

**ENVIRONMENTAL IMPACT ASSESSMENT PROCESS  
FINAL BASIC ASSESSMENT REPORT**

**PROPOSED HEUNINGSPRUIT PV 2 SOLAR ENERGY FACILITY, NEAR  
KOPPIES FREE STATE PROVINCE**

**DEA REF No: 14/12/16/3/3/1/1084**

**FINAL BASIC ASSESSMENT REPORT  
FOR SUBMISSION TO DEPARTMENT OF  
ENVIRONMENTAL AFFAIRS**

**DECEMBER 2013**

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## environmental affairs

Department:  
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REPUBLIC OF SOUTH AFRICA

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**File Reference Number:**

**Application Number:**

**Date Received:**


Basic assessment report in terms of the Environmental Impact Assessment Regulations, 2010, promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended.

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### Kindly note that:

1. This **basic assessment report** is a standard report that may be required by a competent authority in terms of the EIA Regulations, 2010 and is meant to streamline applications. Please make sure that it is the report used by the particular competent authority for the activity that is being applied for.
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15. Shape files (.shp) for maps must be included on the electronic copy of the report submitted to the competent authority.

## PROJECT DETAILS

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<b>DEA Ref No</b>	:	14/12/16/3/3/1/1083
<b>Title</b>	:	Environmental Basic Assessment Process Draft Basic Assessment Report: Proposed Heuningspruit PV 2 Solar Energy Facility, Near Koppies, Free State Province
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<b>Client</b>	:	Sun Mechanics (Pty) Ltd
<b>Report Status</b>	:	Final Basic Assessment Report for submission to Department of Environmental Affairs

**When used as a reference this report should be cited as:** Savannah Environmental (2013)  
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Free State Province.

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## **SUMMARY AND OVERVIEW OF THE PROPOSED PROJECT**

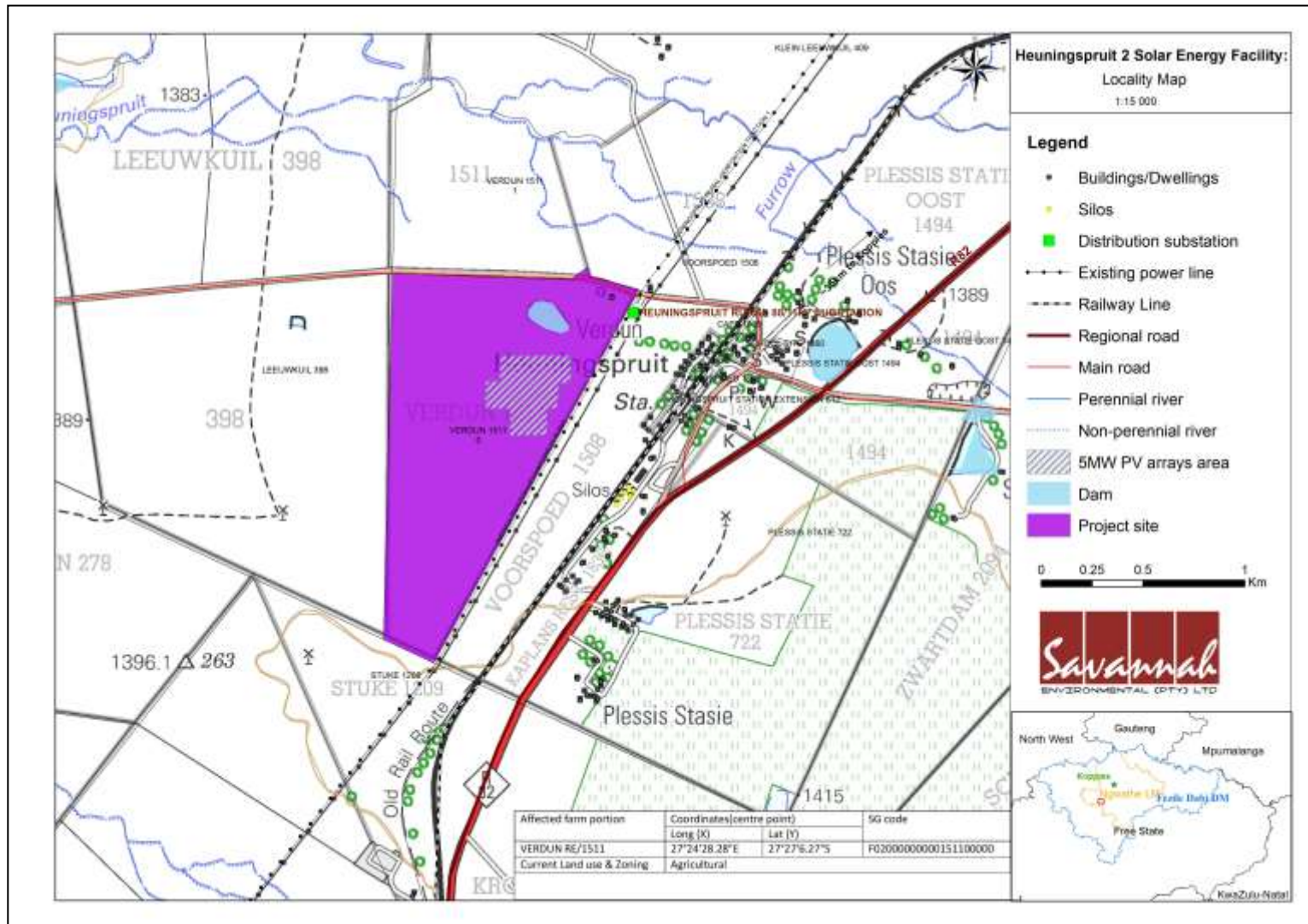
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Sun Mechanics (Pty) Ltd, an Independent Power Producer (IPP), is proposing the establishment of a commercial solar energy facility (using photovoltaic technology) of approximately 5 MW in capacity. The facility is proposed on the farm Verdun RE/1511 located approximately 35 km south west of Koppies in the Free State Province. The proposed project will be referred to as the **Heuningspruit PV 2 Solar Energy Facility**.

The purpose of the project is to generate electricity which will be fed-into the national electricity grid. The project will participate in the Department of Energy's Small Projects Renewable Energy Independent Power Producer Procurement Programme (REIPPP). The REIPPP Programme has been designed to contribute towards the South African government's renewable energy target of 17GW by 2030, and to stimulate the renewable industry in South Africa.

The facility development footprint will be less than 13 ha within which the following infrastructure will be established:

- » Photovoltaic (PV) panels up to 5m in height (fixed or tracking technology) with a capacity of up to 5MW.
- » Mounting structures to be either rammed steel piles or piles with pre-manufactured concrete footing to support the PV panels.
- » Cabling between the project components, to be lain underground.
- » Inverters/Transformer enclosures.
- » An on-site switching station up to 88kV in capacity.
- » An overhead power line of approximately 250m in length to tie into the existing Heuningspruit Rural-Syferfontien Traction 88kV Eskom power line on site. An application to Eskom has been made to connect via this power line into the existing Heuningspruit Rural Substation which is located adjacent (on the north western boundary) to the development site. Eskom will confirm the voltage of the connection power line and connection point. Eskom may request adjustment or possible expansion or inclusion of additional transformers or bays or switching gear associated with the existing substation and 88kV overhead power line.
- » Internal access roads (4 to 5 m wide)
- » Fencing.
- » Workshop area (20 m x 30 m.) for maintenance, storage, offices and small modular water filtration or di-ionisation unit (approx. 10 X 10m).
- » Parking and water storage tanks.
- » Laydown area 200m<sup>2</sup>



**Figure 1:** Locality map showing the development area for the proposed Heuningspruit PV 2 Solar Energy Facility



## 1.1 NEED FOR THE PROPOSED DEVELOPMENT

Due to the exploitation of and large-scale reliance on non-renewable resources and the potential subsequent impacts on climate, there is increasing pressure globally to increase the share of renewable energy generation. South Africa currently depends on fossil fuels for the supply of approximately 90% of its primary energy needs. With economic development over the next several decades resulting in an ever increasing demand for energy, there is some uncertainty as to the availability of economically extractable coal reserves for future use. Furthermore, several of South Africa's coal-fired power stations are nearing the end of their economic life, require refurbishment, or have been recently returned to service (re-commissioned) at great expense (i.e. the Camden, Komati, and Grootvlei Power Stations).

The current electricity imbalances in South Africa highlight the significant role that renewable energy can play in terms of power supplementation. Given that renewables can generally be deployed in a decentralised manner close to consumers, they offer the opportunity for improving grid strength and supply quality, while reducing expensive transmission and distribution losses. At present, South Africa is some way off from exploiting the diverse gains from renewable energy and from achieving a considerable market share in the industry. In order to meet the long-term goal of a sustainable renewable energy industry, a target of 17.8 GW of renewables by 2030 has been set by the Department of Energy (DoE) within the Integrated Resource Plan (IRP) 2010 and incorporated in the IPP Procurement Programme. This energy will be produced from various renewable energy technologies including solar energy facilities (i.e. such as PV or CPV technology). The proposed project is to contribute towards this goal for renewable energy. Sun Mechanics (Pty) Ltd is participating in the Department of Energy's Small Projects Renewable Energy Independent Power Producer Procurement Programme (RE-IPPP). Sun Mechanics (Pty) Ltd has entered the first stage of the Department of Energy's Small Projects (REIPPP) in October 2013.

Locally, the project is in line with the Ngwathe Local Municipality IDP. Critical services needed in the Ngwathe Municipality include bulk supply of electricity which includes transmission, distribution and where applicable, generation. The Ngwathe Local Municipality lists the following objectives in the IDP:

- » To ensure sustainable provision of bulk services through an effective internal network that will be able to supply quality electricity according to consumer demand.
- » Ensure the success and sustainability of current government job creation programmes and projects
- » To create an enabling environment and sustainability of current government job creation programmes and projects.

The municipality's IDP makes reference to renewable energy, and advocates the following in order to slow climate change:

- » Reduce emissions of heat trapping gases

- » Increase energy efficiency
- » Use of renewable energy sources like wind, solar and biomass.

The proposed solar energy facility is in line with the municipality's IDP and it will assist in meeting the set objectives.

## **1.2 REQUIREMENT FOR AN ENVIRONMENTAL IMPACT ASSESSMENT PROCESS**

In terms of the EIA Regulations published in terms of Section 24(5) of the National Environmental Management Act (NEMA, Act No. 107 of 1998), authorisation is required from the National Department of Environmental Affairs (DEA) as the competent authority, in consultation with the Free State Department of Economic Development, Tourism and Environmental Affairs (DEDTEA) for the establishment of the proposed solar energy facility. In terms of sections 24 and 24D of NEMA, as read with the EIA Regulations of GN R544 – R546 (as amended), a Basic Assessment process is required to be undertaken for the proposed project. The Heuningspruit PV 2 Solar Energy Facility project was registered with the National Department of Environmental Affairs (the competent authority) under application reference number **14/12/16/3/3/1/1084**. The following listed activities are relevant to the proposed project:

<b>Notice Number</b>	<b>Activity</b>	<b>Description</b>	<b>Relevance of Regulation to Project</b>
GN 544, 18 JUNE 2010	1	The construction of facilities or infrastructure for the generation of electricity where; ii. the electricity output is 10 megawatts or less but the total extend of the facility is covers an area in excess of 1 hectare	The proposed facility will have an export capacity of up to 5 MW and will be constructed over an area larger than 1 hectare in extend
GN 544, 18 JUNE 2010	10	The construction of facilities or infrastructure for the transmission and distribution of electricity – Outside urban areas or industrial complexes with a capacity of more than 33kv but less than 275kv;	The facility will require the construction of an on-site substation and overhead power line connecting to the existing network.
GN 544, 18 JUNE 2010	23	The transformation of undeveloped, vacant or derelict land to- ii residential, retail, commercial, recreational, industrial or institutional use, outside an urban area and where the total area to be transformed is bigger than 1 hectare but less than 20 hectares.	The area to be developed for the solar energy facility will be outside an urban area with a footprint greater than 1 hectare and less than 20 hectare in extent.
GN 544, 18 JUNE 2010	39	The expansion of (v) bulk storm water outlet structures. Within a water course or within 32 meters of a watercourse, measured from the edge of a water course, where such expansion will result in an increased development footprint but excluding where such expansion will occur behind the development setback line.	There could be a need to expand existing storm water management structures.
GN 544, 18 JUNE 2010	47:	The widening of a road by more than 6 meters, or the lengthening of a road by more than 1 kilometer (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exist, where the existing road is wider than 8 meters  Excluding widening or lengthening occurring inside urban areas.	There could be a need to expand an existing road.
GN 546,	14(a)(i)	The clearance of an area of 5	The proposed facility may require

18 JUNE 2010		hectares or more of vegetation cover constitutes indigenous vegetation. (a) Free State i. All areas outside urban areas	clearance of indigenous vegetation.
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An environmental impact assessment is an effective planning and decision-making tool for the project developer as it provides the opportunity for the developer to be forewarned of potential environmental issues and to assess if potential environmental impacts can be avoided, minimised or mitigated to acceptable levels. The Basic Assessment process forms part of the feasibility studies for a proposed project and will inform the final design process in order to ensure that environmentally sensitive areas are avoided as far as possible. Comprehensive, independent environmental studies are required in accordance with the EIA Regulations to provide the competent authority with sufficient information in order to make an informed decision.

### **1.3 DETAILS OF ENVIRONMENTAL ASSESSMENT PRACTITIONER AND EXPERTISE TO CONDUCT THE BASIC ASSESSMENT PROCESS**

Savannah Environmental was contracted by Sun Mechanics (Pty) Ltd as the independent environmental consultant to undertake the Basic Assessment process for the proposed solar energy facility. Neither Savannah Environmental, nor any of its specialist sub-consultants on this project are subsidiaries of, or are affiliated to Sun Mechanics (Pty) Ltd. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed project.

Savannah Environmental is a specialist environmental consultancy which provides a holistic environmental management service, including environmental assessment and planning to ensure compliance with relevant environmental legislation. Savannah Environmental benefits from the pooled resources, diverse skills and experience in the environmental field held by its team that has been actively involved in undertaking environmental studies for a wide variety of projects throughout South Africa and neighbouring countries. Strong competencies have been developed in project management of environmental processes, as well as strategic environmental assessment and compliance advice, and the assessment of environmental impacts, the identification of environmental management solutions and mitigation/risk minimising measures.

The Savannah Environmental team has considerable experience in environmental impact assessments and environmental management, and have been actively involved in undertaking environmental studies for a wide variety of projects throughout South Africa, including those associated with electricity generation, specifically from renewable sources.

The EAPs from Savannah Environmental who are responsible for this project are:

- » Jo-Anne Thomas, the principle Environmental Assessment Practitioner (EAP) for this project, is a registered Professional Natural Scientist and holds a Master of Science degree. She has 15 years' experience consulting in the environmental field. Her key focus is on strategic environmental assessment and advice; management and co-ordination of environmental projects, which includes integration of environmental studies and environmental processes into larger engineering-based projects and ensuring compliance to legislation and guidelines; compliance reporting; the identification of environmental management solutions and mitigation/risk minimising measures; and strategy and guideline development. She is currently involved in undertaking siting processes as well as EIAs for several renewable energy projects across the country
  
- » Umeshree Naicker, the principle author of this report, holds an Honours Bachelor of Science degree in Environmental Management and has 5 years' experience in environmental management and has undertaken EIAs for a number of proposed solar energy facilities across South Africa, including a number of facilities in the Free State Province.

In order to adequately identify and assess potential environmental impacts, several specialists have been appointed to conduct specialist studies, as required:

<b>Specialist Studies Undertaken</b>	<b>Specialists</b>
Ecology Impact Assessment	Simon Todd of Simon Todd Consulting
Soil and Agricultural Potential Impact Assessment	Louis du Pisani of Eduplan cc
Heritage Impact Assessment	Jaco van der Walt of Heritage Contracts and Archaeological Consulting
Palaeontology Desktop Study	Barry Millsteed of BM Geological Services
Visual Impact Assessment	Johan Claassen of Zone Land Solutions
Social Impact Assessment	Tony Barbour of Tony Barbour Consulting

Curricula vitae for the Savannah Environmental and specialist project team are included in **Appendix J1**.

## **REVIEW OF DRAFT BASIC ASSESSMENT REPORT**

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The Draft Basic Assessment Report was prepared by Savannah Environmental in order to assess the potential environmental impacts associated with the Heuningspruit PV 2 Solar Energy Facility. The report was available for public review at the following places:

- » Ngwathe Local Municipality Library
- » Ngwathe Local Municipality
- » [www.savannahSA.com](http://www.savannahSA.com)

## SECTION A: ACTIVITY INFORMATION

Has a specialist been consulted to assist with the completion of this section?

NO ✓

If YES, please complete the form entitled "Details of specialist and declaration of interest" for the specialist appointed and attach in Appendix I.

### 1. PROJECT DESCRIPTION

**Describe the project associated with the listed activities applied for**

Sun Mechanics (Pty) Ltd is proposing the establishment of a commercial photovoltaic (PV) solar energy facility with a capacity of up to 5MW to be established on the farm Verdun RE/1511 which is located ~35km south west of Koppies in the Free State Province. The Heuningspruit PV 2 solar energy facility will have a development footprint of ~13 hectares within which the following typical infrastructure will be established:

- » Arrays of photovoltaic (PV) panels with a capacity of up to 5MW.
- » Mounting structures to be either rammed steel piles or piles with pre-manufactured concrete footing to support the PV panels.
- » Cabling between the project components, to be lain underground.
- » Inverters/Transformer enclosures.
- » An on-site 88kV or lower voltage kV switching station.
- » An overhead power line of approximately 250m in length to tie into the existing power line (Heuningspruit Rural-Syferfontien Traction 88kV Eskom power line) on site. An application to Eskom has been made to connect into Eskom's existing Heuningspruit Rural Substation which is located adjacent (north western boundary) to the development site. Eskom will confirm voltage of connection power line and connection point. Eskom may request adjustment or possible expansion or inclusion of additional transformers or bays or switching gear associated with the existing substation and 88kva overhead transmission line.
- » Internal access roads (4 to 5 m wide)
- » Fencing.
- » Workshop area (20 m x 30 m.) for maintenance, storage, offices and small modular water filtration or di-ionisation unit (approx. 10 X 10m).
- » Parking and water storage tanks.
- » Laydown area 200m<sup>2</sup>

It is estimated that the workshop area will be 50 m x 50 m, the water tanks will have a capacity of 20-30,000 litres (approx. 5 tanks), the office/workshop size would be 20 m x 30 m. Depending on water quality, a filtration unit (approx. 5 by 5m) may be required and could fit within the workshop. If further water treatment is required, a

modular deionising unit of approximately 10 m x 10 m may also be required. All of this proposed infrastructure would fall within the area indicated in green in Figure 1.

An estimated 2 million litres of water would be required for the construction of the PV facility plant. Water will be trucked from the nearest licenced water user, municipality or suitable borehole.

In addition to standard water use for an office and toilets during the operational phase, the PV panels may need to be cleaned. Two cleaning events per year are estimated which should accommodate dust storm events and regular cleaning. For operations approximately 500,000 litres (500 m<sup>3</sup>) of water per annum is proposed to be trucked in from the nearest water source as per a water purchase agreement from a local authorised user or service provider. Depending on the quality of water, it is not expected that this water would need to be treated and thus this water will not accumulate any chemicals or hazardous materials and therefore is not regarded as wastewater. If the water quality of purchased water is poor and/or needs deionising for panel cleaning then a small salt-rich residue will remain and be disposed of at the appropriate municipal waste disposal facility. It is envisaged that the volume of salt residue would not exceed 0.5m<sup>3</sup> per cleaning event and would be transported off-site and disposed of at the nearest authorised facility. The anticipated volumes of salt residue would not trigger the need for a waste license.

The overall aim of the design and layout of the facility is to maximise electricity production through exposure to the solar radiation, while minimising infrastructure, operation and maintenance costs, and social and environmental impacts. The use of solar energy for power generation can be described as a non-consumptive use of natural resources which emits no greenhouse gas emissions during the electricity generation process. The generation of renewable energy will contribute to South Africa's electricity generating market which has historically been dominated by coal-based power generation.

## **1. Components of the PV Facility**

The PV facility will be comprised of the following:

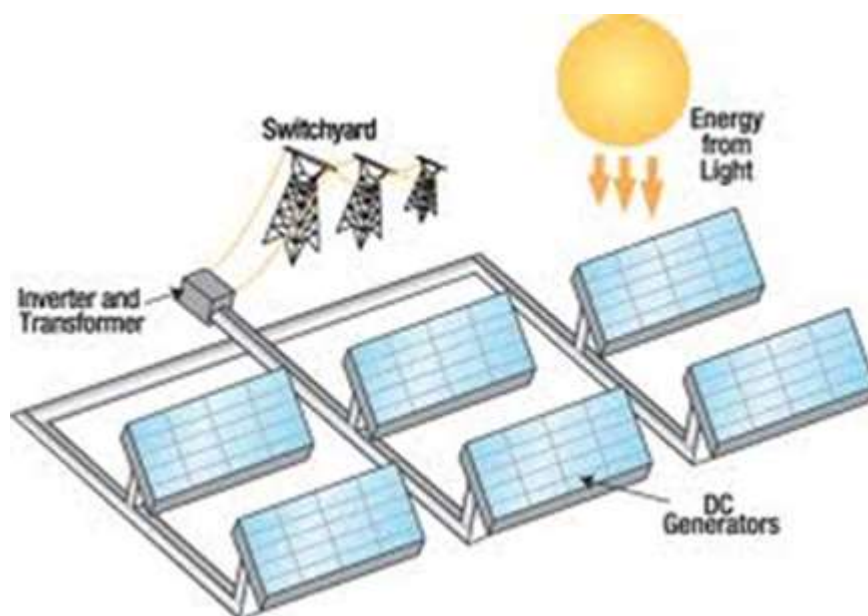
### **Photovoltaic Cells**

Solar energy facilities, such as those using PV panels, use the energy from the sun to generate electricity through a process known as the Photovoltaic Effect. This effect refers to photons of light colliding with electrons, and therefore placing the electrons into a higher state of energy to create electricity.

An individual photovoltaic cell is made of silicone which acts as a semiconductor. The cell absorbs solar radiation which energises the electrons inside the cells and produces



electricity. Individual PV cells are linked and placed behind a protective glass sheet to form a photovoltaic panel. A photovoltaic (PV) cell is made of silicone which acts as a semiconductor used to produce the photovoltaic effect. Individual PV cells are linked and placed behind a protective glass sheet to form a photovoltaic panel. The PV cell is positively charged on one side and negatively charged on the other side and electrical conductors are attached to either side to form a circuit. This circuit then captures the released electrons in the form of an electric current (direct current). An inverter must be used to change the direct current (DC) it to alternating current (AC). The electricity is then transmitted through a power line for distribution to the grid and use.



**Figure 2:** Schematic diagram of a PV plant (Sourced from: <http://www.solar-green-wind.com/archives/tag/solar-cells>)

A single cell is sufficient to power a small device such as an emergency telephone. However, to produce 5 MW of power, the proposed facility will require numerous cells arranged in multiples/arrays which will be fixed to a support structure.

### **PV Panels and Mounting for Fixed Panel Technology**

For fixed-panel technology, the PV panels will be fixed to a support structure (as illustrated in Figure 3) set at an angle so to receive the maximum amount of solar radiation. The height of the PV panels is expected to be up to 5 m.



**Figure 3:** PV panels installed

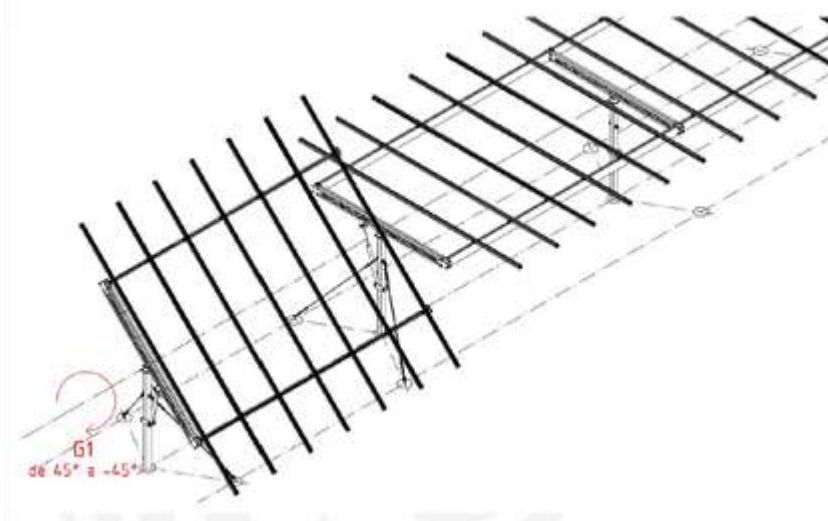
The angle of the fixed panel is dependent on the latitude of the proposed facility and the angles may be adjusted to optimise for summer or winter solar radiation characteristics. The PV panels are designed to operate continuously for more than 20 years, unattended and with low maintenance.

#### **Panels and mounting structure for Tracking**

Single-axis tracking technology is being considered for this project. For this technology, the adopted mounting structure is a mono axial tracking frame with:

- » Direction of rotation axis North – South
- » Sun path direction tracking East – West
- » Maximum allowed tracking angle, from  $+45^{\circ}$  to  $-45^{\circ}$
- » Maximum modules surface for frame, about 36 m<sup>2</sup>

This technology ensures an advantage of an increase of about 25% in terms of energy production compared to the horizontal fixed technology.



**Figure 4:** Frame, structural details of a tracking PV technology



**Figure 5:** Illustration of tracking PV technology panels

A 'single axis tracker' will track the sun from east to west, while a dual axis tracker will in addition be equipped to account for the seasonal waning of the sun. These systems utilise moving parts and complex technology, including solar irradiation sensors to optimise the exposure of PV panels to sunlight. These systems result in a higher efficiency of the facility but are more complex as:

- » A high degree of maintenance is required due to the nature of the machinery used in the system, which consists of numerous components and moving parts. A qualified technician is required to carry out regular servicing of these parts, which places a question on the feasibility of this system given the remote location of the proposed project site.
- » The costs of the system are necessarily higher than a fixed mounted system

due to the maintenance required for its upkeep and its complex design.

- » A larger project site is required for this system given that the separate mountings need to be placed a distance apart to allow for their tracking movement.
- » A power source is needed to mechanically drive the tracking system and this would offset a certain portion of the nett energy produced by the plant.

## **2. Overview of the Construction Phase**

A facility consisting of several PV arrays with a generating capacity of 5 MW could take approximately 8-12 months to construct and commission, and would require the expertise of skilled, semi-skilled and low skilled staff.

In order to construct the proposed PV solar energy facility and associated infrastructure, a series of activities will need to be undertaken. Site preparation activities will include clearance of vegetation at the footprint of certain components (i.e. inverters and transformer position) and the establishment of the internal access roads. The PV panels will be sited a certain distance away from each other (to avoid shading) within the broader development site. Clearing activities, where required, will involve the stripping of topsoil which will need to be stockpiled and/or spread on site. Anticipated activities during construction are described below.

### **Conduct Surveys**

Prior to initiating construction, a number of surveys will be required including, but not limited to, a geotechnical survey, a site survey and, survey of substation site and access road servitudes.

### **Establishment of Access Roads**

Direct access to the site exists via the R82 from Kroonstad and the S155 bordering the site on the northern side. There are several internal farm access roads on the study area and the proposed site is easily accessible via these roads. Internal access roads may however need to be upgraded for use during construction and operation.

### **Undertake Site Preparation**

Site preparation activities will include clearance of vegetation at the footprint of each support structure. These activities will require the stripping of topsoil which will need to be stockpiled, backfilled and/or spread on site.

### **Transport of Components and Equipment to Site**

The components and equipment required for the construction of the proposed facility will be brought to site in sections by means of national and provincial roads and then proposed internal access road. Some of the components (i.e. transformer) may be defined as abnormal loads in terms of the Road Traffic Act (Act No. 29 of 1989) by virtue of the dimensional limitations (i.e. weight).

Typical civil engineering construction equipment will need to be brought to the site (e.g. excavators, trucks, graders, compaction equipment, cement trucks, etc.) as well as components required for the upgrade of the substation and site preparation.

### **Establishment of Laydown Areas on Site**

Laydown and storage areas will be required for the typical construction equipment which will be required on site.

### **Erect PV Cells and Construct Substation & Inverters**

The PV cells will be arranged in arrays. The support structures will be fixed into the ground with the use of concrete, depending on the soil conditions at the site. The height of the PV panel structure will be up to 5 m.

An overhead power line of approximately 250m in length to tie into the existing power line (Heuningspruit Rural-Syferfontien Traction 88kV Eskom power line) on site.

Inverters and PV plant transformer /substation will be installed to facilitate the connection between the solar energy facility and the Eskom electricity grid. Connection will be dependent on final engagement with Eskom, but it is expected to be via the Heuningspruit Rural Substation and or associated connecting infrastructure / switchyard investigated in this study. The position of the inverters within the footprint of the broader site will be informed by the final positioning of the PV components.

### **Establishment of Ancillary Infrastructure**

Ancillary infrastructure may include a workshop, storage areas as well as a temporary contractor's equipment camp. The establishment of these facilities/buildings will require the clearing of vegetation and levelling of the development site and the excavation of foundations prior to construction. A laydown area for building materials and equipment associated with these buildings will also be required. Water storage tanks will also be placed on-site to collect water for cleaning of the PV panels.

### **Undertake Site Rehabilitation**

Once construction is completed and once all construction equipment is removed from

site, the site must be rehabilitated where practical and reasonable. On full commissioning of the facility, any access points to the site which are not required during the operational phase must be closed and rehabilitated.

### **3. Overview of the Operation Phase**

The electricity that is generated from the PV panels will be stepped up through the on-site inverters and transformers at the substation. Thereafter an overhead power line of approximately 250m in length to tie into the existing 88kV power line (Heuningspruit Rural-Syferfontien Traction 88kV Eskom power line) on site.

It is anticipated that full-time security, maintenance and control room staff will be required on site. Each component within the solar energy facility will be operational except under circumstances of mechanical breakdown, unfavourable weather conditions or maintenance activities.

#### **Cleaning of the PV Panels Using Water**

Two panel cleaning events per year are estimated which should accommodate dust storm events and regular cleaning. For operations, approximately 500,000 litres (or 500 m<sup>3</sup>) of water per annum is proposed to be trucked in from the nearest water source as per a water purchase agreement from a local authorised user or service provider. Depending on the quality of water, it is not expected that this water would need to be treated and thus this water will not accumulate any chemicals or hazardous materials and therefore is not regarded as wastewater. If the water quality of purchased water is poor and or needs deionising for panel cleaning then a small salt rich residue will remain and will be disposed of at the appropriate municipal waste disposal facility. It is envisaged that the volume of salt residue would not exceed 0.5m<sup>3</sup> per cleaning event and would be transported off site and disposed of at the nearest authorised waste disposal facility. The anticipated volumes of salt residue would not trigger the need for a waste license.

### **4. Overview of the Decommissioning Phase**

The solar energy facility is expected to have a lifespan of more than 20 years (with maintenance) and the power plant infrastructure would only be decommissioned once it has reached the end of its economic life. If economically feasible/desirable the decommissioning activities would comprise the disassembly and replacement of the individual components with more appropriate technology or infrastructure available at that time. However, if not deemed so, then the facility would be completely decommissioned which would include the following decommissioning activities.

#### **Site Preparation**

Site preparation activities will include confirming the integrity of the access to the site

to accommodate the required equipment (e.g. lay down areas) and the mobilisation of decommissioning equipment.

### **Disassemble and Remove Components**

All above ground facilities that are not intended for future use at the site would be disassembled, and reused and recycled (where possible), or disposed of in accordance with regulatory requirements. Much of the above ground wire, steel, and PV panels of which the system is comprised are recyclable materials and would be recycled to the extent feasible. The components of the plant would be deconstructed and recycled or disposed of in accordance with regulatory requirements. The site will be rehabilitated and can be returned to the current or other beneficial land-use.

### **Provide a detailed description of the listed activities associated with the project as applied for**

The following listed activities are relevant to the proposed development:

<b>Notice Number</b>	<b>Activity</b>	<b>Description</b>	<b>Relevance of Regulation to Project</b>
GN 544, 18 JUNE 2010	1	The construction of facilities or infrastructure for the generation of electricity where; i. the electricity output is more than 10 megawatts but less than 20 megawatts	The proposed facility will have an export capacity of less than 20 MW and will be constructed over an area larger than 1 ha.
GN 544, 18 JUNE 2010	10	The construction of facilities or infrastructure for the transmission and distribution of electricity – Outside urban areas or industrial complexes with a capacity of more than 33kv but less than 275kv;	The facility will require the construction of an on-site substation and overhead power line connecting to the existing network.
GN 544, 18 JUNE 2010	23	The transformation of undeveloped, vacant or derelict land to- ii residential, retail, commercial, recreational, industrial or institutional use, outside an urban area and where the total area to be transformed is bigger than 1 hectare but less than 20 hectares.	The area to be developed for the solar energy facility will be greater than 1 hectare and less than 20ha in extent.
GN 544, 18 JUNE 2010	39	The expansion of (v) bulk storm water outlet structures. Within a water course or within 32 meters of a watercourse, measured from the edge of a water course,	There could be a need to expand existing storm water management structures.

Notice Number	Activity	Description	Relevance of Regulation to Project
		where such expansion will result in an increased development footprint but excluding where such expansion will occur behind the development setback line.	
GN 544, 18 JUNE 2010	47:	The widening of a road by more than 6 meters, or the lengthening of a road by more than 1 kilometer (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exist, where the existing road is wider than 8 meters  Excluding widening or lengthening occurring inside urban areas.	There could be a need to expand an existing road.
GN 546, 18 JUNE 2010	14(a)(i)	The clearance of an area of 5 hectares or more of vegetation cover constitutes indigenous vegetation. (b) Free State i. All areas outside urban areas	The proposed facility may require clearance of indigenous vegetation.

## 2. FEASIBLE AND REASONABLE ALTERNATIVES

**"alternatives"**, in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to—

- (a) the property on which or location where it is proposed to undertake the activity;
- (b) the type of activity to be undertaken;
- (c) the design or layout of the activity;
- (d) the technology to be used in the activity;
- (e) the operational aspects of the activity; and
- (f) the option of not implementing the activity.

Describe alternatives that are considered in this application as required by Regulation 22(2)(h) of GN R.543. Alternatives should include a consideration of all possible means by which the purpose and need of the proposed activity (NOT PROJECT) could be accomplished in the specific instance taking account of the interest of the applicant in the activity. The no-go alternative must in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed.

The determination of whether site or activity (including different processes, etc.) or both is appropriate needs to be informed by the specific circumstances of the activity and its



environment. After receipt of this report the, competent authority may also request the applicant to assess additional alternatives that could possibly accomplish the purpose and need of the proposed activity if it is clear that realistic alternatives have not been considered to a reasonable extent.

The identification of alternatives should be in line with the Integrated Environmental Assessment Guideline Series 11, published by the DEA in 2004. Should the alternatives include different locations and lay-outs, the co-ordinates of the different alternatives must be provided. The co-ordinates should be in degrees, minutes and seconds. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection.

### **a) Site alternatives**

A site alternative refers to the identification of more than one potential site which may be suitable for the establishment of a proposed facility. Due to the nature of the proposed development (i.e. a renewable energy facility), the location of the project is largely dependent on technical and environmental factors such as solar irradiation (i.e. the fuel source), climatic conditions, available extent and the relief/topography of the site, and available grid connection. The proposed site was identified by the proposed developer as being technically feasible. Therefore no site alternatives have been considered.

The following characteristics were considered in determining the feasibility of the proposed site:

**Site Extent** - space is an important factor for the development of a PV facility. An area of approximately 13 ha would be required for the 5MW facility. The proposed site, Verdun RE/1511, with a study area of ~ 20ha, will therefore be sufficient for the installation of the proposed facility, and should allow for the avoidance of any identified environmental and/or technical constraints in terms of the final design of the facility.

**Land availability and Site access** - The land is available for lease by the developer. The identified site is accessible via the R82 from Kroonstad and the S155 bordering the site on the northern side, and is therefore appropriately located for easy transport of components and equipment as well as labour movement to and from the site.

**Climatic Conditions** - the economic viability of a PV facility is directly dependent on the annual direct solar irradiation values. The site has been demarcated as an area of high irradiation, which indicates that the regional location of the project is appropriate for a solar energy facility.

**Gradient** - a level surface area is preferred for the installation of PV panels (i.e. a gradient of 3% or less). The slope of the proposed site is considered to be acceptable from a development perspective, which reduces the need for extensive earthworks and associated levelling activities, thereby minimising environmental impacts.

**Grid Connection** Due to the proposed size and location of the facility, an 88kV connection to the Heuningspruit Rural Substation is the preferred option. A connection application has been made to Eskom.

<b>Alternative 1 (preferred alternative)</b>		
The proposed Heuningspruit PV 2 Facility is expected to have a developmental footprint (~13ha) which is smaller than the broader site area (~20ha). Therefore the facility and associated infrastructure (i.e. PV panels, internal roads, etc.) can be appropriately located to avoid sensitive areas within the broader study area. The extent of the site therefore allows for the identification of design, layout and siting alternatives within the site boundaries.	Lat 27° 27' 01.11" S	Long 27° 24' 37.89" E
<b>Alternative 2</b>		
»		
<b>Alternative 3</b>		
»		
<b>Alternative 4</b>		
»		

In the case of linear activities:

The co-ordinates for the power line of suitable voltage to connect into the existing 88kV are provided below:

**Power line( ~250m)**

- Starting point of the activity
- Middle/Additional point of the activity
- End point of the activity

**Latitude (S):**

**Longitude (E):**

27	26'59	14	27	24'45	65
27	26'47	45	27	24'57	29

Alternative S2 (if any)

- Starting point of the activity
- Middle/Additional point of the activity
- End point of the activity


Alternative S3 (if any)

- Starting point of the activity
- Middle/Additional point of the activity
- End point of the activity


For route alternatives that are longer than 500m, please provide an addendum with co-ordinates taken every 250 meters along the route for each alternative alignment.

In the case of an area being under application, please provide the co-ordinates of the corners of the site as indicated on the lay-out map provided in Appendix A.

**b) Layout alternatives**

<b>Alternative 1 (preferred alternative)</b>		
<b>Description:</b>	<b>Lat (DDMMSS)</b>	<b>Long (DDMMSS)</b>
The proposed Heuningspruit PV 2 Facility is expected to have a developmental footprint (~13ha) which is smaller than the broader area (~20ha). Therefore the facility and associated infrastructure (i.e. PV panels, internal roads, etc.) can be appropriately located to avoid sensitive areas within the broader study area. The extent of the site therefore allows for the identification of design layout and siting alternatives within the site boundaries.	Lat 27° 27' 01.11" S	Long 27° 24' 37.89" E
<b>Alternative 2</b>		
Description	Lat (DDMMSS)	Long (DDMMSS)
<b>Alternative 3</b>		
Description	Lat (DDMMSS)	Long (DDMMSS)

**c) Technology alternatives**

<b>Alternative 1 (preferred alternative)</b>
As it is the intention of Sun Mechanics to develop renewable energy projects as part of the DoE's Renewable Energy Independent Power Producing Programme (REIPPP), only renewable energy technologies are being considered. Solar energy is considered to be

the most suitable renewable energy technology for this site, based on the site location, ambient conditions and energy resource availability (i.e. solar irradiation). Solar PV was determined as the most suitable option for the proposed site as large volumes of water are not needed for power generation purposes as would be required for concentrated solar power technology (CSP). In addition, PV technology is considered more feasible from a technical perspective at this scale of development (i.e. 5MW). PV is also preferred when compared to CSP technology because of the lower visual profile.

Very few technological options exist as far as PV technologies are concerned. Those that are available are usually differentiated by weather and temperature conditions that prevail, such that optimality is obtained by the final choice. The impacts of any of the PV technology choices on the environment are very similar. The construction, operation and decommissioning activities associated with the facility will also be the same irrespective of the technology chosen. There are a number of different solar PV technologies, i.e.:

- » Fixed / static PV panels;
- » Tracking PV panels (with solar panels that rotate to follow the sun’s movement); and
- » Concentrated PV Plants (CPV technology).

Fixed or single-axis tracking PV is being considered for the proposed Heuningspruit PV 2 Facility. The preferred option will be informed by financial, technical and environmental factors.

Alternative 2
Alternative 3

**d) Other alternatives (e.g. scheduling, demand, input, scale and design alternatives)**

<b>Alternative 1 (preferred alternative)</b>
<p><b><i>Operating Alternatives</i></b></p> <p>This refers to the manner in which a proposed facility would function. For example, should a wind energy facility prove problematic for avifauna during migrating periods, an operating alternative of switching off certain turbines during those times could be proposed. No operating alternatives would be applicable to the proposed solar energy facility as there are no feasible means of alternative operation for a facility of this nature.</p>
Alternative 2
Alternative 3

--

**e) No-go alternative**

This is the option of not constructing Heuningspruit PV 2 Solar Energy Facility. This option is assessed as the “no go alternative” in this Basic Assessment Report (Section D and Appendix F).

Paragraphs 3 – 13 below should be completed for each alternative.

**3. PHYSICAL SIZE OF THE ACTIVITY**

**a) Indicate the physical size of the preferred activity/technology as well as alternative activities/technologies (footprints):**

**Alternative:**

Alternative A1<sup>1</sup> (preferred activity alternative)

Alternative A2 (if any)

Alternative A3 (if any)

**Size of the activity:**

~130 000 m <sup>2</sup>
m <sup>2</sup>
m <sup>2</sup>

or, for linear activities:

**Alternative: Power line**

Alternative A1 (preferred activity alternative)

Alternative A2 (if any)

Alternative A3 (if any)

**Length of the activity:**

~ 250m
m
m

**b) Indicate the size of the alternative sites or servitudes (within which the above footprints will occur):**

**Alternative:**

Alternative A1 (preferred activity alternative)

Alternative A2 (if any)

Alternative A3 (if any)

**Size of the site/servitude:**

m <sup>2</sup>
m <sup>2</sup>
m <sup>2</sup>

<sup>1</sup> “Alternative A..” refer to activity, process, technology or other alternatives.

#### 4. SITE ACCESS

Does ready access to the site exist?

YES ✓

If NO, what is the distance over which a new access road will be built

m

Describe the type of access road planned:

The identified site is accessible via the R82 from Kroonstad and the S155 bordering the site on the northern side (Both would be used as follows: S1555 being directly and easily accessible and. the national highway R82 would be used in relation to sources local labour). There are several internal farm access roads within the study area and the proposed site is easily accessible via these roads.

Include the position of the access road on the site plan and required map, as well as an indication of the road in relation to the site. See Appendix A.

A site plan showing the position of the access road, as well as an indication of the road in relation to the site is included within **Appendix A**.

#### 5. LOCALITY MAP

An A3 locality map must be attached to the back of this document, as **Appendix A**. The scale of the locality map must be relevant to the size of the development (at least 1:50 000. For linear activities of more than 25 kilometres, a smaller scale e.g. 1:250 000 can be used. The scale must be indicated on the map.). The map must indicate the following:

- an accurate indication of the project site position as well as the positions of the alternative sites, if any;
- indication of all the alternatives identified;
- closest town(s);
- road access from all major roads in the area;
- road names or numbers of all major roads as well as the roads that provide access to the site(s);
- all roads within a 1km radius of the site or alternative sites; and
- a north arrow;
- a legend; and
- locality GPS co-ordinates (Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in degrees and decimal minutes. The minutes should have at least three decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection).

An A3 Locality Map is attached within **Appendix A**.

## **6. LAYOUT/ROUTE PLAN**

A detailed site or route plan(s) must be prepared for each alternative site or alternative activity. It must be attached as **Appendix A** to this document.

The site or route plans must indicate the following:

- the property boundaries and numbers of all the properties within 50 metres of the site;
- the current land use as well as the land use zoning of the site;
- the current land use as well as the land use zoning each of the properties adjoining the site or sites;
- the exact position of each listed activity applied for (including alternatives);
- servitude(s) indicating the purpose of the servitude;
- a legend; and
- a north arrow.

A detailed site plan(s) for each alternative activity is attached within **Appendix A**

## **7. SENSITIVITY MAP**

The layout/route plan as indicated above must be overlain with a sensitivity map that indicates all the sensitive areas associated with the site, including, but not limited to:

- watercourses;
- the 1:100 year flood line (where available or where it is required by DWA);
- ridges;
- cultural and historical features;
- areas with indigenous vegetation (even if it is degraded or infested with alien species); and
- critical biodiversity areas.

The sensitivity map must also cover areas within 100m of the site and must be attached in **Appendix A**.

A sensitivity map covering areas within 100m of the site is attached within **Appendix A**.

## **8. SITE PHOTOGRAPHS**

Colour photographs from the centre of the site must be taken in at least the eight major compass directions with a description of each photograph. Photographs must be

attached under **Appendix B** to this report. It must be supplemented with additional photographs of relevant features on the site, if applicable.

Colour photographs have been taken from the centre of the proposed site in the eight major compass directions. Annotated photographs are included in **Appendix B**.



## 9. FACILITY ILLUSTRATION




A detailed illustration of the activity must be provided at a scale of at least 1:200 as **Appendix C** for activities that include structures. The illustrations must be to scale and must represent a realistic image of the planned activity. The illustration must give a representative view of the activity.

A preliminary facility illustration which represents a realistic image of the planned solar energy facility is attached within **Appendix C**.

## 10. ACTIVITY MOTIVATION

Motivate and explain the need and desirability of the activity (including demand for the activity):

<b>1. Is the activity permitted in terms of the property's existing land use rights?</b>	<b>NO</b>	✓	Please explain
The proposed development site is currently zoned for agricultural use. The site will have to be rezoned and become "special use" as required by the municipality.			
<b>2. Will the activity be in line with the following?</b>			
<b>(a) Provincial Spatial Development Framework (PSDF)</b>	<b>YES</b>	✓	Please explain
The Free State PSDF is a provincial spatial and strategic planning policy that responds to and complies with, in particular, the National Development Plan (NDP) Vision 2030 and the National Spatial Development Perspective (NSDP). This framework promotes a developmental state in accordance with the principles of global sustainability as is stated by, among others, the South African Constitution and the enabling legislation. The FS PSDF is based on six growth and development pillars, each of which has its own set of drivers with long-term programmes. Pillar 1 highlights the job creation, economic and sustainable growth by expanding and maintaining basic road infrastructures through the implementation of alternative electricity infrastructures. The proposed project will contribute towards job creation and the maintenance of services such as roads which will be used during the construction of the proposed facility. The proposed project is a renewable energy facility that would add the national grid. Therefore the proposed project contributes to the Free State PSDF.			
<b>(b) Urban edge / Edge of Built environment for the area</b>	<b>YES</b>	✓	Please explain
The proposed site is located approximately 35 km south west of the town of Koppies and ~30 km north east of the town of Kroonstad. The site will not impact on the urban edge.			

<p><b>(c) Integrated Development Plan (IDP) and Spatial Development Framework (SDF) of the Local Municipality (e.g. would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF?).</b></p>	<p>Yes ✓</p>		<p>Please explain</p>
<p>Critical services needed in the Ngwathe Municipality include bulk supply of electricity which includes transmission, distribution and where applicable, generation. The Ngwathe Local Municipality lists the following objectives in the IDP:</p> <ul style="list-style-type: none"> <li>» To ensure sustainable provision of bulk services through an effective internal network that will be able to supply quality electricity according to consumer demand.</li> <li>» Ensure the success and sustainability of current government job creation programmes and projects</li> <li>» To create an enabling environment and sustainability of current government job creation programmes and projects.</li> </ul> <p>Although the municipality's IDP makes no specific reference to renewable energy, it does advocate the following in order to slow climate change:</p> <ul style="list-style-type: none"> <li>» Reduce emissions of heat trapping gases</li> <li>» Increase energy efficiency</li> <li>» Use of renewable energy sources like wind, solar and biomass.</li> </ul> <p>The proposed solar energy facility is in line with the municipality's IDP and it will assist in meeting the set objectives. The solar facility will also create direct and indirect job opportunities that will stimulate local economic growth. The project will not compromise the integrity of the IDP.</p>			
<p><b>(d) Approved Structure Plan of the Municipality</b></p>	<p>YES ✓</p>		<p>Please explain</p>
<p>One of the municipality's objectives is to upgrade bulk electricity networks and associated infrastructure. This project will assist with the upgrading of this infrastructure and creating jobs.</p>			
<p><b>(e) An Environmental Management Framework (EMF) adopted by the Department (e.g. Would the approval of this application compromise the integrity of the existing environmental management priorities for the area and if so, can it be justified in terms of sustainability considerations?)</b></p>		<p>NO ✓</p>	<p>Please explain</p>
<p>Ngwathe Local Municipality does not have an Environmental Management Framework as a development guiding tool in its jurisdiction. The Free State Department of Tourism and Economic Development is in the process of developing a provincial biodiversity plan.</p>			

<b>(f) Any other Plans (e.g. Guide Plan)</b>	<b>YES</b>	<b>NO</b>	Please explain
N/A			
<b>3. Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved SDF agreed to by the relevant environmental authority (i.e. is the proposed development in line with the projects and programmes identified as priorities within the credible IDP)?</b>	YES ✓		Please explain
The main purpose of the development is to generate electricity from a renewable resource, which will be fed into the national grid. The project is not specifically considered within the approved municipal SDF. However the municipality identified basic service delivery such as electricity, creation and economic growth as priorities within the SDF both locally and within the district municipality. the proposed development will assist in achieving these objectives			
<b>4. 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.)</b>	YES ✓		Please explain
The evacuation of additional power into the Eskom grid, although only 5MW, will serve to improve the stability of the grid for the immediate area, assist the government in achieving the goal of 17GW renewable energy as part of the electricity generation technology mix by 2030, and assist in the reduction in the need to mine non-renewable resources such as coal for conventional power generation.  The proposed development will benefit the local community through job creation, skills development opportunities and training which will, in turn, assist in reducing poverty levels that the area is currently facing, and strengthen electricity supply for the area.			
<b>5. 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? (Confirmation by the relevant Municipality in this regard must be attached to the final Basic Assessment Report as Appendix I.)</b>	YES ✓		Please explain
All the services required for the project have been adequately provided for and, should any need for other services arise, the relevant authority will be communicated with.			

<p><b>6. 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)? (Comment by the relevant Municipality in this regard must be attached to the final Basic Assessment Report as Appendix I.)</b></p>		<p><b>NO</b> ✓</p>	<p>Please explain</p>
<p>The proposed project is to be developed by a private developer (i.e. Sun Mechanics) and not the municipality. It therefore does not fall within the infrastructure planning of the municipality, although the need for the promotion of alternative energy sources is advocated in the municipal IDP. The project will not have any implications for the infrastructure planning of the municipality.</p>			
<p><b>7. Is this project part of a national programme to address an issue of national concern or importance?</b></p>		<p><b>YES</b> ✓</p>	<p>Please explain</p>
<p>This project is proposed to be developed under the IPP Procurement Programme that is being run by the National Department of Energy. The evacuation of additional power into the Eskom grid will serve to improve the stability of the grid for the immediate area, assist the government in achieving the goal of 17GW renewable energy as part of the electricity generation technology mix by 2030, and assist in the reduction in the need to mine non-renewable resources such as coal for conventional power generation. In order to meet the long-term goal of a sustainable renewable energy industry, a target of 17.8 GW of renewables by 2030 has been set by the Department of Energy (DoE) within the Integrated Resource Plan (IRP) 2010 and incorporated in the IPP Procurement Programme. This energy will be produced from various renewable energy technologies including solar energy facilities (i.e. such as PV or CPV technology). The proposed project is to contribute towards this goal for renewable energy.</p>			
<p><b>8. 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.)</b></p>		<p><b>YES</b> ✓</p>	<p>Please explain</p>
<p>» <i>Site access</i> The identified site is accessible via the R82 from Kroonstad and the S155 bordering the site on the northern side.</p> <p>» <i>Climatic Conditions</i> The economic viability of a photovoltaic plant is directly dependent on the annual direct solar irradiation values. A study of available radiation data shows that the proposed site is uniformly irradiated by the sun.</p> <p>» <i>Gradient</i> A level surface area is preferred for the installation of PV panels and specifically for PV technologies. This reduces the need for extensive earthworks associated with the levelling of a site, thereby minimising environmental impacts. The proposed</p>			

<p>area for the proposed PV plant is generally on a flat location with slopes less than 5 degrees.</p> <p>» <i>Grid Connection</i></p> <p>Due to the proposed size and location of the facility, an <b>overhead power line(88kV) of approximately 250m in length to tie into the existing power line (Heuningspruit Rural-Syferfontien Traction 88kV Eskom power line) on site</b> A connection application has been made to Eskom.</p>		
<p><b>9. Is the development the best practicable environmental option for this land/site?</b></p>	<p>YES ✓</p>	<p>Please explain</p>
<p>The prevailing climatic conditions over the proposed site are suitable for dryland cultivation. However due to the high clay content and the shallowness of the soils expected in the area, the area is categorised as being "marginal potential arable land-not suitable for cultivation". Although the climate in the area is suitable for cultivation, the soils are not best suited for this purpose and therefore the area has a low production potential. Furthermore, the current grazing capacity (for livestock farming) is estimated at 7ha/LSU. Therefore, agriculture on this site can be considered as marginal. Currently a PV energy facility is the best practicable environmental option as it will offer an additional income source to the landowner (who will earn a portion of the revenue from the facility), as well as an alternative, sustainable energy source, and at the same time reduce the carbon footprint and environmental impacts associated with coal-generated electricity,</p>		
<p><b>10. Will the benefits of the proposed land use/development outweigh the negative impacts of it?</b></p>	<p>YES ✓</p>	<p>Please explain</p>
<p>The negative impacts associated with the proposed activity include impacts on vegetation, soils and land use and are expected to be limited to the development footprint, and are not considered to be of high significance. All impacts can be managed and mitigated to acceptable levels, as outlined in the Environmental Management Programme.</p> <p>Positive impacts associated with the facility include i) an alternative income source for the landowner; ii) generation of electricity from a renewable resource also reduces reliance (albeit limited) on conventional power sources; iii) local economic upliftment and job creation. These positive impacts will extend beyond the boundary of the site and are expected to outweigh the negative impacts.</p>		
<p><b>11. Will the proposed land use/development set a precedent for similar activities in the area (local municipality)?</b></p>	<p>NO ✓</p>	<p>Please explain</p>
<p>There may be similar developments being proposed within the municipality; however no solar projects have been developed as yet. The development of similar projects will not be dictated by the location of this one (such as for example the development of industrial activities – factories – could have).</p>		

<b>12. Will any person's rights be negatively affected by the proposed activity/ies?</b>		<b>NO</b> ✓	Please explain
<p>The proposed project will take place on privately owned land. The proposed facility would impact directly on the landowner and indirectly on adjacent landowners. It must be noted that the affected landowner would enter into a lease agreement with the developer and would be compensated for the use of his property. Therefore, his rights are not considered to be affected. Adjacent landowners and surrounding residents may be affected from a visual perspective. It is not expected that this would impact on their rights. Parties who might be interested in or affected by the construction of the facility are consulted with regards to the proposed project through the EIA process.</p>			
<b>13. Will the proposed activity/ies compromise the "urban edge" as defined by the local municipality?</b>		<b>NO</b> ✓	Please explain
<p>The site is approximately 35 km south west of the town of Koppies. The project will not undermine the urban edge in any way.</p>			
<b>14. Will the proposed activity/ies contribute to any of the 17 Strategic Integrated Projects (SIPS)?</b>	<b>YES</b> ✓		Please explain
<p>The proposed activity covers the objectives of Strategic Infrastructure Projects (SIPS) 8, 9 and 10:</p> <ul style="list-style-type: none"> <li>• SIP 8: Green energy of support of South African economy - Support sustainable green energy initiatives on a National scale through a diverse range of clean energy options envisaged in the Integrated Resource Plan(IRP 2010)</li> <li>• SIP 9: Electricity Generation to support socio-economic development: Accelerate construction of new electricity capacity in accordance with IRP 2010 to meet the need of the economy and address historical imbalance.</li> <li>• SIP 10: Electricity transmission and distribution for all - Expansion of the transmission and distribution network for all and support economic development.</li> </ul>			
<b>15. What will the benefits be to society in general and to the local communities?</b>	Please explain		
<p>Job opportunities, albeit limited, will be created during the construction and operation of the proposed facility. In addition, local and regional economic benefits would be realised through the additional revenue generated as a result of the proposed project (through direct and indirect job opportunities, local spend, local procurement, etc.).</p>			
<b>16. Any other need and desirability considerations related to the proposed activity?</b>	Please explain		
<p>As indicated in the IDP, the area is in need of infrastructure which will benefit the municipal economy. This project will assist in addressing this need.</p>			
<b>17. How does the project fit into the National Development Plan for 2030?</b>	Please explain		
<p>One of the National Development Plan for 2030 is the transition to low carbon energy through speeding up and expanding renewable energy. This project will fit into this vision since it aims to contribute towards electricity supply through carbon-free methods.</p>			

**18. Please describe how the general objectives of Integrated Environmental Management as set out in section 23 of NEMA have been taken into account.**

The general objectives of Integrated Environmental Management have been taken into account for this Basic Assessment Report by means of identifying, predicting and evaluating the actual and potential impacts on the environment, socio-economic conditions and cultural heritage component. The risks, consequences, alternatives as well as options for mitigation of activities have also been considered with a view to minimise negative impacts, maximise benefits, and promote compliance with the principles of environmental management.

**19. Please describe how the principles of environmental management as set out in section 2 of NEMA have been taken into account.**

The principle of environmental management as set out in section of NEMA states that:

- » Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably;
- » Development must be sustainable socially (people), environmentally (planet) and economically (prosperity);and
- » Sustainable development requires the consideration of all the relevant factors,

From project perspective the development can be considered sustainable as it makes use of renewable energy resource and does not have a high significant impact on the environment.

These principles of sustainable development is further taken into account by including measures within the Environmental Management Programme (EMPr) to mitigate impacts that may occur thereby further reducing the environmental impacts. The EMPr would provide mitigation measures in terms of disturbance to ecosystems, loss of biodiversity, pollution and degradation to the environment, waste and storm water management.

**11. APPLICABLE LEGISLATION, POLICIES AND/OR GUIDELINES**

List all legislation, policies and/or guidelines of any sphere of government that are applicable to the application as contemplated in the EIA regulations, if applicable:

Table 1: List all legislation, policies and/or guidelines for the Heuningspruit PV 2 Solar Energy Facility

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
<b>National Legislation</b>			
National Environmental Management Act (Act No 107 of 1998)	<p>The EIA Regulations have been promulgated in terms of Chapter 5 of the Act. Listed activities which may not commence without an environmental authorisation are identified within these Regulations.</p> <p>In terms of S24(1) of NEMA, the potential impact on the environment associated with these listed activities must be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation.</p> <p>In terms of GNR 544 - 546 of June 2010 a Scoping and EIA Process is required to be undertaken for the proposed project.</p>	<p>Department of Environmental Affairs – competent authority</p> <p>Free State Department of Economic Development, Tourism and Environmental Affairs (FS DEDTEA) – commenting authority</p>	<p>The listed activities triggered by the proposed solar energy facility have been identified and assessed in the EIA process being undertaken (i.e. Scoping and EIA).</p> <p>This Basic Assessment Report will be submitted to the competent and commenting authority in support of the application for authorisation.</p>
National Environmental Management Act (Act No 107 of 1998)	<p>In terms of the Duty of Care Provision in S28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with this project is avoided, stopped or minimised.</p> <p>In terms of NEMA, it has become the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.</p>	Department of Environmental Affairs	While no permitting or licensing requirements arise directly by virtue of the proposed project, this section has found application during the EIA Phase through the consideration of potential impacts (cumulative, direct, and indirect). It will continue to apply throughout the life cycle of the project.
Environment Conservation	National Noise Control Regulations (GN R154	Department of Environmental	Noise impacts are expected to be



Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
Act (Act No 73 of 1989)	dated 10 January 1992)	Affairs  Department of Environment and Nature Conservation  Local Authorities	associated with the construction phase of the project and are not likely to present a significant intrusion to the local community. Therefore is no requirement for a noise permit in terms of the legislation.  On-site activities should be limited to 6:00am - 6:00pm, Monday - Saturday (excluding public holidays).  Should activities need to be undertaken outside of these times, the surrounding communities will need to be notified and appropriate approval will be obtained from DEA and the Local Municipality.
National Water Act (Act No 36 of 1998)	Water uses under S21 of the Act must be licensed unless such water use falls into one of the categories listed in S22 of the Act or falls under the general authorisation.	Department of Water Affairs  Provincial Department of Water Affairs	A water use license (WUL) is required to be obtained if drainage lines are impacts on. Currently no drainage lines occur on the site and will not be impacted by the proposed layout of the facility.  Should water be abstracted from the borehole on site or any other natural resource for use within the facility, a water use license may be required.
National Water Act (Act No 36 of 1998)	In terms of S19, the project proponent must ensure that reasonable measures are taken	Department of Water Affairs	This section of the Act will apply with respect to the potential impact on

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	throughout the life cycle of this project to prevent and remedy the effects of pollution to water resources from occurring, continuing, or recurring.	Provincial Department of Water Affairs	drainage lines, primarily during the construction phase (i.e. pollution from construction vehicles).
Minerals and Petroleum Resources Development Act (Act No 28 of 2002)	<p>A mining permit or mining right may be required where a mineral in question is to be mined (e.g. materials from a borrow pit) in accordance with the provisions of the Act. Requirements for Environmental Management Programmes and Environmental Management Plans are set out in S39 of the Act.</p> <p>S53 Department of Mineral Resources: Approval from the Department of Mineral Resources (DMR) may be required to use land surface contrary to the objects of the Act in terms of section 53 of the Mineral and Petroleum Resources Development Act, (Act No 28 of 2002): In terms of the Act approval from the Minister of Mineral Resources is required to ensure that proposed activities do not sterilise a mineral resources that might occur on site</p>	Department of Mineral Resources	<p>As no borrow pits are expected to be required for the construction of the facility, no mining permit or right is required to be obtained.</p> <p>A Section 53 application will be submitted the Free State DMR office.</p>
National Environmental Management: Air Quality Act (Act No 39 of 2004)	<p>S18, S19, and S20 of the Act allow certain areas to be declared and managed as "priority areas."</p> <p>Declaration of controlled emitters (Part 3 of Act) and controlled fuels (Part 4 of Act) with relevant emission standards.</p>	Department of Environmental Affairs	<p>No permitting or licensing requirements arise from this legislation.</p> <p>The Act provides that an air quality officer may require any person to submit an atmospheric impact report if there is reasonable suspicion that</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
<p>National Heritage Resources Act (Act No 25 of 1999)</p>	<p>S38 states that Heritage Impact Assessments (HIAs) are required for certain kinds of development including:</p> <ul style="list-style-type: none"> <li>» The construction of a road, power line, pipeline, canal or other similar linear development or barrier exceeding 300 m in length; and</li> <li>» Any development or other activity which will change the character of a site exceeding 5 000 m<sup>2</sup> in extent.</li> </ul> <p>Stand alone HIAs are not required where an EIA Process is carried out as long as the EIA contains an adequate HIA component that fulfils the provisions of S38. In such cases only those components not addressed by the EIA should be covered by the heritage component.</p>	<p>South African Heritage Resources Agency</p>	<p>the person has failed to comply with the Act.</p> <p>A permit may be required should identified cultural/heritage sites on site be required to be disturbed or destroyed as a result of the proposed development.</p> <p>A HIA has been undertaken as part of the Basic Assessment Process to identify heritage sites. No heritage sites are located within the study area. See Appendix D2.</p>
<p>National Environmental Management: Biodiversity Act (Act No 10 of 2004)</p>	<p>In terms of S57, the Minister of Environmental Affairs has published a list of critically endangered, endangered, vulnerable, and protected species in GNR 151 in Government Gazette 29657 of 23 February 2007 and the regulations associated therewith in GNR 152 in GG29657 of 23 February 2007, which came into effect on 1 June 2007.</p> <p>In terms of GNR 152 of 23 February 2007: Regulations relating to listed threatened and</p>	<p>Department of Environmental Affairs</p>	<p>As the applicant will not carry out any restricted activity, as is defined in S1 of the Act, no permit is required to be obtained in this regard.</p> <p>Specialist flora and fauna studies have been undertaken as part of the basic Assessment process. As such the potential occurrence of critically endangered, endangered, vulnerable, and protected species, as well as</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>protected species, the relevant specialists must be employed during the EIA Phase of the project to incorporate the legal provisions as well as the regulations associated with listed threatened and protected species (GNR 152) into specialist reports in order to identify permitting requirements at an early stage of the EIA Phase.</p> <p>The Act provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (G 34809, GoN 1002), 9 December 2011).</p>		<p>critically endangered (CR), endangered (EN), vulnerable (VU) or protected ecosystems and the potential for them to be affected has been considered, this report is contained in Appendix D 1.</p>
<p>Conservation of Agricultural Resources Act (Act No 43 of 1983)</p>	<p>Regulation 15 of GNR1048 provides for the declaration of weeds and invader plants, and these are set out in Table 3 of GNR1048. Weeds are described as Category 1 plants, while invader plants are described as Category</p>	<p>Department of Agriculture</p>	<p>This Act will find application throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies must be developed and</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>2 and Category 3 plants. These regulations provide that Category 1, 2 and 3 plants must not occur on land and that such plants must be controlled by the methods set out in Regulation 15E.</p>		<p>implemented. In addition, a weed control and management plan must be implemented.</p> <p>The permission of agricultural authorities will be required if the Project requires the draining of vleis, marshes or water sponges on land outside urban areas.</p>
<p>National Forests Act (Act No. 84 of 1998)</p>	<ul style="list-style-type: none"> <li>» In terms of S5(1) no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a license granted by the Minister to an (applicant and subject to such period and conditions as may be stipulated”.</li> <li>» GN 1042 provides a list of protected tree species.</li> </ul>	<p>National Department of Forestry</p>	<p>A permit would need to be obtained for any protected trees that are affected by the development.</p>
<p>National Veld and Forest Fire Act (Act 101 of 1998)</p>	<p>In terms of S21 the applicant would be obliged to burn firebreaks to ensure that should a veldfire occur on the property, that it does not spread to adjoining land.</p> <p>In terms of S12 the applicant must ensure that the firebreak is wide and long enough to have a reasonable chance of preventing the fire from spreading, not causing erosion, and is reasonably free of inflammable material.</p>	<p>Department of Water Affairs</p>	<p>While no permitting or licensing requirements arise from this legislation, and this Act will find application during the construction and operational phase of the project.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>In terms of S17, the applicant must have such equipment, protective clothing, and trained personnel for extinguishing fires.</p>		
<p>Hazardous Substances Act (Act No 15 of 1973)</p>	<p>This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products.</p> <p>Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc, nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance                      Group IV: any electronic product; and                      Group V: any radioactive material.</p> <p>The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.</p>	<p>Department of Health</p>	<p>It is necessary to identify and list all the Group I, II, III, and IV hazardous substances that may be on the site and in what operational context they are used, stored or handled. If applicable, a license is required to be obtained from the Department of Health.</p>
<p>Development Facilitation</p>	<p>Provides for the overall framework and</p>	<p>Local Municipality</p>	<p>The applicant must submit a land</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
Act (Act No 67 of 1995)	<p>administrative structures for planning throughout the Republic.</p> <p>S(2 - 4) provide general principles for land development and conflict resolution.</p>	District Municipality	development application in the prescribed manner and form as provided for in the Act. A land development applicant who wishes to establish a land development area must comply with procedures set out in the Act.
Subdivision of Agricultural Land Act (Act No 70 of 1970)	Details land subdivision requirements and procedures. Applies for subdivision of all agricultural land in the province	Local Municipality District Municipality	Subdivision will have to be in place prior to any subdivision approval in terms of S24 and S17 of the Act.
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)	<p>The Minister may by notice in the <i>Gazette</i> publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment.</p> <p>The Minister may amend the list by –</p> <ul style="list-style-type: none"> <li>» Adding other waste management activities to the list.</li> <li>» Removing waste management activities from the list.</li> <li>» Making other changes to the particulars on the list.</li> </ul> <p>In terms of the Regulations published in terms of this Act (GN 718), A Basic Assessment or Environmental Impact Assessment is required to be undertaken for identified listed activities.</p> <p>Any person who stores waste must at least take steps, unless otherwise provided by this</p>	<p>National Department of Water and Environmental Affairs</p> <p>Provincial Department of Environmental Affairs (general waste)</p>	<p>As no waste disposal site is to be associated with the proposed project, no permit is required in this regard.</p> <p>Waste handling, storage and disposal during construction and operation is required to be undertaken in accordance with the requirements of the Act, as detailed in the EMP (refer to Appendix G).</p> <p>The volumes of waste to be generated and stored on the site during construction and operation of the facility will not require a waste license (provided these remain below the prescribed thresholds).</p> <ul style="list-style-type: none"> <li>» in excess of 100m<sup>3</sup> of general waste</li> <li>» in excess of 35m<sup>3</sup> of</li> </ul>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>Act, to ensure that:</p> <ul style="list-style-type: none"> <li>» The containers in which any waste is stored, are intact and not corroded or in</li> <li>» any other way rendered unfit for the safe storage of waste.</li> <li>» Adequate measures are taken to prevent accidental spillage or leaking.</li> <li>» The waste cannot be blown away.</li> <li>» Nuisances such as odour, visual impacts and breeding of vectors do not arise; and</li> <li>» Pollution of the environment and harm to health are prevented.</li> </ul>		<p>hazardous waste</p>
<p>National Road Traffic Act (Act No 93 of 1996)</p>	<ul style="list-style-type: none"> <li>» The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed.</li> <li>» Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts.</li> <li>» The general conditions, limitations, and escort requirements for abnormally</li> </ul>	<ul style="list-style-type: none"> <li>» South African National Roads Agency Limited (national roads)</li> <li>» Provincial Department of Transport</li> </ul>	<ul style="list-style-type: none"> <li>» An abnormal load/vehicle permit may be required to transport the various components to site for construction. These include route clearances and permits will be required for vehicles carrying abnormally heavy or abnormally dimensioned loads.</li> <li>» Transport vehicles exceeding the dimensional limitations (length) of 22m.</li> <li>» Depending on the trailer configuration and height when loaded, some of the power station components may not meet specified dimensional limitations (height and width).</li> </ul>



Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.		
<b>Provincial Legislation</b>			
The Nature Conservation Ordinance 8 of 1969 and amendments	Lists plant and animal species as protected	Free State Department of Economic Development, Tourism and Environmental Affairs	According to the SANBI SIBIS database, only two listed species are known from the area, <i>Boophone disticha</i> and <i>Gnaphalium declinatum</i> . Neither were observed at the site and it is therefore unlikely that they are present at the site. Therefore, it is safe to conclude that the abundance of listed plant species at the site is likely to be very low and it is unlikely that a permit in this regard would be required.

## 12. WASTE, EFFLUENT, EMISSION AND NOISE MANAGEMENT

### a) Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase?

<b>YES</b> ✓	<input checked="" type="checkbox"/>
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If YES, what estimated quantity will be produced per month?

± 8m <sup>3</sup> of solid construction waste consisting mainly of vegetation, spoil material from clearing activities and metal and cabling off cuts.
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How will the construction solid waste be disposed of (describe)?

It is anticipated that construction waste will be disposed of at the closest licensed municipal landfill site.

Where will the construction solid waste be disposed of (describe)?

In order to comply with legal requirements should there be excess solid construction waste after recycling options have been exhausted, the waste will be trucked to Landfill (to be confirmed in consultation with the municipality).

Will the activity produce solid waste during its operational phase?

<input checked="" type="checkbox"/>	<b>NO</b> ✓
n/a	

If YES, what estimated quantity will be produced per month?

How will the solid waste be disposed of (describe)?

If the solid waste will be disposed of into a municipal waste stream, indicate which registered landfill site will be used.

Where will the solid waste be disposed of if it does not feed into a municipal waste stream (describe)?

If the solid waste (construction or operational phases) will not be disposed of in a registered landfill site or be taken up in a municipal waste stream, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Can any part of the solid waste be classified as hazardous in terms of the NEM:WA?

	<b>NO</b> ✓
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If YES, inform the competent authority and request a change to an application for scoping and EIA. An application for a waste permit in terms of the NEM:WA must also be submitted with this application.

Is the activity that is being applied for a solid waste handling or treatment facility?

	<b>NO</b> ✓
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If YES, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA. An application for a waste permit in terms of the NEM:WA must also be submitted with this application.

**b) Liquid effluent**

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system?

	<b>NO</b> ✓
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If YES, what estimated quantity will be produced per month?

	m <sup>3</sup>
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Will the activity produce any effluent that will be treated and/or disposed of on site?

	<b>NO</b> ✓
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*If YES, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.*

Will the activity produce effluent that will be treated and/or disposed of at another facility?

	<b>NO</b> ✓
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If YES, provide the particulars of the facility:

<b>Facility name:</b>			
<b>Contact person:</b>			
<b>Postal address:</b>			
<b>Postal code:</b>			
<b>Telephone:</b>		<b>Cell:</b>	
<b>E-mail:</b>		<b>Fax:</b>	

Describe the measures that will be taken to ensure the optimal reuse or recycling of waste water, if any:

Water will be used for the cleaning of panels during operation and for dust suppression during construction. Waste water (other than normal sewage) will not be produced.

**c) Emissions into the atmosphere**

Will the activity release emissions into the atmosphere other than exhaust emissions and dust associated with construction phase activities?

	<b>NO</b> ✓

If YES, is it controlled by any legislation of any sphere of government?

If YES, the applicant must consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

If NO, describe the emissions in terms of type and concentration:

PV installations convert solar energy into electricity, and consume no fuel during operation. PV installations produce an insignificant quantity of greenhouse gases over their lifecycle when compared to conventional coal-fired power stations. The operational phase of a solar facility produces little to zero carbon dioxide, sulphur dioxide, mercury, particulates, or any other type of air pollution. However, dust will be generated during the construction phase. The contractor would need to adhere to the Environmental Management Programme for mitigation measures.

**d) Waste permit**

Will any aspect of the activity produce waste that will require a waste permit in terms of the NEM:WA?

	<b>NO</b> ✓
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If YES, please submit evidence that an application for a waste permit has been submitted to the competent authority

**e) Generation of noise**

Will the activity generate noise?

	<b>NO</b> ✓

If YES, is it controlled by any legislation of any sphere of government?

If YES, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

If NO, describe the noise in terms of type and level:

A limited amount of noise will be generated during the construction phase of the facility due to movement of heavy machinery on site. The operation phase will not generate any noise.

### 13. WATER USE

Please indicate the source(s) of water that will be used for the activity by ticking the appropriate box(es):

<b>Municipal</b> ✓	Water board	Groundwater	River, stream, dam or lake	<b>Other</b>	The activity will not use water
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The applicant will be trucking in water with purchase agreement from agreement from localised user or the municipality, as advised by Department of Water Affairs.

If water is to be extracted from groundwater, river, stream, dam, lake or any other natural feature, please indicate the volume that will be extracted per month:

Does the activity require a water use authorisation (general authorisation or water use license) from the Department of Water Affairs?

<b>NO</b> ✓

If YES, please provide proof that the application has been submitted to the Department of Water Affairs.

N/A
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### 14. ENERGY EFFICIENCY

Describe the design measures, if any that have been taken to ensure that the activity is energy efficient:

The activity is in itself an activity that is proposed to generate electricity from a cleaner alternative energy source (i.e. solar radiation).
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Describe how alternative energy sources have been taken into account or been built into the design of the activity, if any:

The purpose of a PV installation is to utilise a renewable energy source (i.e. solar radiation) for the production of electricity. Therefore it is not required to consider any additional alternative energy sources.
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**SECTION B: SITE/AREA/PROPERTY DESCRIPTION**

**Important notes:**

- For linear activities (pipelines, etc) as well as activities that cover very large sites, it may be necessary to complete this section for each part of the site that has a significantly different environment. In such cases please complete copies of Section B and indicate the area, which is covered by each copy No. on the Site Plan.

Section B Copy No. (e.g. A):

- Paragraphs 1 - 6 below must be completed for each alternative.

- Has a specialist been consulted to assist with the completion of this section?

<b>YES</b> ✓	
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If YES, please complete the form entitled "Details of specialist and declaration of interest" for each specialist thus appointed and attach it in Appendix I. All specialist reports must be contained in **Appendix D**.

**Property description/physical address:**

<b>Province</b>	Free State Province
<b>District Municipality</b>	Fezile Dabi District Municipality
<b>Local Municipality</b>	Ngwathe Local Municipality
<b>Ward Number(s)</b>	20
<b>Farm name and number</b>	Verdun RE/1511
<b>Portion number</b>	0
<b>SG Code</b>	F020000000151100000

Where a large number of properties are involved (e.g. linear activities), please attach a full list to this application including the same information as indicated above.

**Current land-use zoning as per local municipality IDP/records:**

Agriculture (Grazing of livestock)
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In instances where there is more than one current land-use zoning, please attach a list of current land use zonings that also indicate which portions each use pertains to, to this application.

Is a change of land-use or a consent use application required?

<b>YES</b> ✓	<input type="checkbox"/>
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**1. GRADIENT OF THE SITE**

Indicate the general gradient of the site.

**Alternative S1:**

<b>Flat</b> ✓	1:50	-	1:20	-	1:15	-	1:10	-	1:7,5	-	Steeper than 1:5
	1:20		1:15		1:10		1:7,5		1:5		

**Alternative S2 (if any):**

Flat	1:50	-	1:20	-	1:15	-	1:10	-	1:7,5	-	Steeper than 1:5
	1:20		1:15		1:10		1:7,5		1:5		

**Alternative S3 (if any):**

Flat	1:50	-	1:20	-	1:15	-	1:10	-	1:7,5	-	Steeper than 1:5
	1:20		1:15		1:10		1:7,5		1:5		

**2. LOCATION IN LANDSCAPE**

Indicate the landform(s) that best describes the site:

2.1 Ridgeline	<input type="checkbox"/>	2.4 Closed valley	<input type="checkbox"/>	2.7 Undulating plain / low hills	<input type="checkbox"/>
2.2 Plateau	<input type="checkbox"/>	2.5 Open valley	<input type="checkbox"/>	2.8 Dune	<input type="checkbox"/>
2.3 Side slope of hill/mountain	<input type="checkbox"/>	<b>2.6 Plain</b>	<input checked="" type="checkbox"/>	2.9 Seafront	<input type="checkbox"/>

**3. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE**

Is the site(s) located on any of the following?

	<b>Alternative S1:</b>	<b>Alternative S2 (if any):</b>		<b>Alternative S3 (if any):</b>	
Shallow water table (less than 1.5m deep)	<input type="checkbox"/>	YES	NO	YES	NO
Dolomite, sinkhole or doline areas	<input type="checkbox"/>	YES	NO	YES	NO
Seasonally wet soils (often close to water bodies)	<input type="checkbox"/>	YES	NO	YES	NO
Unstable rocky slopes or steep slopes with loose soil	<input type="checkbox"/>	YES	NO	YES	NO
Dispersive soils (soils that dissolve in water)	<input type="checkbox"/>	YES	NO	YES	NO

	<b>Alternative S1:</b>	<b>Alternative S2 (if any):</b>	<b>Alternative S3 (if any):</b>
Soils with high clay content (clay fraction more than 40%)	<b>YES</b> ✓	YES NO	YES NO
Any other unstable soil or geological feature	<b>NO</b> ✓	YES NO	YES NO
An area sensitive to erosion	<b>NO</b> ✓	YES NO	YES NO

If you are unsure about any of the above or if you are concerned that any of the above aspects may be an issue of concern in the application, an appropriate specialist should be appointed to assist in the completion of this section. Information in respect of the above will often be available as part of the project information or at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by the Council for Geo Science may also be consulted.

#### 4. GROUND COVER

Indicate the types of groundcover present on the site. The location of all identified rare or endangered species or other elements should be accurately indicated on the site plan(s).

Natural veld - good condition <sup>E</sup> ✓	<b>Natural veld with scattered aliens<sup>E</sup></b>	Natural veld with heavy alien infestation <sup>E</sup>	Veld dominated by alien species <sup>E</sup>	Gardens
Sport field	Cultivated land	Paved surface	Building or other structure	Bare soil

If any of the boxes marked with an "E" is ticked, please consult an appropriate specialist to assist in the completion of this section if the environmental assessment practitioner doesn't have the necessary expertise.

**An Ecological assessment has been completed for the proposed facility - refer to Appendix D1.**

#### 5. SURFACE WATER

Indicate the surface water present on and or adjacent to the site and alternative sites?

Perennial River	<b>NO</b> ✓
Non-Perennial River (Drainage lines)	<b>NO</b> ✓
Permanent Wetland	<b>NO</b> ✓
Seasonal Wetland	<b>NO</b> ✓
Artificial Wetland	<b>NO</b> ✓



Estuarine / Lagoonal wetland		NO✓	
------------------------------	--	-----	--

Note: There is a small earth dam at the northern end of proposed Heuningspruit PV 2 Solar Energy Facility.

Note:

If any of the boxes marked YES or UNSURE is ticked, please provide a description of the relevant watercourse.

N/A
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## 6. LAND USE CHARACTER OF SURROUNDING AREA

Indicate land uses and/or prominent features that currently occur within a 500m radius of the site and give description of how this influences the application or may be impacted upon by the application:

<b>Natural area</b> ✓	<b>Dam</b> or reservoir	Polo fields
Low density residential	Hospital/medical centre	Filling station <sup>H</sup>
Medium density residential	School	Landfill or waste treatment site
High density residential	Tertiary education facility	Plantation
Informal residential <sup>A</sup>	Church	<b>Agriculture</b> ✓
Retail commercial & warehousing	Old age home	River, stream or wetland✓ (Drainage Line)
Light industrial	Sewage treatment plant <sup>A</sup>	Nature conservation area
Medium industrial <sup>AN</sup>	Train station or shunting yard <sup>N</sup>	Mountain, koppie or ridge
Heavy industrial <sup>AN</sup>	<b>Railway line</b> <sup>N</sup> ✓	Museum
Power station	Major road (4 lanes or more) <sup>N</sup>	Historical building
Office/consulting room	Airport <sup>N</sup>	Protected Area
Military or police base/station/compound	Harbour	Graveyard
Spoil heap or slimes dam <sup>A</sup>	Sport facilities	Archaeological site
Quarry, sand or borrow pit	Golf course	<b>Other land uses: An existing 88 kV power line bisects the property</b>  <b>There is a small earth dam at the northern end of proposed</b>

		<b>Heuningspruit PV 2 Solar Energy Facility.</b>
--	--	--

If any of the boxes marked with an "N" are ticked, how will this impact / be impacted upon by the proposed activity?

The railway line will not be impacted upon by the proposed activity, as it falls outside the boundary of the project. The project will not generate any significant noise during construction or operation and will therefore not add to the existing noise generated from the railway line.

If any of the boxes marked with an "An" are ticked, how will this impact / be impacted upon by the proposed activity? Specify and explain:

If any of the boxes marked with an "H" are ticked, how will this impact / be impacted upon by the proposed activity? Specify and explain:

Does the proposed site (including any alternative sites) fall within any of the following:

Critical Biodiversity Area (as per provincial conservation plan)		<b>NO</b> ✓
Core area of a protected area?		<b>NO</b> ✓
Buffer area of a protected area?		<b>NO</b> ✓
Planned expansion area of an existing protected area?		<b>NO</b> ✓
Existing offset area associated with a previous Environmental Authorisation?		<b>NO</b> ✓
Buffer area of the SKA?		<b>NO</b> ✓

If the answer to any of these questions was YES, a map indicating the affected area must be included in Appendix A.

## 7. CULTURAL/HISTORICAL FEATURES

Are there any signs of culturally or historically significant elements, as defined in section 2 of the National Heritage Resources Act, 1999, (Act No. 25 of 1999), including Archaeological or paleontological sites, on or close (within 20m) to the site? If YES, explain:

	<b>NO</b> ✓
--	-------------

The impacts to heritage resources by the proposed development are considered to be low as the study area was ploughed in the past and this would have destroyed any surface indicators of heritage resources. No sites were recorded in the development footprint. An informal cemetery (Site 1) was documented to the north west of the proposed alternatives and no direct impact is foreseen on the site.

If uncertain, conduct a specialist investigation by a recognised specialist in the field (archaeology or palaeontology) to establish whether there is such a feature(s) present on or close to the site. Briefly explain the findings of the specialist:

Will any building or structure older than 60 years be affected in any way?

**NO** ✓

Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?

**NO** ✓

If YES, please provide proof that this permit application has been submitted to SAHRA or the relevant provincial authority.

## **PALAEONTOLOGY**

The study area is completely underlain by Permian sediments of the Volksrust Formation. The Volksrust Formation is fossiliferous elsewhere in the Karoo Basin, but known fossil localities are not numerous. The probability of a negative impact on the palaeontological heritage of the Volksrust Formation is accordingly low. However, the fossil assemblages known to occur within the Volksrust Formation are potentially scientifically significant.

Palaeontological sites are occasionally identified in alluvial terraces and dongas of Quaternary age within South Africa, but are uncommon. As such, the risk of a negative impact is low, but the significance of any negative impact on the fossil assemblages could potentially be high.

## **8. SOCIO-ECONOMIC CHARACTER**

### **a) Local Municipality**

Please provide details on the socio-economic character of the local municipality in which the proposed site(s) are situated.

Level of unemployment:

As indicated below, demographic indices of the Ngwathe Local Municipality population have largely remained quite stable over the 10 year period since the 2001 Census. The population has grown at an average of 1.4% per year, and the number of households has also increased (15.6% over 10 year period). Indices for age, gender and household size and structure have remained more or less the same. Of note is the large percentage of female-headed households (41.8%).

#### **Overview of key demographic indicators for the Ngwathe Local Municipality**

ASPECT	2001	2011	CHANGE
<b>Population</b>	118 810	120 520	+1.4% p.a.
<b>Households</b>	32 108	37 102	+ 15.6%
<b>Household size (average)</b>	3.6	3.2	- 0.4
<b>% Female headed households</b>	42.2	41.8	- 0.4
<b>Sex Ratio (males per 100 females)</b>	90.7	91	+ 0.3
<b>Dependency ratio per 100 (15-64)</b>	60.5	60.2	+ 0.3
<b>% Population &lt;15 years</b>	30.6	30.1	- 0.5
<b>% Population 15-64</b>	62.3	62.4	+ 0.1
<b>% Population 65+</b>	7.1	7.5	+ 0.4
<b>Unemployment rate (official) - % of economically active population</b>	47.1	35.2	- 11.9
<b>Youth unemployment rate (official) - % of economically active population 15-34</b>	59.4	45.1	- 14.3
<b>No schooling - % of population 20+</b>	17.5	8.5	- 7
<b>Higher Education - % of population 20+</b>	5.3	6.4	+ 1.1
<b>Matric - % of population 20+</b>	16.3	25.8	+ 9.5

*Source: Compiled from StatsSA Census 2011 Municipal Fact Sheet*

Relatively large positive changes are however observable with regard to education and employment. In this regard, while the current unemployment figure remains high (35.2%), both the official and youth unemployment rates have declined significantly, namely by 11.9% and 14.3%, respectively.

#### Economic profile of local municipality:

The NLM's key economic sectors are agriculture, manufacturing and commercial activities. Parys has a strong commercial component and provides a wide range of services regarding health, education and professional services to the FDDM. Agriculture is the undisputed backbone of the NLM economy, with the region one of the country's foremost maize and sunflower producing areas. Key tourism attractions in the NLM include the Vredefort Dome (a UNESCO World Heritage Site), the Vaal River and dams (recreation), and Anglo-Boer battlefield sites. Proximity to Gauteng has seen the NLM grow in importance as weekend tourism destination over the past decade, including with regard to the development of game farms and lodges (none in meaningful proximity to PV sites)<sup>2</sup>.

#### Level of education:

With regard to education levels, the portion of the population older than 20 years without formal education has declined by 7% to 8.5%. At the same time, while the

<sup>2</sup>[www.localgovernment.co.za/locals/view/42/ngwathe-local-municipality;www.ngwathe.fs.gov.za/#tab1](http://www.localgovernment.co.za/locals/view/42/ngwathe-local-municipality;www.ngwathe.fs.gov.za/#tab1)

percentages of the adult population with tertiary (+1.1%) and secondary (+9.5%) qualifications have increased, only 32.2% of the adult population has a secondary or higher qualification.

**b) Socio-economic value of the activity**

What is the expected capital value of the activity on completion?	R500 million
What is the expected yearly income that will be generated by or as a result of the activity?	Depends on the bid tariff for the project and variables of Department of Energy
Will the activity contribute to service infrastructure?	YES
Is the activity a public amenity?	NO
How many new employment opportunities will be created in the development and construction phase of the activity/ies?	Approximately 80
What is the expected value of the employment opportunities during the development and construction phase?	This will become known after an initial total price has been calculated for the project.
What percentage of this will accrue to previously disadvantaged individuals?	5% highly skilled 20%.skilled
How many permanent new employment opportunities will be created during the operational phase of the activity?	Approximately 20
What is the expected current value of the employment opportunities during the first 10 years?	Not known at this stage
What percentage of this will accrue to previously disadvantaged individuals?	20% to be employed from PDI as a minimum standard in accordance with the Department of Energy requirements

**9. BIODIVERSITY**

Please note: The Department may request specialist input/studies depending on the nature of the biodiversity occurring on the site and potential impact(s) of the proposed activity/ies. To assist with the identification of the biodiversity occurring on site and the ecosystem status consult <http://bgis.sanbi.org> or [BGIShelp@sanbi.org](mailto:BGIShelp@sanbi.org). Information is also available on compact disc (cd) from the Biodiversity-GIS Unit, Ph (021) 799 8698. This information may be updated from time to time and it is the applicant/ EAP's responsibility to ensure that the latest version is used. A map of the relevant biodiversity information (including an indication of the habitat conditions as per (b) below) and must be provided as an overlay map to the property/site plan as **Appendix D** to this report.

a) **Indicate the applicable biodiversity planning categories of all areas on site and indicate the reason(s) provided in the biodiversity plan for the selection of the specific area as part of the specific category)**

Systematic Biodiversity Planning Category				If CBA or ESA, indicate the reason(s) for its selection in biodiversity plan
Critical Biodiversity Area (CBA)	Ecological Support Area (ESA)	<b>Other Natural Area (ONA)</b> ✓	No	
			Natural Area	
			Remaining (NNR)	

b) **Indicate and describe the habitat condition on site**

Habitat Condition	Percentage of habitat condition class (adding up to 100%)	Description and additional Comments and Observations (including additional insight into condition, e.g. poor land management practises, presence of quarries, grazing, harvesting regimes etc).
Natural	94%	<p>The majority of the site and the entire PV area development footprint consist of degraded grassland on previously transformed areas. Vegetation cover has generally recovered well, but diversity within these areas is lower than in adjacent intact grassland. Dominant species include <i>Eragrostis curvula</i>, <i>Aristida adscensionis</i>, <i>Sporobolus fimbriatus</i> and <i>Cynodon dactylon</i>.</p> <p>The area around the dam consists of grassland with a relatively dense cover of <i>Acacia karoo</i>, with other shrubs such as <i>Asparagus larcinus</i>, <i>Ziziphus mucronata</i> and <i>Searsia pyroides</i>. The grass layer contained species such as <i>Themeda triandra</i>, <i>Eragrostis lehmanianna</i> and <i>Sporobolus fimbriatus</i>. This area is considered reasonably high sensitivity on account of the structure and higher cover in this area which provides shelter for fauna such as Duiker and Scrub Hare which were observed hiding out in this area. This area should be avoided due to its significance for fauna as well as the proximity of this area to the dam.</p>

<b>Habitat Condition</b>	<b>Percentage of habitat condition class (adding up to 100%)</b>	<b>Description and additional Comments and Observations (including additional insight into condition, e.g. poor land management practises, presence of quarries, grazing, harvesting regimes etc).</b>
Near Natural (includes areas with low to moderate level of alien invasive plants)	0%	
Degraded (includes areas heavily invaded by alien plants)	5%	<i>Acacia karoo</i> may occur as scattered trees and alien species such as <i>Verbena aristigera</i> , <i>Datura stramonium</i> and <i>Tagetes minuta</i> .
Transformed (includes cultivation, dams, urban, plantation, roads, etc)	1%	There is a small earth dam at the northern end of Heuningspruit PV2.

**c) Complete the table to indicate:**

- (i) the type of vegetation, including its ecosystem status, present on the site; and
- (ii) whether an aquatic ecosystem is present on site.

<b>Terrestrial Ecosystems</b>		<b>Aquatic Ecosystems</b>			
<b>Ecosystem threat status as per the National Environmental Management: Biodiversity Act (Act No. 10 of 2004)</b>	Critical	Wetland (including rivers, depressions, channelled and unchannelled wetlands, flats, seeps pans, and artificial wetlands)		Estuary	Coastline
	Endangered				
	Vulnerable				
	Least Threatened ✓	<b>NO</b> ✓		<b>NO</b> ✓	<b>NO</b> ✓

**d) Please provide a description of the vegetation type and/or aquatic ecosystem present on site, including any important biodiversity features/information identified on site (e.g. threatened species and special habitats)**

According to the national vegetation map (Mucina & Rutherford 2006), the entire site falls within the Central Free State Grassland vegetation type. There is some Vaal-Vet

Sandy Grassland mapped to the east of the site, but it is some distance away and would not be impacted by the development. The Central Free State Grassland vegetation type occupies 15 982 km<sup>2</sup> largely within the Free State from Sasolburg in the north to Dewetsdorp in the south. The vegetation type occurs at elevations of between 1300m and 1640m with most of the area between 1400-1460m. Central Free State Grassland occurs on undulating plains supporting short grassland, dominated under natural conditions by *Themeda triandra* but with *Eragrostis curvula* and *E. chloromelas* in degraded conditions. Overgrazed and trampled areas may become dominated by karoo shrubs or even *Acacia karoo* along bottomlands. The underlying geology is usually sedimentary mudstones and sandstones of the Adelaide Subgroup as well as those of the Ecca Group. The dominant landform is the Dc land type with occasional areas of the Ea land type associated with intrusive dolerite. Approximately 76% of the vegetation type is considered intact and according to the National List of the Threatened Ecosystems (2011) it is not considered a vegetation type of conservation concern given its relatively wide extent and moderate level of transformation. The Vaal-Vet Sandy Grassland is however listed as Endangered due to the high level of transformation this vegetation unit has experienced, but as mentioned above, there is no Vaal-Vet Sandy Grassland within the study area and it would not be impacted by the development.

#### Thornveld

There is a small earth dam at the northern end of Heuningspruit PV2 that is considered sensitive as it provides mesic habitat and breeding area for amphibians. The walls of the dam are dominated by *Acacia karoo* and form an important area for birds at the site. Although the dam itself has become largely silted up, it has been colonised by grass such as *Setaria sphacelata* and is locally important as a mesic environment. This area and the adjacent buffer area should be avoided as much as possible.

The area around the dam consists of grassland with a relatively dense cover of *Acacia karoo*, with other shrubs such as *Asparagus laricinus*, *Ziziphus mucronata* and *Searsia pyroides*. The grass layer contained species such as *Themeda triandra*, *Eragrostis lehmanianna* and *Sporobolus fimbriatus*. This area is considered reasonably high sensitivity on account of the structure and higher cover in this area which provides shelter for fauna such as Duiker and Scrub Hare which were observed hiding out in this area. This area should be avoided due to its significance for fauna as well as the proximity of this area to the dam.





**Figure 6:** The thornveld habitat type which occurs in the vicinity of the dam and is dominated by *Acacia karoo*.

## SECTION C: PUBLIC PARTICIPATION

### 1. ADVERTISEMENT AND NOTICES

<b>Publication name</b>	Volksblad and Snuffelblad	
<b>Date published</b>	14 December 2013 and 15 December 2013 respectively	
<b>Site notice position</b>	<b>Latitude</b>	<b>Longitude</b>
	27° 54' 29.13" S	27° 32' 02.21" E
<b>Date placed</b>	12 November 2013	

Include proof of the placement of the relevant advertisements and notices in **Appendix E1**.

### 2. DETERMINATION OF APPROPRIATE MEASURES

Provide details of the measures taken to include all potential I&APs as required by Regulation 54(2)(e) and 54(7) of GN R.543.

Key stakeholders (other than organs of state) identified in terms of Regulation 54(2)(b) of GN R.543:

- » Site notices were placed at the farm entrance gate.
- » Adverts were placed in the Volksblad (Regional newspaper) and Snuffelblad (local newspapers) to notify the public of the proposed project and invited participation and review of this Draft Basic Assessment Report.
- » A Background Information Document (BID) was distributed to the surrounding landowners and placed on the website: [www.savannahsa.com](http://www.savannahsa.com).
- » Focus group meeting were arranged with the local municipality, landowner and adjacent landowners. The local municipality cancelled the meeting a day prior to the meeting due to the Nelson Mandela Memorial. The attendees of the meeting were to attend the memorial. The meeting with the landowner and adjacent landowners were also cancelled due to inclement weather. The adjacent landowners were called and requested to submit their concerns or comments.

Include proof that the key stakeholder received written notification of the proposed activities as **Appendix E2**. This proof may include any of the following:

- » e-mail delivery reports;
- » registered mail receipts;
- » courier waybills;
- » signed acknowledgements of receipt; and/or
- » or any other proof as agreed upon by the competent authority.

### 3. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

Summary of main issues raised by I&APs	Summary of response from EAP
No comments of concern.	

### 4. COMMENTS AND RESPONSE REPORT

The practitioner must record all comments received from I&APs and respond to each comment before the Draft BAR is submitted. The comments and responses must be captured in a comments and response report as prescribed in the EIA regulations and be attached to the Final BAR as **Appendix E3**.

**Note:** All comments received during the public review period will be included within a Comments and Responses Report within the Final BAR.

### 5. AUTHORITY PARTICIPATION

Authorities and organs of state identified as key stakeholders:

- Free State - Department of Economic Development, Tourism and Environmental Affairs (FS DEDTEA)
- Free State - Department of Agriculture and Rural Development
- Free State - Department of Public Works
- Free State - Department of Public Roads And Transport
- Free State - Department of Water Affairs
- South African Heritage Resources Agency
- Ngwathe Local Municipality
- Fezile Dabi District Municipality
- SANRAL
- Eskom
- Square Kilometre Array (SKA)
- Department of Energy
- National Department of Agriculture, Forestry and Fisheries

Include proof that the Authorities and Organs of State received written notification of the proposed activities as **Appendix E4**.

In the case of renewable energy projects, Eskom and the SKA Project Office must be included in the list of Organs of State.

### 6. CONSULTATION WITH OTHER STAKEHOLDERS

Note that, for any activities (linear or other) where deviation from the public participation requirements may be appropriate, the person conducting the public participation process may deviate from the requirements of that sub-regulation to the extent and in the manner as may be agreed to by the competent authority.

Proof of any such agreement must be provided, where applicable. Application for any deviation from the regulations relating to the public participation process must be submitted prior to the commencement of the public participation process.

A list of registered I&APs is included as **Appendix E5**.

Copies of any correspondence and minutes of any meetings held must be included in **Appendix E6**.

## **SECTION D: IMPACT ASSESSMENT**

The assessment of impacts must adhere to the minimum requirements in the EIA Regulations, 2010, and should take applicable official guidelines into account. The issues raised by interested and affected parties should also be addressed in the assessment of impacts.

### **1. IMPACTS THAT MAY RESULT FROM THE PLANNING AND DESIGN, CONSTRUCTION, OPERATIONAL, DECOMMISSIONING AND CLOSURE PHASES AS WELL AS PROPOSED MANAGEMENT OF IDENTIFIED IMPACTS AND PROPOSED MITIGATION MEASURES**

Provide a summary and anticipated significance of the potential direct, indirect and cumulative impacts that are likely to occur as a result of the planning and design phase, construction phase, operational phase, decommissioning and closure phase, including impacts relating to the choice of site/activity/technology alternatives as well as the mitigation measures that may eliminate or reduce the potential impacts listed. This impact assessment must be applied to all the identified alternatives to the activities identified in Section A (2) of this report.

A summary and anticipated significance of the potential direct, indirect and cumulative impacts that are likely to occur as a result of the planning and design phase, construction phase, operational phase and decommissioning phases of the proposed Heuningspruit PV 2 Facility is provided in the table overleaf.

Activity	Impact summary	Significance	Proposed mitigation
<b>CONSTRUCTION</b>			
<b>Alternative 1 (preferred alternative)</b>			
<b>Ecology</b>			
<p><i>GN544 (1): Construction of facility a PV solar energy facility that will be less than 20MW in capacity.</i>  <i>GN544 (10): The construction of an onsite substation and overhead power line (less than 250m) connecting to the existing infrastructure.</i>  <i>GN544 (23): The area to be transformed/developed for the PV solar energy facility will be less 20ha in extent.</i>  <i>GN544 (39):The expansion of existing storm water management structures</i>  <i>GN544 (47):The widening of existing roads</i>  <i>GN546 (14 a (i)): The site consists of natural vegetation that would need to be cleared.</i></p>			
<p>Construction of PV array, access roads and associated infrastructure.</p>	<p><b>Direct impacts:</b></p> <ul style="list-style-type: none"> <li>» Negative impact on vegetation</li> <li>» Negative faunal impact due to disturbance, transformation and loss of habitat</li> </ul>	<p>Low</p>	<ul style="list-style-type: none"> <li>» Avoid sensitive areas such as artificial dam</li> <li>» Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared.</li> <li>» All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed.</li> <li>» Temporary lay-down areas should be located within previously transformed areas.</li> <li>» Site access should be controlled and no unauthorized persons should be allowed onto the site.</li> <li>» Any fauna directly threatened by the construction activities should be removed to a safe location by the ECO or other suitably qualified person.</li> <li>» The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the demarcated construction site.</li> <li>» Fires should not be allowed on site.</li> <li>» No fire wood collection should be allowed on-site.</li> </ul>

Activity	Impact summary	Significance	Proposed mitigation
			<ul style="list-style-type: none"> <li>» No dogs should be allowed on site.</li> <li>» If the site must be lit at night for security purposes, this should be done with low-UV type lights (such as most LEDs), which do not attract insects.</li> <li>» All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.</li> <li>» All construction vehicles should adhere to a low speed limit to avoid collisions with susceptible species such as snakes and tortoises.</li> </ul>
	<p><b>Indirect impacts:</b></p> <ul style="list-style-type: none"> <li>» Increased erosion risk as a result of soil disturbance and loss of vegetation cover during construction.</li> </ul>	Low	<ul style="list-style-type: none"> <li>» All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk.</li> <li>» During construction, runoff from the site should be bunded and should not be allowed to enter local drainage systems.</li> </ul>
	<p><b>Cumulative impacts:</b></p> <ul style="list-style-type: none"> <li>» Possible erosion of areas lower than the access road, possible contamination of lower-lying drainage lines due to oil or other spillage,</li> <li>» Possible spread and establishment of alien invasive species</li> <li>» Possible excessive fragmentation and</li> </ul>	Low	<ul style="list-style-type: none"> <li>» Cumulative impacts of developments on population viability of species can be reduced significantly if new developments are kept as close as possible to existing developed areas or, where such is not possible, different sections of a development be kept as close together as possible.</li> </ul>

Activity	Impact summary	Significance	Proposed mitigation
	thus reduction of core habitats that may negatively influence species population viability.		
<b>Visual Impacts</b>			
<i>GN544 (1): Construction of facility a PV solar energy facility that will be less than 20MW in capacity.</i>			
<i>GN544 (10): The construction of an onsite substation and overhead power line (less than 250m) connecting to the existing infrastructure.</i>			
<i>GN544 (23): The area to be transformed/developed for the PV solar energy facility will be less 20ha in extent</i>			
Construction and operation of the PV array, access roads and associated infrastructure.	<p><b>Direct impacts:</b></p> <p><b>Visual Impacts</b></p> <ul style="list-style-type: none"> <li>» Potential impact on the users of the main roads in close proximity of the proposed PV facility site</li> <li>» Potential visual impact on the sensitive receptors in the foreground (i.e. within 1km of the facility).</li> <li>» Potential visual impact of artificial lighting as a result of the activity.</li> </ul>	Medium-Low	<ul style="list-style-type: none"> <li>» Keep disturbed areas to a minimum.</li> <li>» No clearing of land to take place outside the demarcated footprint.</li> <li>» Institute a planting regime around the boundaries of the project site to shield the PV plant from any potential views onto it from the view corridors. Only indigenous plant species to be introduced and planted in such a manner and location which would not cast shadows on the PV arrays.</li> <li>» Buildings and similar structures must be designed to be in keeping with regional planning policy documents, especially the principles of critical regionalism, namely sense of place, sense of history, sense of nature, sense of craft and sense of limits.</li> <li>» Utilise existing roads and tracks to the extent possible. Where new roads are required, they should be two-track gravel roads, maintained to prevent dust and erosion.</li> </ul>
	<p><b>Indirect impacts:</b></p> <ul style="list-style-type: none"> <li>» None</li> </ul>		<ul style="list-style-type: none"> <li>» None.</li> </ul>
	<p><b>Cumulative impacts:</b></p> <ul style="list-style-type: none"> <li>» None</li> </ul>		<ul style="list-style-type: none"> <li>» None</li> </ul>



Activity	Impact summary	Significance	Proposed mitigation
<b>Soil &amp; Agricultural Impacts</b>			
<p><i>GN544 (1): Construction of facility a PV solar energy facility that will be less than 20MW in capacity.</i></p> <p><i>GN544 (10): The construction of an onsite substation and overhead power line (less than 250m) connecting to the existing infrastructure.</i></p> <p><i>GN544 (23): The area to be transformed/developed for the PV solar energy facility will be less 20ha in extent</i></p> <p><i>GN544 (39):The expansion of existing storm water management structures</i></p> <p><i>GN544 (47):The widening of existing roads</i></p>			
<p>Site clearing and construction of development footprint infrastructure, i.e. solar arrays, inverter/transformer enclosures, on-site substation, cabling between project components, internal access roads, fencing and workshop area for maintenance, storage and offices</p>	<p><b>Direct impacts:</b></p> <ul style="list-style-type: none"> <li>» Removal of vegetation and soil erosion</li> </ul>	<p>Medium</p>	<ul style="list-style-type: none"> <li>» Care must be taken with the ground cover during and after construction on the site. If it is not possible to retain a good plant cover during construction, technologies should be employed to keep the soil covered by other means, i.e. straw, mulch, erosion control mats, etc., until a healthy plant cover is established again.</li> <li>» Care should be taken to control and contain storm water run-off and not to concentrate its runoff, specifically under the solar arrays.</li> <li>» Cross mounds and other storm water dispersing and drainage techniques must be employed to decrease the speed and force of the storm water properly from road surfaces.</li> <li>» Rehabilitate construction sites with indigenous grasses like <i>Eragrostis curvula</i>, <i>Digitaria eriantha</i>, <i>Panicum maximum</i> and <i>Chloris gayana</i> or mixtures thereof.</li> <li>» Care should be taken to put gravel on access road surfaces to protect the soil against wind and water erosion.</li> <li>»</li> </ul>
	<ul style="list-style-type: none"> <li>» Dust production and dust pollution</li> </ul>	<p>Low</p>	<ul style="list-style-type: none"> <li>» Apply appropriate dust control measures, i.e. water</li> </ul>

Activity	Impact summary	Significance	Proposed mitigation
			spraying, throughout the construction phase.
	» Interference with the day-to-day management of the grazing and livestock	Medium	» When farming infrastructure, i.e. fences, water pipelines, water troughs, etc., is removed or damaged, it should be replaced as soon as possible. Construction and other activities must be communicated and co-ordinated with the landowner to put him in a position to properly plan his management activities.
	» Contamination of the soil, underground water and vegetation	Medium	» Vehicles and equipment must be serviced regularly and maintained in a good running condition. » Use of drip trays and spill kits on site throughout the construction period will minimise the risk of soil contamination from spills. » Storage of contaminants must be limited to low quantities and done under strict industry standards. » There must be strict control over the safe usage of vehicles and equipment to minimise vehicle accidents and damage to vehicles by rocks and boulders which may cause spillages.
	<b>Indirect impacts:</b> » Loss of agricultural potential	Low	» Stop soil erosion at the source and rehabilitate the vegetation on construction sites.
	<b>Cumulative impacts:</b> » Siltation down stream	Medium	» Stop soil erosion at the source
<b>Social Impacts</b>			
<i>GN544 (1): Construction of facility a PV solar energy facility that will be less than 20MW in capacity.</i>			
<i>GN544 (10): The construction of an onsite substation and overhead power line (less than 250m) connecting to the existing infrastructure.</i>			
<i>GN544 (23): The area to be transformed/developed for the PV solar energy facility will be less 20ha in extent</i>			
<b>Construction phase</b>	<b>Direct impacts:</b>	Medium - Low	» Where possible, Heuningspruit PV 2 Solar Energy

Activity	Impact summary	Significance	Proposed mitigation	
(Including all related infrastructure such as transmission lines, access roads, office and warehouse components) and	<p><b>Positive social impacts:</b></p> <ul style="list-style-type: none"> <li>» Creation of employment and business opportunities.</li> </ul> <p><b>Potential negative impacts:</b></p> <ul style="list-style-type: none"> <li>» Influx of construction workers employed on the project;</li> <li>» Increased risk of stock theft, poaching and damage to farm infrastructure associated with construction workers;</li> <li>» Increased risk of veld fires associated with construction related activities;</li> <li>» Impact of heavy vehicles, including damage to roads, safety, noise and dust;</li> <li>» Loss of agricultural land associated with construction related activities.</li> </ul>		<p>should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically semi and low-skilled job categories. This will reduce the potential impact that this category of worker could have on local family and social networks;</p> <ul style="list-style-type: none"> <li>» Maximise the use of local labour for low – semi skilled jobs far as possible.</li> </ul>	
	<p><b>Indirect impacts:</b></p> <ul style="list-style-type: none"> <li>» Alternatively local employed during the construction phase may learn new skills thereby making them more employable in the future.</li> </ul>		Low	<ul style="list-style-type: none"> <li>» The developer should implement a training and skills development programme for locals during the first 5 years of the operational phase. The aim of the programme should be to maximise the number of South African's and locals employed during the operational phase of the project.</li> </ul>
	<p><b>Cumulative impacts:</b></p> <ul style="list-style-type: none"> <li>» Impacts on family and community relations that may, in some cases, persist for a long period of time. Also in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the</li> </ul>		Low	<ul style="list-style-type: none"> <li>» Attention should be given to the extension and improvement of the existing HIV/Aids awareness programmes in the area.</li> </ul>

Activity	Impact summary	Significance	Proposed mitigation
	affected individuals and/or their families and the community.		
<b>Heritage Impacts</b>			
<p><i>GN544 (1): Construction of facility a PV solar energy facility that will be less than 20MW in capacity.</i>  <i>GN544 (10): The construction of an onsite substation and overhead power line (less than 250m) connecting to the existing infrastructure.</i>  <i>GN544 (23): The area to be transformed/developed for the PV solar energy facility will be less 20ha in extent</i>  <i>GN544 (47):The widening of existing roads</i></p>			
Construction and operation of the PV array, access roads and associated infrastructure.	<p><b>Heritage</b>  <b>Direct impacts:</b></p> <ul style="list-style-type: none"> <li>» Damage to graves located outside the development footprint</li> <li>» Impacts on archaeological sites not evident on the site and which could be unearthed during construction.</li> </ul>	Low	<ul style="list-style-type: none"> <li>» Protect the site from accidental damage it should be fenced off during construction with an access gate for family members. The area should be demarcated with a fence and all construction activities should be located 15 meters away from the fence around the cemetery.</li> <li>» Should archaeological material be unearthed, construction in the area should halt and a suitably qualified archaeologist employed to record the site prior to its destruction.</li> </ul>
	<p><b>Indirect impacts:</b></p> <ul style="list-style-type: none"> <li>» None</li> </ul>		<ul style="list-style-type: none"> <li>» None</li> </ul>
	<p><b>Cumulative impacts:</b></p> <ul style="list-style-type: none"> <li>» The loss of a number of archaeological sites</li> </ul>		<ul style="list-style-type: none"> <li>» None</li> </ul>
<b>Palaeontology</b>			
<p><i>GN544 (1): Construction of facility a PV solar energy facility that will be less than 20MW in capacity.</i>  <i>GN544 (10): The construction of an onsite substation and overhead power line (less than 250m) connecting to the existing infrastructure.</i>  <i>GN544 (23): The area to be transformed/developed for the PV solar energy facility will be less 20ha in extent</i></p>			
Construction and operation of the PV array, access roads and associated	<p><b>Direct impacts:</b></p> <ul style="list-style-type: none"> <li>» Any damage that occurs to fossil material during the excavation and construction phase of the project would be permanent and</li> </ul>	Low	<ul style="list-style-type: none"> <li>» A thorough field investigation by a palaeontologist as part of a Full Palaeontological Heritage Impact Assessment of the entire extent of the development area should be undertaken prior to the</li> </ul>

Activity	Impact summary	Significance	Proposed mitigation
infrastructure.	irreversible.		commencement of construction. This would allow a meaningful evaluation of the presence of potentially fossil-bearing strata within the target areas.
	<b>Indirect impacts:</b> None		» None
	<b>Cumulative impacts:</b> » The loss of a number of palaeontological findings.	Low	» None
<b>Alternative 2</b>			
	<i>Direct impacts:</i>		
	<i>Indirect impacts:</i>		
	<i>Cumulative impacts:</i>		
<b>Alternative 3</b>			
	<i>Direct impacts:</i>		
	<i>Indirect impacts:</i>		
	<i>Cumulative impacts:</i>		

Activity	Impact summary	Significance	Proposed mitigation
<b>OPERATION</b>			
<b>Alternative 1 (preferred alternative)</b>			
<b>Ecology</b>			
<i>GN544 (23): The area to be transformed/developed for the PV solar energy facility will be less 20ha in extent</i>			

Activity	Impact summary	Significance	Proposed mitigation
Construction of PV array, access roads and associated infrastructure.	<p><b>Direct impacts:</b></p> <ul style="list-style-type: none"> <li>» Negative faunal impacts due to operation</li> <li>» Negative avifaunal impacts due to the presence of overhead power lines at the site (limited due to the short length of the power line)</li> <li>» Negative effects of alien plant invasion</li> <li>» Increased erosion risk as a result of the presence of the facility</li> </ul>	Low	<ul style="list-style-type: none"> <li>» No unauthorized persons should be allowed onto the site.</li> <li>» Any fauna such as snakes or fauna threatened by the maintenance and operational activities should be removed to a safe location.</li> <li>» The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden.</li> <li>» No fires should only be allowed at the site.</li> <li>» No fire wood collection should be allowed on-site or in the surrounding area.</li> <li>» No dogs should be allowed on site.</li> <li>» If the site must be lit at night for security purposes, this should be done with low-UV type lights (such as most LEDs), which do not attract insects.</li> <li>» All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.</li> <li>» All vehicles accessing the site should adhere to a low speed limit (30km/h max) to avoid collisions with susceptible species such as snakes and tortoises.</li> <li>» All new power line infrastructure should be bird-friendly in configuration and adequately insulated. These activities should be supervised by a specialist with experience in this field.</li> <li>» Any electrocution and collision events that occur should be recorded, including the species affected</li> </ul>

Activity	Impact summary	Significance	Proposed mitigation
			<p>and the date. If repeated collisions occur within the same area, then further mitigation and avoidance measures may need to be implemented.</p> <ul style="list-style-type: none"> <li>» Due to the disturbance at the site as well as the increased runoff generated at the site, alien plant species are likely to be a long-term problem at the site and a long-term control plan will need to be implemented.</li> <li>» Rehabilitation of cleared areas with indigenous species after construction to reduce alien invasion potential.</li> <li>» Regular monitoring for alien plants within the development footprint.</li> <li>» Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible.</li> <li>» All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk.</li> <li>» Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance.</li> <li>» All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques.</li> </ul>
	<p><b>Indirect impacts:</b> None</p>		None
	<p><b>Cumulative impacts:</b></p>	Low	<ul style="list-style-type: none"> <li>» The natural vegetation at the site is naturally low</li> </ul>

Activity	Impact summary	Significance	Proposed mitigation
	<ul style="list-style-type: none"> <li>» Reduced landscape connectivity due to the presence of the facility</li> </ul>		<ul style="list-style-type: none"> <li>and is compatible with a PV facility and should be encouraged to return following construction.</li> <li>» Fauna within the site which do not pose a danger to humans or the operation of the facility should be tolerated.</li> </ul>
<b>Visual Impacts</b>			
<i>GN544 (23): The area to be transformed/developed for the PV solar energy facility will be less 20ha in extent</i>			
Maintenance and operation of proposed PV plant	<p>Direct impacts:</p> <ul style="list-style-type: none"> <li>» Impact of lighting on sensitive receptors in the area</li> <li>» Impacts on residents and roads (The R82 and S156) located within 1 km of the site</li> <li>» Negative impact on the sense of place</li> </ul>	Medium-low	<ul style="list-style-type: none"> <li>» Outdoor lighting must be strictly controlled so as to prevent light pollution.</li> <li>» All lighting must be installed at downward angles.</li> <li>» Sources of light must as far as possible be shielded by physical barriers.</li> <li>» Consider the application of motion detectors to allow the application of lighting only where and when it is required.</li> <li>» Only minimum wattage light fixtures must be used.</li> <li>» Vegetated and landscaped berms around the perimeter of the project site should minimise visual impacts onto the site and negate any potential negative impact on the sense of place of the area.</li> </ul>
	<p><b>Indirect impacts:</b></p> <ul style="list-style-type: none"> <li>»</li> <li>» The proposed infrastructure is of such a nature that the status quo could be regained after decommissioning of the plant.</li> </ul>	low	<ul style="list-style-type: none"> <li>» Providing that the site is rehabilitated to its current state, the visual impact will also be removed.</li> </ul>
	<p><b>Cumulative impacts:</b></p> <ul style="list-style-type: none"> <li>» The proposed activities will contribute to an increased cumulative visual impact</li> <li>» The introduction of the PV plant, coupled with</li> </ul>	Medium	<ul style="list-style-type: none"> <li>» Provided that the footprint of the individual sites is not enlarged and their positions remain as planned, the cumulative impact of the proposed activity is regarded to be insignificant.</li> </ul>



Activity	Impact summary	Significance	Proposed mitigation
	the transmission lines and proposed substation will contribute to an increased cumulative visual impact.		
<b>Soil &amp; Agricultural Impacts</b>			
<i>GN544 (23): The area to be transformed/developed for the PV solar energy facility will be less 20ha in extent</i>			
Cleaning of solar arrays with water, detergents and soaps	<b>Direct impacts:</b> <b>Soil &amp; Agricultural Impacts</b> » Soil erosion » Soil and water contamination	Low	» Practice proper run-off control and ensure good vegetation cover of the soil » Use water only for cleaning of solar arrays
	<b>Indirect impacts:</b> » Water and soil contamination downstream	Low	» Use water only for cleaning of solar arrays
	<b>Cumulative impacts:</b> Water and soil contamination	Low	» Use water only for cleaning of solar arrays
<b>Social Impacts</b>			
<i>GN544 (23): The area to be transformed/developed for the PV solar energy facility will be less 20ha in extent</i>			
Including all related infrastructure such as transmission lines, access roads, office and warehouse components	<b>Direct impacts:</b> <b>Positive social impacts:</b> » Creation of employment and business operations » Benefits associated with the establishment of a local community trust; » The establishment of renewable energy infrastructure. <b>Potential negative impacts:</b> » The visual impacts and associated impact on sense of place » Impact on Tourism	Medium -Low	» Where possible, Sun Mechanic (Pty) Ltd should employ locals.

Activity	Impact summary	Significance	Proposed mitigation
	<p><b>Indirect impacts:</b></p> <p>» Once the construction phase is complete, locals may not be able to find future employment.</p>	Low	» The developer should implement a training and skills development programme for locals during the first 5 years of the operational phase. The aim of the programme should be to maximise the number of South African's and locals employed during the operational phase of the project.
	<p><b>Cumulative impacts:</b></p> <p>» The cumulative impact on the social environment of other developments in the area would increase the positive and negative social impacts.</p>	Medium to Low	The developer should be aware of the other projects in the area and work closely with the local municipality to development the community trust.
<b>Heritage Impacts</b>			
<b>Listed activities assessed from a heritage potential perspective</b>			
<i>GN544 (23): The area to be transformed/developed for the PV solar energy facility will be less 20ha in extent</i>			
Operation of PV facility.	<p><b>Direct impacts:</b></p> <p>» Impacts on archaeological sites not evident on the site and which could be unearthed during operation phase.</p>	Low	» The identified sites located outside the development area should not be impacted.
	<p><b>Indirect impacts:</b></p> <p>» None</p>		» None
	<p><b>Cumulative impacts:</b></p> <p>» The loss of a number of archaeological sites</p>	Low	» None
<b>Alternative 2</b>			
	<p><b>Direct impacts:</b></p>		
	<p><b>Indirect impacts:</b></p>		

Activity	Impact summary	Significance	Proposed mitigation
	<i>Cumulative impacts:</i>		
<b>Alternative 3</b>			
	<i>Direct impacts:</i>		
	<i>Indirect impacts:</i>		
	<i>Cumulative impacts:</i>		

Activity	Impact summary	Significance	Proposed mitigation
<b>DECOMMISSIONING AND CLOSURE</b>			
<b>Alternative 1 (preferred alternative)</b>			
Decommissioning of Solar Energy Facility	<b>Direct impacts:</b> Social: » A retrenchment and downscaling programme	Medium -Low	» Sun Mechanics should also investigate the option of establishing an Environmental Rehabilitation Trust Fund to cover the costs of decommissioning and rehabilitation of disturbed areas. The Trust Fund should be funded by a percentage of the revenue generated from the sale of energy to the national grid over the 20 year operational life of the facility. The rationale for the establishment of a Rehabilitation Trust Fund is linked to the experiences with the mining sector in South Africa and failure of many mining companies to allocate sufficient funds during the operational phase to cover the costs of rehabilitation and closure.
	Visual: » The major visual impact associated with the decommissioning of the facility is the residual	Medium -Low	» This would be short-term and would reduce through rehabilitation of the site

Activity	Impact summary	Significance	Proposed mitigation
	visual effects such as scarring of the landscape.		
	» Soil: » Soil Erosion	Medium	» » Care should be taken to control and contain storm water run-off and not to concentrate its runoff. » Rehabilitate the decommissioned area with indigenous grasses like <i>Eragrostis curvula</i> , <i>Digitaria eriantha</i> , <i>Panicum maximum</i> and <i>Chloris gayana</i> or mixtures thereof.
	» Dust production and dust pollution	Low	» Apply appropriate dust control measures, i.e. water spraying.
	» Interference with the day-to-day management of the grazing and livestock	Medium	» Decommissioning activities must be communicated and co-ordinated with the land owner to put him in a position to properly plan his management activities.
	<i>Indirect impacts:</i>		
	<b>Cumulative Impacts: Soil</b> » Siltation of watercourses downstream	Low	» Stop soil erosion at the source

NO-GO OPTION			
Construction, operation and decommissioning phase of the solar energy facility	<b>Direct impacts:</b> » No Impacts on site	Low	» None
	<b>Indirect impacts:</b> » The No-Development option would represent a lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy. Given South Africa's position as one of the highest per capita producer of carbon emissions in the	Low	» Implementation of the proposed project

	world, this would represent a high negative social cost.		
	<p><b>Cumulative impacts:</b></p> <p>» Contributing to further unemployment and unsustainable ways to produce electricity</p>	Low	» Implementation of the proposed project

A complete impact assessment in terms of Regulation 22(2)(i) of GN R.543 must be included as **Appendix F**.

## 2. ENVIRONMENTAL IMPACT STATEMENT

Taking the assessment of potential impacts into account, please provide an environmental impact statement that summarises the impact that the proposed activity and its alternatives may have on the environment after the management and mitigation of impacts have been taken into account, with specific reference to types of impact, duration of impacts, likelihood of potential impacts actually occurring and the significance of impacts.

### Alternative A (preferred alternative)

This section provides a summary of the environmental assessment and conclusions drawn for the proposed solar energy facility. In doing so, it draws on the information gathered as part of the Basic Assessment process and the knowledge gained by the environmental consultants during the course of the process and presents an informed opinion of the environmental impacts associated with the proposed project.

The following conclusions can be drawn from the studies undertaken within this Basic Assessment:

- » The overall impact on **ecology** as a result of the construction and operation of the proposed facility is likely to be of **low to medium significance** (in terms of impacts associated with Listed Activities GN R544 Activity 1 (i), GN R544 Activity 10(i) , GN R544 Activity 23, GN R544 Activity 39, GN R544 Activity 47 and GN R 546 Activity 14 (a) (i)). . The site for the proposed Heuningspruit PV 2 facility is not considered highly sensitive from an ecological perspective (Refer to sensitivity map). The proposed development areas have been transformed in the past and although there are some relatively more sensitive habitats in the vicinity, these are of limited extent and are outside of the development footprint of the current development layout for Heuningspruit PV 2. There is a small earth dam at the northern end of the proposed Heuningspruit PV 2 solar energy facility. The walls of the dam are dominated by *Acacia karoo* and form an important area for birds at the site. Although the dam itself has become largely silted up, it has been colonised by grass such as *Setaria sphacelata* and is locally important as a mesic environment. This area and the adjacent buffer area should be avoided as much as possible. Given the location and extent of the proposed development, there are not likely to be significant impacts on broad-scale ecological processes such as disruption of landscape connectivity. There are also not likely to be any listed plant species present at the site and the abundance of listed fauna in the area is also likely to be very low.
- » The proposed activity will have a **low to medium impact** on **soils** (in terms of impacts associated with Listed Activities GN R544 Activity 1 (i), GN R544 Activity 10(i), GN R544 Activity 39, GN R544 Activity 47 and GN R544 Activity 23) in the immediate and surrounding areas. Implementation and management of proposed

mitigation measures will minimise loss of topsoil, prevent contamination of topsoil and stockpiled soil and minimise overall soil erosion. In terms of agricultural potential, the study area is categorised as being “marginal potential arable land” and considered not suitable for cultivation. Impacts on agricultural potential will therefore be low.

- » The impacts to heritage resources as a result of the construction and operation of the proposed development are considered to be **low significance** (in terms of impacts associated with Listed Activities GN R544 Activity 1 (i), GN R544 Activity 10(i), GN R544 Activity 23 and GN R544 Activity 47). The only heritage remains within the area consist of an informal cemetery (Site 1) which was documented outside of the proposed development area and no direct impact is foreseen on the site. However some recommendations are made to protect the site from accidental damage during the construction phase of the project and are discussed below. Management measures would need to be taken into account to avoid damage to the informal cemetery. Damage can be caused by construction vehicles unknowingly damaging the graves. To prevent this, the area should be demarcated with a fence and all construction activities should be located 15 meters away from the fence around the cemetery.
- » The effects of the construction of the power generation facility will be restricted to the Volkrust Formation and Quaternary alluvium cover (present to the north of the preferred sites of Heuningspruit PV 1 Solar Energy Facility). It is interpreted herein that the effects of the construction of the project will in general be restricted to the immediate land surface and the upper few metres of the geological substrate. Any fossil materials that remain undiscovered beneath infrastructure elements after the construction of the project will only be negatively affected in so far as they will be unavailable for scientific study for the life expectancy of the infrastructural elements that comprise the project (e.g., a minimum of 20-25 years). The Volkrust Formation contains both plant macrofossils of the Glossopteris Flora, insect faunas, the bivalve Megadesmus and trace fossil assemblages that are potentially highly significant to the cultural and scientific heritage of South Africa. However, the number of fossil sites reported from the formation is not numerous, as such, the risk of a negative **impact is low** (in terms of impacts associated with Listed Activities GN R544 Activity 1 (i), GN R544 Activity 10(i) and GN R544 Activity 23), but the significance of any negative impact on the fossil assemblages could potentially be **high**. In order to minimise the risk of impact, it is recommended that a field survey be undertaken for the development area prior to the commencement of construction.
- » The results of the Visual Impact Assessment for the proposed Heuningspruit Facility therefore found that the proposed activity will have a **medium to high** (in terms of impacts associated with Listed Activities GN R544 Activity 1 (i), GN R544 Activity 10(i) and GN R544 Activity 23) impact from Key Observation Points (KOPs)

identified in the foreground (<1km) and a low impact from KOPs identified in the middle- and background (>1km). The project site has quite a large zone of visual influence, judging from the viewsheds generated. However, the viewsheds generated are compiled taking into account the contours of the area. The project site and the surrounding area are relatively flat. As a result, the initial viewshed created from the highest point on the project site does give the impression that the site is highly visible from its immediate surroundings. The on-site verification from the selected Key Observation Points and the viewsheds generated from the latter points, however, indicated that the project site is not very distinguishable from most observation points. This is perhaps with the exception of the observation points in the foreground to the project site. This is mainly due to the flatness of the surrounding area. Trees, buildings or any other obstacle in the landscape has maximum effect in obscuring views from any point. The proposed mitigation measures will likewise reduce any significant impact to be a localised impact. Additionally, the large silos that tower approx. 30m behind the south of the site. The aesthetics of the area are not being significantly altered

- » The overall **social** and socio-economic impact in terms of positive and negative impacts is likely to be of a **medium to low significance** (in terms of impacts associated with Listed Activities GN R544 Activity 1 (i), GN R544 Activity 10(i) and GN R544 Activity 23) during both the construction and operational phases with the implementation of enhancement/mitigation measures. The potential negative impacts associated with the construction phase are typical of construction-related activities and are expected to respond to the mitigation measures proposed. Issues identified include the influx of outside workers, whether locals would be employable during the construction phase of the project as on-site skills development and training would be imperative to ensure that the benefits of employment could be maximised, the intrusion impacts associated with construction, and impacts on the daily living and movement patterns of neighbouring landowners and road users.

The possible job creation and skills development, although limited in extent, are regarded as a significant positive injection into the area. The project would result in significant positive economic spin-offs for the local area and region primarily because of the labour intensive operational practices that would be associated with it.

Based on the findings of the studies undertaken, in terms of environmental constraints and opportunities identified through the Environmental Basic Assessment process, no environmental fatal flaws were identified to be associated with the establishment of the proposed Heuningspruit PV 2 Solar Energy facility and associated infrastructure.

The significance levels of the majority of identified negative impacts can generally be reduced to acceptable levels by implementing the recommended mitigation measures.



With reference to the information available at this planning approval stage in the project cycle, the confidence in the environmental assessment undertaken is regarded as acceptable.

Therefore, it is recommended that the project should be authorised. However, a number of issues requiring mitigation have been highlighted in the impact assessment (Appendix F). In response to these potential environmental impacts, environmental specifications for the management of these issues / impacts are detailed within the draft Environmental Management Programme (EMPr) included within Appendix G.

### **No Go Alternative (Compulsory)**

Also referred to as the 'Do nothing' option, this refers to Sun Mechanics Solar Energy (Pty) Ltd not constructing the proposed solar energy facility on the identified site. In this scenario the potential positive and negative environmental and social impacts as described in this Basic Assessment Report will not occur and the status quo will be maintained.

Should the project not proceed, the contribution of approximately 5 MW from this project towards the Government target for renewable energy will not be realised. As a result the potential local and regional socio-economic and environmental benefits expected to be associated with the proposed project would not be realised. These include:

- » **Increased energy security:** The current electricity crisis in South Africa highlights the significant role that renewable energy can play in terms of power supplementation. In addition, given that renewables can often be deployed in a decentralised manner close to consumers, they offer the opportunity for improving grid strength and supply quality, while reducing expensive transmission and distribution losses.
- » **Exploitation of South Africa's significant renewable energy resource:** At present, valuable national resources including biomass by-products, solar radiation and wind power remain largely unexploited. The use of these energy flows will strengthen energy security through the development of a diverse energy portfolio.
  - \* Pollution reduction: The releases of by-products through the burning of fossil fuels for electricity generation have a particularly hazardous impact on human health and contribute to ecosystem degradation.
  - \* Support for international agreements: The effective deployment of renewable energy provides a tangible means for South Africa to demonstrate its commitment to its international agreements under the Kyoto Protocol, and for cementing its status as a leading player within the international community.
  - \* Employment creation: The sale, development, installation, maintenance, and management of renewable energy facilities have significant potential for job

creation in South Africa.

- \* Acceptability to society: Renewable energy offers a number of tangible benefits to society including reduced pollution concerns, improved human, and ecosystem health.
- \* Support to a new industry sector: The development of renewable energy offers the opportunity to establish a new industry within the South African economy.
- \* Support to local community: Since the local community will acquire some ownership in the facility, some of the revenue generated by the facility will be utilised for upliftment of the local community.

Within a policy framework, the development of renewable energy in South Africa is supported by the White Paper on Renewable Energy (November 2003), which has set a target of 17MW renewable energy contributions to final energy generation mix by 2030. The target is to be achieved primarily through the development of solar, biomass, solar and small-scale hydro.

The No-Development option would represent a lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy. Given South Africa's position as one of the highest per capita producer of carbon emissions in the world, this would represent a High negative social cost.

The no-development option also represents a lost opportunity in terms of the employment and business opportunities (construction and operational phase) associated with the proposed solar energy facility and the benefits associated with the establishment of a Community Trust. This also represents a negative social cost. On a local level, should the development proceed, the landowner will benefit from the proposed development financially. The study area is not suitable for cultivation and therefore the landowner will not be able to benefit agriculturally. The no-development option will therefore not be beneficial to the landowner or the broader community.

**The 'Do nothing' alternative is, therefore, not a preferred alternative.**

## SECTION E. RECOMMENDATION OF PRACTITIONER

Is the information contained in this report and the documentation attached hereto sufficient to make a decision in respect of the activity applied for (in the view of the environmental assessment practitioner)?

YES ✓

If "NO", indicate the aspects that should be assessed further as part of a Scoping and EIA process before a decision can be made (list the aspects that require further assessment).

If "YES", please list any recommended conditions, including mitigation measures that should be considered for inclusion in any authorisation that may be granted by the competent authority in respect of the application.

There are no insurmountable environmental or social constraints that prevent the establishment of the proposed Heuningspruit PV 2 Solar Energy Facility.

The construction of the proposed solar energy facility should be implemented according to the EMPr to adequately mitigate and manage potential impacts associated with construction activities. The construction activities and relevant rehabilitation of disturbed areas should be monitored against the approved EMPr, the Environmental Authorisation and all other relevant environmental legislation. Relevant conditions to be adhered to include:

### **Design, Construction, and Decommissioning Phases:**

- » Prior to construction, a walk through survey should be done by a palaeontologist.
- » There is a small earth dam at the northern end of the proposed Heuningspruit PV 2 solar energy facility. This area and the adjacent buffer area should be avoided as much as possible.
- » All relevant practical and reasonable mitigation measures detailed within this report and the specialist reports contained within Appendix D must be implemented.
- » The draft Environmental Management Programme (EMPr) as contained within Appendix G of this report should form part of the contract with the Contractors appointed to construct and maintain the proposed solar energy facility, and will be used to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for all life cycle phases of the proposed project is considered to be key in achieving the appropriate environmental management standards as detailed for this project.
- » The final development area should be surveyed for species of conservation concern and suitable for search and rescue, which should be translocated prior to the commencement of construction.

- » Limited hazardous materials should be stored on site. Any accidental chemical, fuel and oil spills that occur at the site during preconstruction should be cleaned up in the appropriate manner as related to the nature of the spill.
- » No unattended open excavations, holes or pits should be left on site for extended periods as fauna can fall in and become trapped.
- » Any soil disturbance required for preconstruction exploration activities should be rectified after the appropriate measurements have been made.
- » Heavy vehicles should not access the site following heavy rains as the saturated soils will be vulnerable to damage and the risk of vehicles getting stuck and disturbing the soil is high.
- » Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible. An alien management plan should be developed as part of the EMPr for the development.
- » Vegetation management within the site should be as biodiversity compatible as possible. No herbicides should be used to clear vegetation. Where vegetation needs to be reduced, then livestock or manual clearing (by hand) should be used.
- » To minimise the soil erosion hazard the following factors need to be addressed (i) to maintain a healthy soil cover between the solar arrays, specifically a good grass cover, and (ii) to employ conservation practices similar to the conservation cultivation when planning the arrangement of the PV arrays, i.e. in strips of land on the contour of the land, with buffer zones of grass between the development strips and the channelling of run-off water from the development strips into stable grass covered waterways or outlets.
- » There are several fences on the proposed site that will be interfered with. Contingency plans should be put in place to ensure that the farm owner can still carry on with the day-to-day grazing management during and after the construction phase.
- » Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude. This measure will help to soften the appearance of the power line within its context.
- » Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.
- » Reduce and control construction dust through the use of approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent).
- » Rehabilitate all disturbed areas, construction areas, roads, slopes etc. immediately after the completion of construction works. If necessary, an ecologist should be consulted to assist or give input into rehabilitation specifications.
- » Roads must be maintained to forego erosion and to suppress dust, and rehabilitated areas must be monitored for rehabilitation failure. Remedial actions must be implemented as a when required.
- » Once the power line has exhausted its life span, all associated infrastructure not required for the post rehabilitation use of the site/servitude should be removed and

all disturbed areas appropriately rehabilitated. An ecologist should be consulted to give input into rehabilitation specifications.

- » An application for all other relevant permits (e.g. those with respect to protected tree species or protected plant species) must be obtained from the relevant authority prior to the commencement of construction activities.
- » All declared alien plants must be identified and managed in accordance with the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983), the implementation of a monitoring programme in this regard is recommended.

**Operation Phase:**

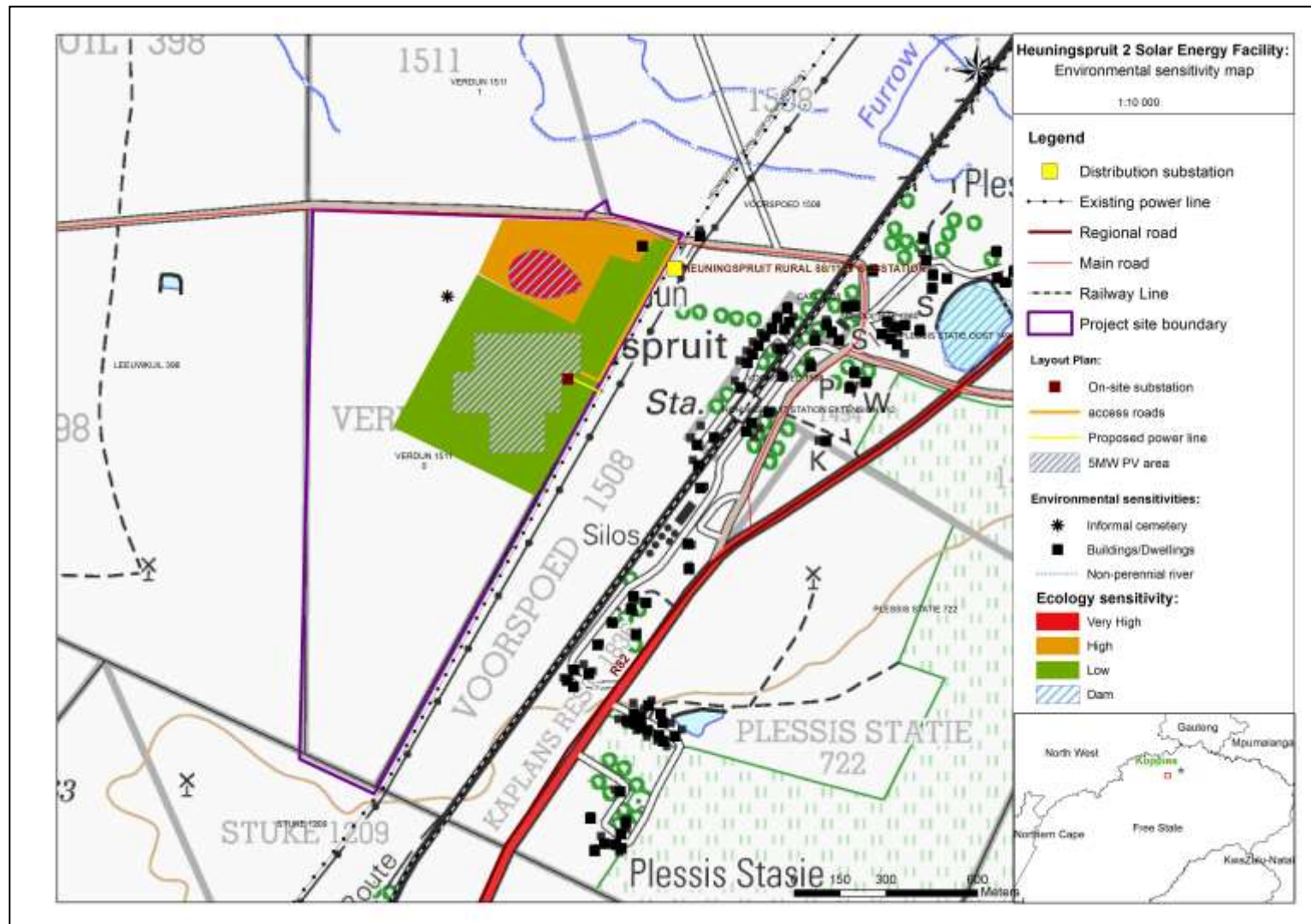
The mitigation and management measures previously listed in this Basic Assessment Report should be implemented in order to minimise potential environmental impacts. The following mitigation measures should also be implemented.

- » Maintenance of erosion control measures
- » Development and implementation of a storm water management plan.
- » On-going maintenance of the facility to minimise the potential for visual impacts.
- » On-going monitoring of the site to detect and restrict the spread of alien plant species.
- » Training, skills development and the use of local labour.

Is an EMPr attached?

**YES** ✓

The EMPr must be attached as **Appendix G**.



**Figure 7:** Sensitivity map of the proposed Heuningspruit PV 2 Solar Energy Facility

The details of the EAP who compiled the BAR and the expertise of the EAP to perform the Basic Assessment process must be included as **Appendix H**.

If any specialist reports were used during the compilation of this BAR, please attach the declaration of interest for each specialist in **Appendix I**.

Any other information relevant to this application and not previously included must be attached in **Appendix J**.

\_\_\_\_\_  
NAME OF EAP

\_\_\_\_\_  
SIGNATURE OF EAP

\_\_\_\_\_  
DATE

## **SECTION F: APPENDICES**

The following appendixes must be attached:

Appendix A: Maps

Appendix B: Photographs

Appendix C: Facility illustration(s)

Appendix D: Specialist reports (including terms of reference)

Appendix E: Public Participation

Appendix F: Impact Assessment

Appendix G: Environmental Management Programme (EMPr)

Appendix H: Details of EAP and expertise

Appendix I: Specialist's declaration of interest

Appendix J:CVs