion will cause loss and deterioration of soil resources and may occur during all phases of the project.
- Loss of topsoil due to poor topsoil management (burial, erosion, etc) during construction related soil profile disturbance (levelling, excavations, road surfacing etc.) and resultant decrease in that soil's capability for supporting vegetation.

- Generation of alternative land use income through rental for energy facility. This will provide farming enterprises with increased cash flow and rural livelihood, and thereby improve the financial sustainability of farming on site.
- Cumulative impacts due to the regional loss of agricultural resources and production as a result of other developments on agricultural land in the region.

7.6.1.2. Terms of reference for EIA study

The following assessments will be undertaken in the EIA phase:

More detailed assessment of soil conditions and identification of potentially arable land

The EIA phase assessment will include a field investigation of soils and agricultural conditions across the site. This field investigation will be aimed at ground proofing the existing land type information and understanding the specific soil and agricultural conditions and their variation on site. It will particularly identify those parts of the site that might be suitable as arable land. It will not necessarily be based on a grid spacing of test pits over the entire area, but will comprise a reconnaissance type of soil mapping exercise based on an assessment of surface conditions, topography, and hand augered samples in strategic places, where necessary. Where there is a likelihood of potentially arable land, the soil assessment will use a sampling distance that classifies it as detailed, that is a minimum of 6.25 sample points per 100 hectares or a grid spacing of 400 x 400 meters (van der Watt & van Rooyen, 1990)¹. Such a soil investigation is considered adequate for the purposes of this study.

Assessment of erosion and erosion potential on site

The field investigation will involve 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.

Terms of Reference

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

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

¹ van der Watt, H.v.H. & T.H. van Rooyen. 1990. A glossary of soil science. The Soil Science Society of South Africa, Pretoria.

- Identify and assess all potential impacts (direct, indirect and cumulative) and economic consequences of the proposed development on soils and agricultural potential;
- Describe and map soil types (soil forms) and characteristics (soil depth, soil colour, limiting factors, and clay content of the top and sub soil layers);
- Map soil survey points;
- Describe the topography of the site;
- Do basic climate analysis and identify suitable crops and their water requirements;
- Summarise available water sources for agriculture;
- Describe historical and current land use, agricultural infrastructure, as well as possible alternative land use options;
- Describe the erosion, vegetation and degradation status of the land;
- Determine and map, if there is variation, the agricultural potential across the site;
- Determine and map the agricultural sensitivity to development across the site; and
- Provide recommended mitigation measures, monitoring requirements, and rehabilitation guidelines for all identified impacts.

7.6.2. Visual Impact Assessment

7.6.2.1. Issues to be addressed

Key issues during the construction phase are:

- Potential visual intrusion of construction activities on the existing views of sensitive visual receptors in the rural landscape.
- Potential visual intrusion of a large area cleared of vegetation on the existing views of sensitive visual receptors.
- Potential visual impact of night lighting during the construction phase on the nightscape of the region.

Key issues related to the operational phase of the development are:

- Potential landscape impact of introducing a large solar plant into a rural agricultural landscape;
- Potential visual intrusion of a large solar field on the existing views of sensitive visual receptors in Dealesville;
- Potential visual intrusion on views and viewpoints on game farms and private nature reserves in the region surrounding the proposed sites;
- Potential impact of night lighting of the development on the surrounding nightscape;
- Potential cumulative visual impact of 12 photovoltaic solar plants and two large Eskom substations on the existing rural agricultural landscape; and
- Potential cumulative visual impact of 12 photovoltaic solar plants and two large Eskom substations on the existing views and viewpoints of sensitive visual receptors in the region.

7.6.2.2. *Terms of reference for EIA study*

The Visual Impact Assessment will consist of the following:

Desktop Review

The desktop review informs the rest of the assessment process in terms of documentation (e.g. municipal and regional planning policy, spatial development frameworks, legislation, national and international examples of similar developments) and availability of data (sensitive landscapes and visual receptors, spatial data for visibility analyses and landscape assessment). It also provides a basis for evaluating the confidence levels for the overall assessment.

Desktop Analysis

A GIS and available spatial data will be used during the preliminary study 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

The field survey will use 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
- Light pollution levels in the current nightscape of the region.

Landscape Baseline

The Landscape Baseline incorporates results from the desktop review and field survey to provide a description of the existing character and condition of the landscape. Landscape character reflects various factors such as geology, topography, land cover/use and human settlements that combine in particular ways to form the landscape. These factors will be described, as well as the ways they combine to create unique landscape types within the study area. The landscape condition refers to the current state of the landscape in terms of human impact. The value attached to the landscape by local residents and other sensitive receptors will also be determined where possible.

Visual Baseline

Information gathered during the field survey on the influence of vegetation and topography on the potential visibility of the development will provide a basis for determining the actual Zone of Visual Influence of the development, and the practical extents of the area for which the visibility analyses will be done. Cumulative viewsheds will be calculated for various components of the development, as well as for alternative sites and layouts under consideration. The viewsheds will be used to determine the potential visibility of the various sites and elements, as well as to identify and

classify visual receptors (viewers and principal representative viewpoints) in terms of their sensitivity to changes in the quality of their views.

Mitigation

The report 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 will be suggested.

7.6.3. Terrestrial Ecology Impact Assessment

7.6.3.1. Issues to be addressed

As discussed in Chapter 6, the proposed facility layout will be assessed with regard potential construction and operation impacts on the terrestrial environment, with the following key issues being assessed:

- Loss of natural vegetation;
- Habitat fragmentation - loss of biodiversity;
- Impacts on species of special concern; and
- Establishment of declared weeds and alien invader plants.

7.6.3.2. Terms of reference for EIA study

The terrestrial ecological assessment study will be conducted according to the ToR provided, the EIA Regulations, published by the Department of Environmental Affairs and Tourism (April 1998) in terms of the Environmental Conservation Act No. 73 of 1989 as well as within the guidelines and principles for biodiversity assessment as outlined by Brownlie (2005) and De Villiers et al. (2005). This includes the following activities and studies:

Vegetation/Ecosystem

A description of the broad ecological characteristics of the site and its surrounds in terms of any mapped spatial components of ecological processes and/or patchiness, patch size, relative isolation of patches, connectivity, corridors, disturbance regimes, ecotones, buffering, viability, etc.

In terms of **pattern**, the following will be identified or described:

Community and ecosystem level

- The main vegetation type, its aerial extent and interaction with neighbouring types, soils or topography;
- Threatened or vulnerable ecosystems (cf. new SA vegetation map/National Spatial Biodiversity Assessment¹, fine-scale systematic conservation plans, etc).

Species level

- Red Data Book species (giving location if possible using GPS)
- The viability of an estimated population size of the RDB species that are present (include the degree of confidence in prediction based on availability of information and specialist knowledge, i.e. High=70-100% confident, Medium 40-70% confident, low 0-40% confident)
- The likelihood of other RDB species, or species of conservation concern, occurring in the vicinity (include degree of confidence).

Other pattern issues

- Any significant landscape features or rare or important vegetation associations such as seasonal wetlands, alluvium, seeps, quartz patches or salt marshes in the vicinity.
- The extent of alien plant cover of the site, and whether the infestation is the result of prior soil disturbance such as ploughing or quarrying (alien cover resulting from disturbance is generally more difficult to restore than infestation of undisturbed sites).
- The condition of the site in terms of current or previous land uses.

In terms of **process**, the following will be identified or described:

- The key ecological “drivers” of ecosystems on the site and in the vicinity, such as fire.
- Any mapped spatial component of an ecological process that may occur at the site or in its vicinity (i.e. corridors such as watercourses, upland-lowland gradients, migration routes, coastal linkages or inland-trending dunes, and vegetation boundaries such as edaphic interfaces, upland-lowland interfaces or biome boundaries)
- Any possible changes in key processes, e.g. increased fire frequency.
- Furthermore, any further studies that may be required during or after the EIA process will be outlined.
- All relevant legislation, permits and standards that would apply to the development will be identified.
- The opportunities and constraints for development will be described and shown graphically on an aerial photograph, satellite image or map delineated at an appropriate level of spatial accuracy.

Faunal Ecology

- Describe and assesses the terrestrial fauna present in the area that will be affected by the proposed development.
- Conduct a faunal assessment that can be integrated into the terrestrial ecological study.
- Describe the existing impacts of current land use as they affect the fauna.
- Clarify species of special concern (SSC) and that are known to be:
 1. Endemic to the region;
 2. That are considered to be of conservational concern;
 3. That are in commercial trade (CITES listed species); or
 4. Are of cultural significance.
- Provide monitoring requirements as input into the Environmental Management Plan (EMP) for faunal related issues.

7.6.4. Aquatic Ecology Impact Assessment

7.6.4.1. Issues to be addressed

As discussed in Chapter 6, the proposed facility layout will be assessed with regard potential construction and operation impacts on the aquatic environment, with the following key issues being assessed:

- The potential loss of aquatic habitat (physical destruction);
- Loss of ecosystem services;
- Habitat fragmentation (loss of support areas); and
- Sedimentation and erosion.

Aquatic Ecology

- An assessment (desktop review and field work) of the aquatic biodiversity of the study area will be undertaken that cover the development footprint in relation to available ecological information related to wetland and riverine ecosystems functioning within the region;
- A map demarcating the relevant local drainage area of the respective wetland/s, i.e. the wetland, its respective catchment and other wetland areas within a 500m radius of the study area. This will demonstrate, from a holistic point of view the connectivity between the site and the surrounding regions, i.e. the zone of influence;
- Maps depicting demarcated aquatic areas delineated to a scale of 1:10 000, following the methodology described by the DWAF (2005), together with a classification of delineated wetland areas, according to the methods contained in the Level 1 WET-Health methodology and the latest National Wetland Classification System (2010);
- The determination of the ecological state of any aquatic areas, estimating their biodiversity, conservation and ecosystem function importance with regard ecosystem services;
- Recommend buffer zones and no-go areas around any delineated aquatic areas based on the relevant legislation, e.g. any bioregional plans of conservation guidelines or best practice;
- Assess the potential impacts, based on a supplied methodology;
- Provide mitigations regarding project related impacts, including engineering services that could negatively affect demarcated wetland areas; and
- Recommend specific actions that could enhance the aquatic functioning in the areas, allowing the potential for a positive contribution by the project, e.g. useful of artificial wetlands in stormwater control.

7.6.5. Heritage Impact Assessment

7.6.5.1. Issues to be addressed

Based on a desktop review, discussed in Chapter 5 and 6 of the Draft Scoping Report, it is not expected that the study area will contain any significant heritage features.

7.6.5.2. Terms of reference for EIA study

The following broad ToR has been specified for the Heritage Impact Assessment (HIA) to be undertaken:

- During the EIA, the desktop study undertaken during the Scoping Phase (this phase) will be expanded in order to provide further clues as to what might be found in the study area. Modern and historical aerial photography will be consulted in order to identify potentially sensitive landscape features which can then be checked during the field study. Similarly, farmsteads that were present more than 60 years ago will also be identified through aerial photographs;
- Field assessments of the sites under consideration will be undertaken to examine the heritage remains (excluding palaeontology) that may be present within the study area;
- A desktop Palaeontological Impact Assessment (PIA) will be undertaken;
- A single HIA report will be produced summarising the heritage in the study area. The HIA will include separate impact assessments for the 12 proposed projects. The report will cover all aspects of heritage (including archaeology, palaeontology, graves, built

environment and the cultural landscape) as required by the National Heritage Resources Act (NHRA) (Act 25 of 1999);

- Even though only a single HIA will be produced, 12 separate applications will be submitted to the Heritage Authorities, South African Heritage Resources Authority (SAHRA) and the Free State Heritage Resources Authority (FSHRA); and
- All recommendations and mitigation measures will be included within the EMPr.

7.6.6. Socio-economic Assessment

7.6.6.1. Issues to be addressed

While it is difficult to be sure of all relevant impacts before commencing with the assessment of the development, based on our understanding of the projects, it is likely that the following impacts would need to be assessed using a cost-benefit analysis framework:

- Broad level review of the need and financial viability/risks associated with the projects. This would be based primarily on information from the client. It is assumed that an adequate assessment of technical and financial feasibility of the project has been conducted to establish viability and justify further assessment of the project in the EIA phase;
- Degree of fit with local, regional and national economic development visions and plans including renewable energy plans. Here a review would be conducted of relevant policy and planning documents and the project's compatibility with these will be assessed;
- Impacts on overall economic development potential in the area including impacts on commercial enterprises nearby the site (incl. tourism, small businesses and others). It is expected that assessment of potential risks in this regard would rely heavily on other specialist studies. For example, the visual assessment may have implications for impacts on the tourism sector;
- Impacts associated with project expenditure on direct and indirect employment and household incomes. These impacts would be investigated through an examination of how the project and the spending injection associated with it may impact on the local, regional and national economy;
- Impacts associated with upstream and downstream economic linkages and spin-offs would also be assessed taking import content and other relevant factors into consideration. Experience from other similar projects and any suitable economic models for the area would be used to assess these impacts;
- Impacts associated with required socio-economic development contributions and community shareholding allocations under the REIPPP; and
- Impacts associated with environmental impacts that cannot be mitigated and have economic implications. This would focus on potential negative impacts on neighbouring land owners should they be relevant.

Note that this does not imply a commitment to assessing these impacts or others as impacts will have to be properly identified as part of the study process.

The agricultural specialist study will be responsible for the assessment of impacts on the agricultural sector. This study will holistically assess the significance of impacts on agriculture on the site including a consideration of total land lost per soil potential class, any decreased production and impacts on farm employees.

7.6.6.2. Terms of reference for EIA study

The approach for the Socio-Economic Impact Assessment would involve the following steps in line with accepted assessment practice:

1. Provide a profile of the existing socio-economic context within which the projects would be established;
2. Identify significant socio-economic aspects to be considered for assessment; and
3. Assess significant socio-economic impacts to the extent judged appropriate and recommend appropriate management and mitigation measures.

In order to establish the existing socio-economic environment affected by the projects, information would be gathered from the following sources in order to investigate the existing economic situation that would be affected by the projects:

- Information generated during consultations with the public and authorities;
- Statistical databases such as Census information; and
- Local economic development and planning documents.
-

The study would assess the impacts of the 12 projects separately where relevant focusing on the local, regional and national scales where relevant. Adverse, positive, direct and indirect impacts would be identified for the establishment and operational phases. One report will be produced detailing all impacts for each project separately and cumulatively.

Guidance on approach and methodology will be taken from the Department of Environmental Affairs and Development Planning (DEA& DP) guidelines on economic specialist input to EIA processes which are broadly based on a cost-benefit approach to assessment (van Zyl *et al.*, 2005). This include guidance on the appropriate level of detail required for the assessment in order that it is adequate for informing decision-making without going into superfluous detail (i.e. superfluous detail in this report as well as superfluous detail when the briefs of other specialist studies forming part of the EIA are taken into account). While these guidelines were developed as part of a Western Cape government initiative, they are equally applicable to other parts of South African and were endorsed at a national level by the then Department of Environment Affairs and Tourism. Impact significance ratings will be generated using CSIR guidelines for impact rating. All ratings will reflect a consideration of cumulative impacts.

7.7. Key milestones of the EIA process

| Key Milestones activities | Proposed timeframe in Target scenario |
|--|---|
| Public review period for Draft Scoping Report: 40 days | September 2014 – October 2014 (Current Stage) |
| Public review period for Final Scoping Report: 21 days | November 2014 |
| Review of the Final Scoping Report by DEA - Decision on PoS to undertake the EIA Phase: 14 days acknowledgement of SR and PSEIA + 30 days decision on SR and PSEIA | November 2014 |
| Specialist studies on site and release of draft specialist reports to CSIR | by November 2014 |
| Public review period for Draft EIA Report and EMP: 40 days | February 2015 – March 2015 |
| Public review period for Final EIA Report and EMP: 21 days | April 2015 |
| Submission of EIA Report to DEA for review and decision-making | April 2015 |
| Next steps: 14 days acknowledgement of EIR + 60 days to accept EIR + 45 days for decision on EIR + 2days for notification to applicant | |