

ENVIRONMENTAL IMPACT ASSESSMENT PROCESS  
FINAL BASIC ASSESSMENT REPORT

PROPOSED HENNINGMAN 5MW SOLAR ENERGY  
FACILITY, FREE STATE PROVINCE

(DEA REF No: 14/12/16/3/3/1/1322)

FINAL BASIC ASSESSMENT REPORT

JUNE 2015

**Prepared for:**

Bluewave Capital SA (Pty) Ltd  
Unit EB05, Tannery Park,  
23 Belmont Road,  
Rondebosch,  
7700

B L U E W A V E  
CAPITAL

**Prepared by:**

*Savannah Environmental Pty Ltd*

5 WOODLANDS DRIVE OFFICE PARK  
CNR WOODLANDS DRIVE &  
WESTERN SERVICE ROAD,  
WOODMEAD, GAUTENG  
P.O. BOX 148, SUNNINGHILL, 2157  
TELEPHONE : +27 (0)11 656 3237  
FACSIMILE : +27 (0)86 684 0547  
EMAIL : INFO@SAVANNAHSA.COM  
WWW.SAVANNAHSA.COM

*Savannah*  
ENVIRONMENTAL (PTY) LTD





## environmental affairs

Department:  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA

(For official use only)

**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.

---

### 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.
2. This report format is current as of **1 September 2012**. It is the responsibility of the applicant to ascertain whether subsequent versions of the form have been published or produced by the competent authority
3. The report must be typed within the spaces provided in the form. The size of the spaces provided is not necessarily indicative of the amount of information to be provided. The report is in the form of a table that can extend itself as each space is filled with typing.
4. Where applicable **tick** the boxes that are applicable in the report.
5. An incomplete report may be returned to the applicant for revision.
6. The use of "not applicable" in the report must be done with circumspection because if it is used in respect of material information that is required by the competent authority for assessing the application, it may result in the rejection of the application as provided for in the regulations.
7. This report must be handed in at offices of the relevant competent authority as determined by each authority.
8. No faxed or e-mailed reports will be accepted.
9. The signature of the EAP on the report must be an original signature.
10. The report must be compiled by an independent environmental assessment practitioner.
11. Unless protected by law, all information in the report will become public information on receipt by the competent authority. Any interested and affected party should be provided with the information contained in this report on request, during any stage of the application process.
12. A competent authority may require that for specified types of activities in defined situations only parts of this report need to be completed.
13. Should a specialist report or report on a specialised process be submitted at any stage for any part of this application, the terms of reference for such report must also be submitted.
14. Two (2) colour hard copies and one (1) electronic copy of the report must be submitted to the competent authority.
15. Shape files (.shp) for maps must be included on the electronic copy of the report submitted to the competent authority.

## PROJECT DETAILS

---

<b>Title</b>	:	Environmental Basic Assessment Process Final Basic Assessment Report: Proposed Hennenman 5MW Solar Energy Facility, Free State Province  DEA REF NO: 14/12/16/3/3/1/1322
<b>Authors</b>	:	Savannah Environmental Steven Ingle Karen Jodas
<b>Sub-consultants</b>	:	Marianne Strohbach (Ecologist) Afzelia (Visual specialist) Johann van Tol (Soil scientist) Heritage Contracts and Archaeological Consulting (Heritage specialist)
<b>Client</b>	:	Bluewave Capital SA (Pty) Ltd
<b>Report Status</b>	:	Final Basic Assessment Report

**When used as a reference this report should be cited as:** Savannah Environmental (2015)  
Final Basic Assessment Report: Proposed Hennenman 5MW Solar Energy Facility, Free State  
Province.

**COPYRIGHT RESERVED**

This technical report has been produced for Bluewave Capital SA (Pty) Ltd. The intellectual property contained in this report remains vested in Savannah Environmental and Bluewave Capital SA (Pty) Ltd. No part of the report may be reproduced in any manner without written permission from Bluewave Capital SA (Pty) Ltd or Savannah Environmental (Pty) Ltd.

## TABLE OF CONTENTS

	<b>PAGE</b>
<b>PROJECT DETAILS</b> .....	<b>i</b>
<b>TABLE OF CONTENTS</b> .....	<b>i</b>
<b>APPENDICES</b> .....	<b>iii</b>
<b>DRAFT BASIC ASSESSMENT REPORT FOR REVIEW</b> .....	<b>viii</b>
<b>SUMMARY AND OVERVIEW OF THE PROPOSED PROJECT</b> .....	<b>i</b>
1.1 Need For the Proposed Development .....	iv
1.2 Requirement for an Environmental Impact Assessment Process .....	v
1.3 Details of Environmental Assessment Practitioner and Expertise to conduct the Basic Assessment Process .....	vi
<b>SECTION A: ACTIVITY INFORMATION</b> .....	<b>viii</b>
1. PROJECT DESCRIPTION .....	9
2. FEASIBLE AND REASONABLE ALTERNATIVES .....	16
a) Site alternatives .....	17
b) Layout alternatives .....	21
c) Technology alternatives .....	22
d) Other alternatives (e.g. scheduling, demand, input, scale and design alternatives) .....	23
e) No-go alternative .....	23
3. PHYSICAL SIZE OF THE ACTIVITY .....	23
4. SITE ACCESS .....	25
5. LOCALITY MAP .....	25
6. LAYOUT/ROUTE PLAN .....	26
7. SENSITIVITY MAP .....	26
8. SITE PHOTOGRAPHS .....	26
9. FACILITY ILLUSTRATION .....	27
10. ACTIVITY MOTIVATION .....	27
11. APPLICABLE LEGISLATION, POLICIES AND/OR GUIDELINES .....	34
12. WASTE, EFFLUENT, EMISSION AND NOISE MANAGEMENT .....	45
a) Solid waste management .....	45
b) Liquid effluent .....	46
c) Emissions into the atmosphere .....	47
d) Waste permit .....	47
e) Generation of noise .....	47
13. WATER USE .....	48
14. ENERGY EFFICIENCY .....	48
<b>SECTION B: SITE/AREA/PROPERTY DESCRIPTION</b> .....	<b>49</b>
1. GRADIENT OF THE SITE .....	50
2. LOCATION IN LANDSCAPE .....	50
3. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE .....	50
4. GROUND COVER .....	51

5. SURFACE WATER .....	52
6. LAND USE CHARACTER OF SURROUNDING AREA .....	54
7. CULTURAL/HISTORICAL FEATURES .....	56
8. SOCIO-ECONOMIC CHARACTER .....	57
a) Local Municipality.....	57
b) Socio-economic value of the activity.....	58
9. BIODIVERSITY.....	58
<b>SECTION C: PUBLIC PARTICIPATION .....</b>	<b>64</b>
1. ADVERTISEMENT AND NOTICES .....	64
2. DETERMINATION OF APPROPRIATE MEASURES.....	64
3. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES.....	64
4. COMMENTS AND RESPONSE REPORT.....	65
5. AUTHORITY PARTICIPATION.....	65
6. CONSULTATION WITH OTHER STAKEHOLDERS.....	65
<b>SECTION D: IMPACT ASSESSMENT .....</b>	<b>67</b>
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...	67
2. ENVIRONMENTAL IMPACT STATEMENT .....	83
<b>SECTION E. RECOMMENDATION OF PRACTITIONER.....</b>	<b>87</b>
<b>SECTION F: APPENDICES.....</b>	<b>91</b>

## APPENDICES

---

**Appendix A:** Site Plan(s)

**Appendix B:** Photographic Record

**Appendix C:** Facility Illustration(s)

**Appendix D:** Specialist Reports

- » *Appendix D1: Ecology Study*
- » *Appendix D2: Soils, Land Use, Land Capability and Agricultural Potential Study*
- » *Appendix D3: Visual Study*
- » *Appendix D4: Heritage Study*

**Appendix E:** Record of Public Involvement Process

- » *Appendix E1: Adverts and Site notices*
- » *Appendix E2: I&AP Database*
- » *Appendix E3: Background Information Document*
- » *Appendix E4: Authority & Organ of states correspondence*
- » *Appendix E5: Stakeholder correspondence*
- » *Appendix E6: Comments received*
- » *Appendix E7: Comments and Responses Report*

**Appendix F:** Impact Assessment

**Appendix G:** Environmental Management Programme (EMPr)

**Appendix H:** Details of EAP and expertise

**Appendix I:** Specialist's declaration of interest (in the specialist reports)

**Appendix J:** CVs

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

---

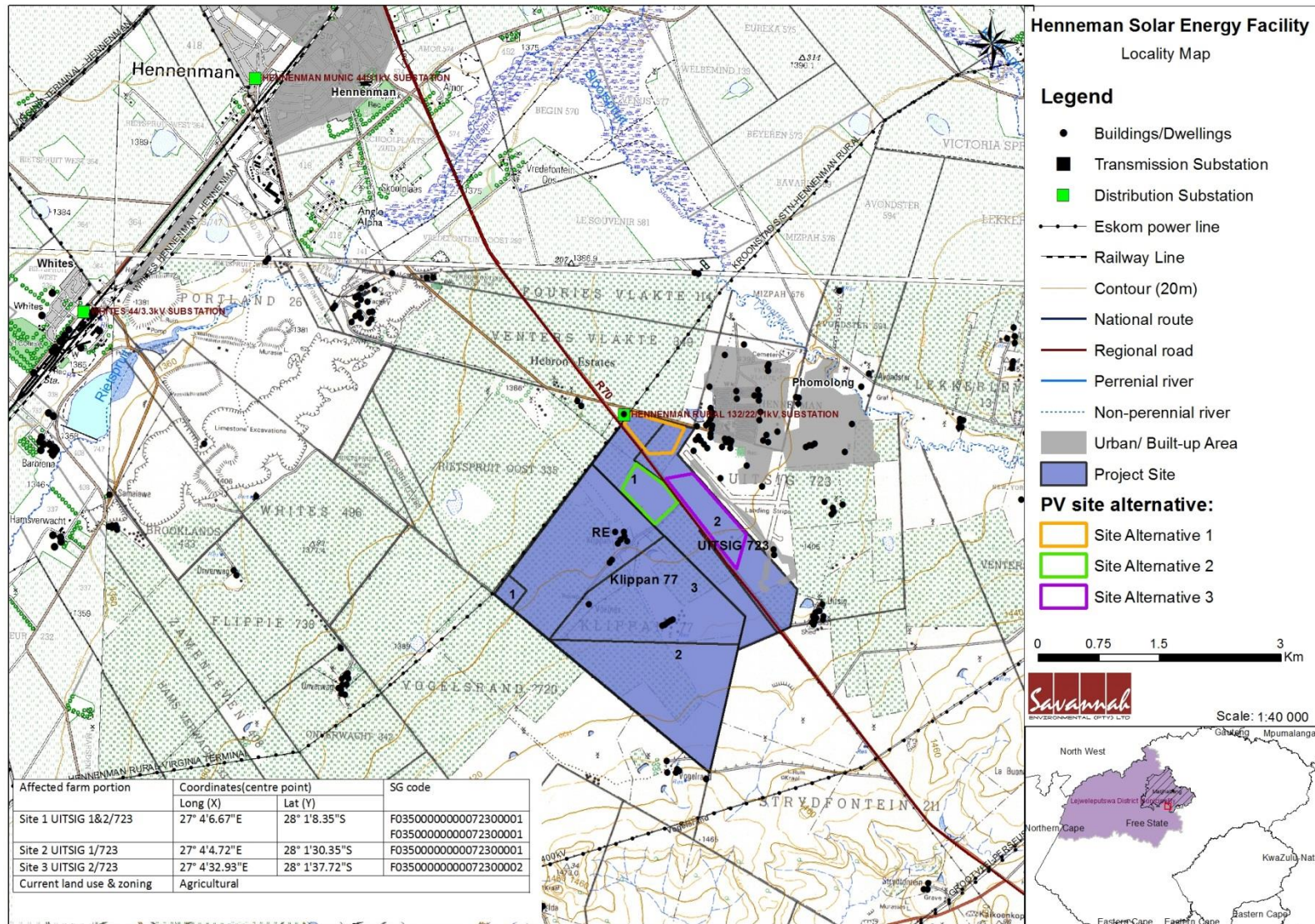
Bluewave Capital SA (Pty) Ltd (Bluewave Capital), a South African solar photovoltaic (PV) developer, is proposing the establishment of a small-scale commercial solar energy facility (using photovoltaic technology) of approximately 5 MW in capacity. The facility is proposed to be located approximately 5km from the town of Hennenman, to the south of Phomolong on the Farm Uitsig 723/1 and Uitsig 723/2 in the Free State Province (refer to Figure 1).

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 Independent Power Producer Small Projects Programme (IPP Small Projects Programme). The IPP Small Projects 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 19.5 ha in extent within which the following infrastructure will be established (refer to Figure 2):

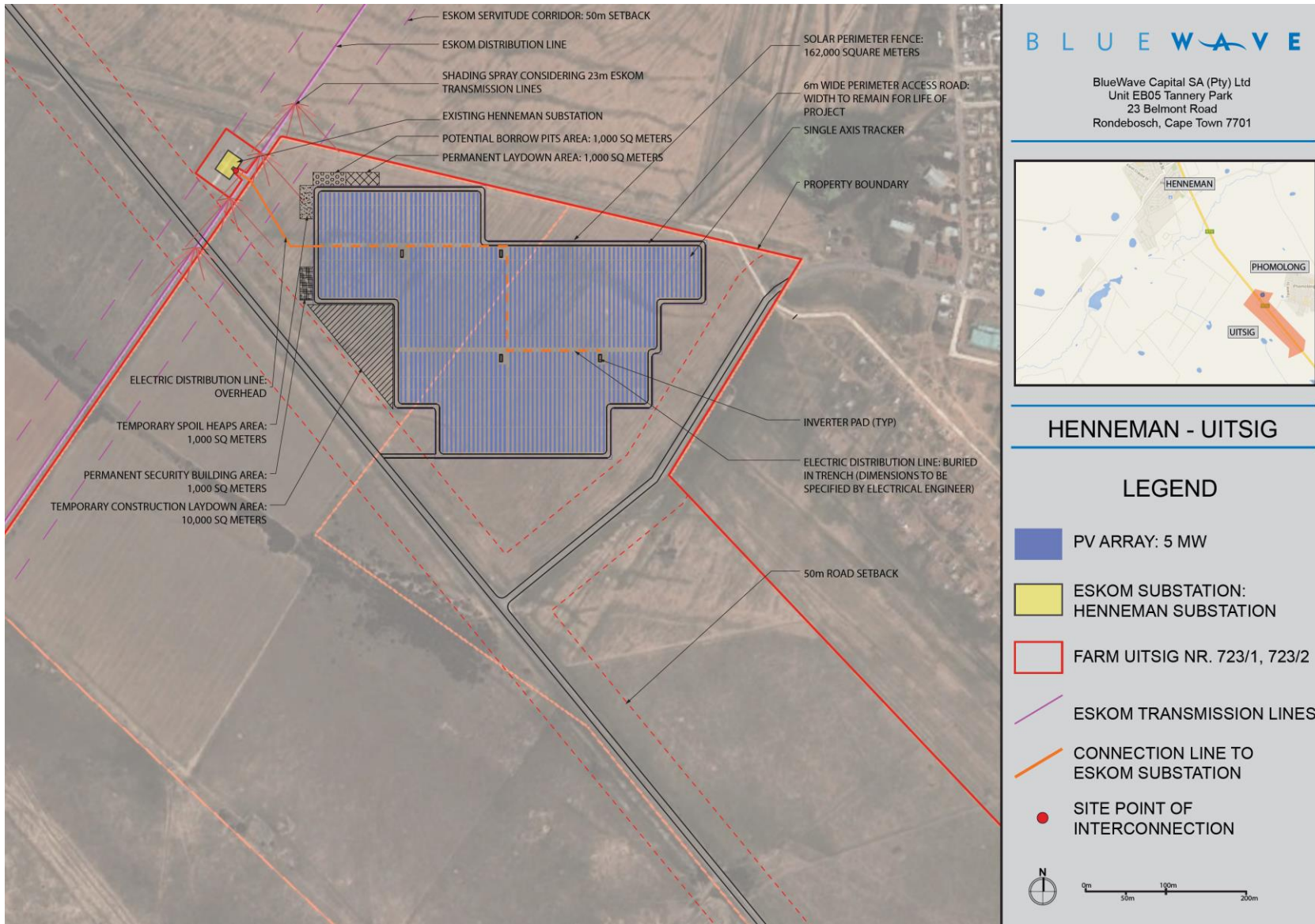
- » Photovoltaic (PV) panels of between 4m – 6m in height (fixed or single axis tracking technology) with a capacity of up to 5MW.
- » Mounting structures to be either rammed steel piles or piles with pre-manufactured concrete footing to support the PV panels.
- » Cabling between the project components, to be lain in trenches ~ 1-2m deep.
- » Power inverters between the PV arrays.
- » An overhead power line to evacuate the power into the Eskom grid via the Hennenman Rural 132/22/11kV Substation situated within a maximum distance of 600m from the proposed PV site.
- » Internal access roads (up to 7m wide).
- » Water storage facility/reservoir.
- » Office, workshop area for maintenance and storage.
- » During construction (temporary infrastructure) such a laydown area will also be required.
- » Fencing.





**Figure 1:** Locality map showing the development area for the proposed Hennenman 5MW Solar Energy Facility (Site Alternatives 1, 2 and 3) on Portions 1 and 2 of the Farm Uitsig 723 in relation to Phomolong and Hennenman





**Figure 2:** Layout plan within preferred site alternative (site alternative 1)

## **1.1 NEED FOR THE PROPOSED DEVELOPMENT**

According to Free State Provincial Spatial Development Framework, renewable energy is a key focus area of the Free State Development Corporation, especially the solar energy sector (Free State Business, 2012). The Free State has significant potential for the harvesting of solar energy (Free State Growth and Development Strategy 2012). Projects for the manufacturing of solar panels and geysers have already been conceptualised and include the following (Free State Business report (2012):

- » Solar-water-geyser manufacturing facility in Botshabelo that would produce 300 000 solar geysers per year.
- » Solar-modules manufacturing and solar-panels assembly facility that would produce 60 MW per year.

The Lejweleputswa District, in its Integrated Development Plan 2011-2012, does not specifically state its position on renewable energy including solar energy, however it is expected that the proposed project will be in line with the districts objectives to support local municipalities with the provision of electricity. The Lejwe Le Putswa Development Agency in 2013 released a request for proposals to undertake an environmental impact assessment for a solar energy facility to be funded by the municipality and therefore it is expected that renewable energy projects are backed by the municipality.

No Environmental Management Framework is available for the region however it is not anticipated that the project will conflict with the regional planning and environmental objectives of the District and Local municipality on the identified site.

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.

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 Renewable Energy Independent Power Producers Procurement (REIPPP) Programme as well as the IPP Small Projects Programme. This energy will be produced from various renewable energy technologies including solar energy facilities (i.e. such as PV technology). The proposed project is to contribute towards this goal for renewable energy.

## 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. An application has been submitted to the DEA. The following listed activities are relevant to the proposed project:

Notice Number	Activity	Description	Relevance of Regulation to Project
GN 544, 18 JUNE 2010	1(ii)	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 extent.
GN 544, 18 JUNE 2010	10(i)	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 project will require the construction of a new overhead power line (outside an urban area) of up to 33kV to connect to the Hennenman Rural Substation.
GN 544, 18 JUNE 2010	23(ii)	The transformation of undeveloped, vacant or derelict land to residential, retail, commercial, recreational, <u>industrial</u> 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 hectares in extent.
GN 546, 18 JUNE 2010	14(a)(i)	The clearance of an area of 5 hectares or more of vegetation cover constitutes indigenous vegetation.	The solar energy facility will be located outside urban areas and may require the clearance of an area whereby more than 75% of

	(a) Free State	vegetation constitutes indigenous
	i. All areas outside urban areas	vegetation

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 Bluewave Capital SA 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 Bluewave Capital SA. 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:

- » Steven Ingle, the principle author of this report, holds a Bachelors degree in Environmental Management and has over 8 years experience in environmental

management and has undertaken numerous EIAs for a number of proposed large-scale infrastructure project and renewable energy facilities across South Africa.

- » Karen Jodas - the principle Environmental Assessment Practitioner (EAP) for this project, is a registered Professional Natural Scientist and holds a Master of Science degree. She has 16 years of 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 responsible for the project management of EIAs for several renewable energy projects across the country.

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	Marianne Strohbach (Ecologist)
Soil and Agricultural Potential Impact Assessment	Johan van Tol (Soil Scientist)
Heritage Impact Assessment	Jaco van der Walt of Heritage Contracts and Archaeological Consulting (Archaeologist)
Visual Impact Assessment	Jon Marshall of Afzelia (Visual specialist)

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

## **REVIEW OF DRAFT BASIC ASSESSMENT**

---

The Basic Assessment Report was prepared by Savannah Environmental in order to assess the potential environmental impacts associated with the **Hennenman 5MW Solar Energy Facility**. The draft BA report was made available for public review from 17 April 2015 to 18 May 2015 at the following places:

- » Hennenman Library
- » Phomolong Library
- » [www.savannahsa.com/projects](http://www.savannahsa.com/projects)

## 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**

Bluewave Capital SA (Pty) Ltd (Bluewave Capital SA), South African solar PV developer, is proposing the establishment of a small-scale commercial solar energy facility (using photovoltaic technology) of approximately 5 MW in capacity. The facility is proposed to be located approximately 5km from the town of Hennenman, to the south of Phomolong on the Farm Uitsig 723/1 and Uitsig 723/2 in the Free State Province.

The facility development footprint will be approximately 16 ha in extent within which the following infrastructure will be established:

- » Photovoltaic (PV) panels of between 4m – 6m in height (fixed or single axis 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 in trenches ~ 1-2m deep.
- » Power inverters between the PV arrays.
- » An overhead power line to evacuate the power into the Eskom grid via the Hennenman Rural 132/22/11kV Substation.
- » Internal access roads (up to 7m wide).
- » Water storage facility/reservoir.
- » Office, workshop area for maintenance and storage.
- » Temporary laydown area.
- » Fencing.

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.

The purpose of the project is to generate electricity for export 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 Programme). 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.

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

The main components of the PV facility will comprise 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.

Solar photovoltaic (PV) panels consist primarily of glass and various semiconductor materials and in a typical solar PV project, will be arranged in rows to form solar arrays. 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. The PV panels are designed to operate continuously for more than 25 years with minimal maintenance required.



**Figure 3:** PV arrays

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.

### **Support Structure**

The photovoltaic (PV) modules will be mounted to steel support structures. These can either be mounted at a fixed tilt angle, optimised to receive the maximum amount of solar radiation and dependent on the latitude of the proposed facility, or a tracking mechanism where at a maximum tilt angle of 45° the modules would be approximately 0.3m off the ground.



**Figure 4:** Support structures

### **Fixed Mounted PV System**

In a fixed mounted PV system, PV panels are installed at a pre-determined angle from which they will not move during the lifetime of the plant's operation. The limitations imposed on this system due to its static placement are offset by the fact that the PV panels are able to absorb incident radiation reflected from surrounding objects. In addition, the misalignment of the angle of PV panels has been shown to only marginally affect the efficiency of energy collection. There are further advantages which are gained from fixed mounted systems, including:

- » The maintenance and installation costs of a fixed mounted PV system are lower than that of a tracking system, which is mechanically more complex given that these PV mountings include moving parts.
- » Fixed mounted PV systems are an established technology with a proven track record in terms of reliable functioning. In addition, replacement parts are able to be sourced more economically and with greater ease than with alternative systems.
- » Fixed mounted systems are robustly designed and able to withstand greater exposure to winds than tracking systems.

### **Single Axis Tracking System**

A 'single axis tracker' tracks 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

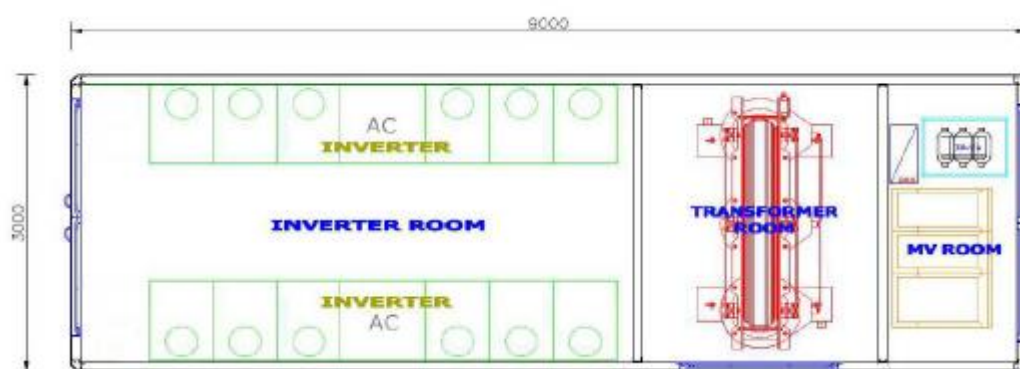
optimise the exposure of PV panels to sunlight. Tracking systems are a new technology and, as such, are less suitable to operations in South Africa. This is because:

- » 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 net energy produced by the plant.

Tracking panels are being considered for the proposed solar energy facility and will be up to 4-6 m in height. The preferred technological option will be informed by financial, technical and environmental factors.

### **Inverter**

The photovoltaic effect produces electricity in direct current (DC). Therefore an inverter must be used to change it to alternating current (AC) for transmission in the national grid. The inverters convert the DC electric input into AC electric output, and then a transformer steps up the current to 33 kV for on-site transmission of the power. The inverter and transformer are housed at the power conversion station (PCS). The PV combining switchgear (PVCS), which are dispersed among the arrays, collect the power from the arrays for transmission to the project's substation. The inverters that Bluewave intend to use on the project are shown below and have a footprint of 9 by 3 meters and are typically 3 meters high. These are usually bolted to a concrete pad similar in size to the inverter.



**Figure 5:** Inverter schematic diagram (courtesy of Bonfiglioli SA)



**Figure 6:** Inverter (Photo courtesy of BlueWave Capital SA)

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

A facility consisting of several PV arrays with a generating capacity of 5 MW could take approximately 6 - 10 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**

The identified site is situated adjacent to an accessible via the R70. The site is therefore appropriately located for easy transport of components and equipment as well as labour movement to and from the site. Direct access to the site can be obtained via the Hennenman Rural Substation service road as well as the road to Phomolong.

### **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 via the existing 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 panels will be arranged in arrays. The height of the PV panel structure will be up to 4m. The frames may be fixed onto the ground with the use of concrete, depending on the soil conditions at the site. An overhead power line of approximately 100m in length to tie into the existing Hennenman Rural Substation will be constructed.

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 Hennenman Rural Substation 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 energy will be transmitted via the new overhead power line into the Hennenman Rural Substation.

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.

### **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:

Notice Number	Activity	Description	Relevance of Regulation to Project
GN 544, 18 JUNE 2010	1(ii)	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 extent.
GN 544, 18 JUNE 2010	10(i)	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 project will require the construction of a new overhead power line (outside an urban area) of up to 33kV to connect to the Hennenman Rural Substation.
GN 544, 18 JUNE 2010	23(ii)	The transformation of undeveloped, vacant or derelict land to 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 hectares in extent.
GN 546, 18 JUNE 2010	14(a)(i)	The clearance of an area of 5 hectares or more of vegetation cover constitutes indigenous vegetation. (a) Free State i. All areas outside urban areas	The solar energy facility will be located outside urban areas and will require the clearance of an area whereby more than 75% of vegetation constitutes 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 however two other site alternatives have been provided for the assessment.

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 16 – 19.5 ha would be required for the 5MW facility and associated infrastructure. The proposed site 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 R70 requiring and direct access to the site can be provided via the Hennenman Rural Substation service road or the road to Phomolong. The site 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. The site is flat and 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** - Small towns are most prone to blackouts or brownouts during times of energy shortages. It is expected that the 5MW will contribute directly to energy security within Hennenman and Phomolong and bolster the local grid during constrained energy supply periods. Grid connection is optimized due to the positioning of the facility adjacent to the Hennenman Rural Substation, allowing for a short grid connection.

<b>Site Alternative 1 (S1) - preferred</b>		
<p>Site alternative 1 occupies an area immediately to the east of the Hennenman Rural Substation on Portion 1 and Portion 2 of the Farm Uitsig 723.</p> <p>The site is bordered to the west by the Hennenman Rural Substation, to the south by the R70, to the east by the road to Phomolong and to the north by a canal and 66kV power line. This site alternative was identified as being the most ecologically suitable option at the project screening phase due to the proximity to the existing substation and the need for avoidance of potential environmental impacts on other areas of the site further from the substation. The site is currently utilised by pedestrians between Phomolong and the R70 and consequently does not have a distinguishable land use, representing a buffer between Phomolong and the R70.</p>	<p>Lat 28° 01' 08.35" S</p>	<p>Long 27° 04' 06.67" E</p>

<p>This site has a grid interconnection distance of ~100m.</p> <p>Site Alternative 1 is the preferred site alternative.</p>		
---	--	--



**Site Alternative 2 (S2)**

<p>Site alternative 2 occupies an area approximately 700 m south east of the Hennenman Rural Substation on Portion 1 of the Farm Uitsig 723.</p> <p>This is the only site on the farm for which no public access is currently allowed (private land) and is situated in close proximity to the landowners farmhouse. The site is bordered to the north by the R70 and bush thickets, to the east by the farm access road, to the south by the farm residence, and to the west by cultivated land.</p> <p>This site has a grid interconnection distance of ~750 m.</p>	<p>Lat 28° 01' 30.35" S</p>	<p>Long 27° 04' 04.72" E</p>
---	---------------------------------	----------------------------------



**Site Alternative 3 (S3)**

<p>Site alternative 3 occupies an area approximately 950 m south east of the Hennenman Rural Substation on Portion 1 of the Farm Uitsig 723.</p> <p>The site is bordered to the south and west by the R70, to the east by other farm boundaries, to the north by the Phomolong settlement (within 200m), and to the west by cultivated land.</p> <p>This site has a grid interconnection distance of ~950 m.</p>	<p>Lat 28° 01' 37.72" S</p>	<p>Long 27° 04' 32.93" E</p>
--	---------------------------------	----------------------------------



In the case of linear activities:

The co-ordinates for the power line of suitable voltage to connect into the existing Hennenman Rural Substation are provided below:

**Linear infrastructure – Site Alternative 1 power line**

Power line (~100m)	Latitude (S):	Longitude (E):
• Starting point of the activity	28° 00'59.06"S	27° 03'53.74"E
• Middle/Additional point of the activity	28° 00'59.66"S	27° 03'54.56"E
• End point of the activity	28° 00'59.14"S	27° 03'55.46"E

**Linear infrastructure - Site Alternative 2 power line**

Power line (~750m)	Latitude (S):	Longitude (E):
• Starting point of the activity	28° 00'59.06"S	27° 03'53.74"E
• Middle/Additional point of the activity	28° 01'09.00"S	27° 03'58.72"E
• End point of the activity	28° 01'20.83"S	27° 04'02.04"E

**Linear infrastructure - Site Alternative 3 power line**

Power line (~950m)	Latitude (S):	Longitude (E):
• Starting point of the activity	28° 00'59.06"S	27° 03'53.74"E
• Middle/Additional point of the activity	28° 01'10.40"S	27° 04'3.53"E
• End point of the activity	28° 01'23.71"S	27° 04'14.98"E

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**

Alternative 1 (preferred alternative)		
Description:	Lat (DDMMSS)	Long (DDMMSS)
The proposed Hennenman 5MW Solar Energy Facility is expected to have a developmental footprint (~16ha) which is smaller than the broader site.  Contiguous rectangular configurations of PV panel arrays are easier to construct. However,	Lat 28° 01' 08.35" S	Long 27° 04' 06.67" E

<p>the constraints of the land parcel requires several smaller rectangle configurations in order to conform to the dimensions of the site. The potential for a layout alternative is therefore constrained by its location between the existing linear infrastructure. No layout alternatives are provided for assessment.</p>		
<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>
<p>As it is the intention of Bluewave Capital SA to develop renewable energy projects as part of the DoE’s IPP Small Projects Programme, 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). PV technology is considered more feasible from a technical perspective at this scale of development (i.e. a small scale project). Furthermore, PV does not require large volumes of water power generation purposes.</p>
<p>The selection of available PV technologies is 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 and differentiated by different landscapes and technologies. 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.:</p>
<ul style="list-style-type: none"> <li>» Fixed / static PV panels;</li> <li>» Tracking PV panels (with solar panels that rotate to follow the sun’s movement).</li> </ul>
<p>Single-axis tracking PV is being considered for the proposed facility. The preferred option will be informed by financial, technical and environmental factors. No technology alternatives are considered further.</p>

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 the proposed Hennenman 5MW Solar Energy Facility. This option is assessed as the “no go alternative” in this Basic Assessment Report (Section D and Appendix F), against which the project impacts are assessed. If the project does not proceed, there will still be a need for alternative energy projects to supplement the current power requirements of the country. The site will remain unchanged and there will be no opportunities for temporary and permanent employment created through this project.

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:**

~160 000 m <sup>2</sup>
~160 000 m <sup>2</sup>
~160 000 m <sup>2</sup>

or, for linear activities:

**Alternative: Power lines**

Alternative A1 (preferred activity alternative)  
 Alternative A2  
 Alternative A3

**Length of the activity:**

Approximately 50 m
Approximately 750 m
Approximately 950 m

**Alternative: Access roads**

Alternative A1 (preferred activity alternative)  
 Alternative A2  
 Alternative A3

**Length of the activity:**

Less than 50 m
Less than 50 m
Approximately 100 m

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

**Alternative:**

Alternative 1 (linear infrastructure)  
  
 Alternative 2 (linear infrastructure)  
  
 Alternative 3 (linear infrastructure)

**Size of the site/servitude:**

Power line- 2 200 m <sup>2</sup> (22m X 100m) Access road – 350m <sup>2</sup> (7m x 50m)
Power line- 16 500 m <sup>2</sup> (22m X 750m) Access road – 350m <sup>2</sup> (7m x 50m)
Power line- 20 900 m <sup>2</sup> (22m X 950m) Access road– 700m <sup>2</sup> (7m x 100m)

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

#### 4. SITE ACCESS

Does ready access to the site exist?

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

<b>NO</b>
Approximately 50 m to each site alternative from the R70

Describe the type of access road planned:

The identified site is accessible from the R70, the Hennenman Rural Substation service road or the road to Phomolong. The proposed access road will be approximately 7m wide and will be tarred.

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>	NO	✓	Please explain
The proposed development site is currently zoned for agricultural use. The development footprint or site will be required to be rezoned to '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>	YES	✓	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 is in line with 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 5km of Hennenman and south-west of Phomolong in the Free State Province and thus falls outside of the urban edge.			
<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>	<b>Yes</b> ✓		Please explain
<p>One of the identified sustainable business practices for the Matjhabeng Local Municipality (as per the 2011 IDP) is to implement practices and procedures that reduce reliance on non-renewable resources with similar PV project planned for development. The manufacturing of solar panel components is a project identified in terms of the municipalities Local Economic Development Plan.</p> <p>The proposed solar energy facility is therefore 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>			
<b>(d) Approved Structure Plan of the Municipality</b>	<b>YES</b> ✓		Please explain
The bulk electrical network is well established around the Matjhabeng area. Eskom serves all mines and all townships in the municipal area and thus there is sufficient bulk infrastructure available to serve the whole area. The main challenge however remains the aging electrical infrastructure in particular in towns where the municipality is the provider. The proposed project could indirectly assist the municipality in this regard as the generated electricity will be fed to the Eskom grid.			
<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>		NO ✓	Please explain
The Matjhabeng 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.			
<b>(f) Any other Plans (e.g. Guide Plan)</b>	<b>YES</b>	<b>NO</b>	Please explain
N/A			

<p><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></p>	<p>YES ✓</p>		<p>Please explain</p>
<p>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.</p>			
<p><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></p>	<p>YES ✓</p>		<p>Please explain</p>
<p>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.</p> <p>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.</p>			
<p><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></p>	<p>YES ✓</p>		<p>Please explain</p>
<p>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> <p>Existing services provided by the Matjhabeng Local Local Municipality are of adequate capacity to absorb the proposed small-scale 5MW PV development.</p> <p>Roads: Access provision from the R70 may result in localised traffic impacts but the cost of any access provisions will be absorbed by the applicant.</p> <p>Water: The municipality will provide the applicant with confirmation of the availability</p>			

<p>of water for the construction phase. Approximately 500m<sup>3</sup> of water per annum will be required for the cleaning of the PV panels. Failing this suitable water sources will be identified for the construction and operational phase.</p> <p>Electricity: The development will generate power, and will strength the local electricity supply as the electricity generated will be fed directly into the Eskom grid.</p>		
<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. Bluewave Capital SA) 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 Department of Energy Small Projects Programme. 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 17.8GW of renewables by 2030 has been set by the Department of Energy (DoE) within the Integrated Resource Plan (IRP) 2010 and incorporated in the REIPPP Programme. This energy will be produced from various renewable energy technologies including solar energy facilities (such as PV technology). The proposed project is to contribute towards this goal for renewable energy and is identified as a Strategic Infrastructure Project in terms of the South African National Infrastructure Plan.</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></p> <p>The identified site is accessible via an existing gravel access road off the R70. The site is therefore appropriately located for easy transport of components and equipment as well as labour movement to and from the site.</p> <p>» <i>Climatic Conditions</i></p>		

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.

» *Gradient*

A level surface area is preferred for the installation of PV panels. The site is flat and 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*

Small towns are most prone to blackouts or brownouts during times of energy shortages. It is expected that the 5MW will contribute directly to energy security within Hennenman/Phomolong and bolster the local grid during constrained energy supply periods. Due to the proposed size and location of the facility, Grid connection is optimized due to the positioning of the facility adjacent to the Hennenman Rural Substation, allowing for a short grid connection. A connection application has been made to Eskom.

<b>9. Is the development the best practicable environmental option for this land/site?</b>	YES ✓		Please explain
--	-------	--	----------------

**Electrical infrastructure:** The Hennenman Rural Substation is located adjacent to the proposed PV facility. The immediate area around the proposed PV site is already characterised by linear disturbances and electrical infrastructure. The proposed development is in line with current land use on and around the site, and would therefore not significantly alter the sense of place.

**Agricultural potential:** In general site alternative 1 has a higher agricultural potential than site alternative 2 and 3. The loss of agricultural land will however be small due to the small development footprint and the fragmented nature of site alternative 1 situated between the R70 and Phomolong. From this perspective, the site is not considered to be of strategic agricultural importance.

**Ecological sensitivity:** As determined in the ecological study conducted, the habitat where the proposed PV facility is located is not considered highly sensitive and, of the different habitats mapped in the area, would be the most suitable receiving environment for the development.

<b>10. Will the benefits of the proposed land use/development outweigh the negative impacts of it?</b>	YES ✓		Please explain
--	-------	--	----------------

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>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><b>NO</b> ✓</p>	<p>Please explain</p>
<p>There is one PV project applications within 8km from the site (west of Hennenman) and 4 PV projects within 40km from the site near Virginia and Allanridge (source: DEAT and CSIR). No solar projects have been developed as yet. The proposed development will therefore not set a precedent however the project will likely set a precedent as far as small-scale PV developments are concerned.</p>		
<p><b>12. Will any person's rights be negatively affected by the proposed activity/ies?</b></p>	<p><b>NO</b> ✓</p>	<p>Please explain</p>
<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 to some extent, however all the land for a considerable extent around the PV site is owned by one landowner. 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>		
<p><b>13. Will the proposed activity/ies compromise the "urban edge" as defined by the local municipality?</b></p>	<p><b>NO</b> ✓</p>	<p>Please explain</p>
<p>The proposed site is located approximately 5km south east of the town of Hennenman and within 1km from Phomolong in the Free State Province. The site falls outside of the urban edge and will not undermine the urban edge in any way.</p>		
<p><b>14. Will the proposed activity/ies contribute to any of the 17 Strategic Integrated Projects (SIPS)?</b></p>	<p><b>YES</b> ✓</p>	<p>Please explain</p>
<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> </ul> <p>However, only upon obtaining preferred bidder status, will the project be considered a SIP project.</p>		

<b>15. What will the benefits be to society in general and to the local communities?</b>	Please explain
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.).	
<b>16. Any other need and desirability considerations related to the proposed activity?</b>	Please explain
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.	
<b>17. How does the project fit into the National Development Plan for 2030?</b>	Please explain
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.	
<b>18. Please describe how the general objectives of Integrated Environmental Management as set out in section 23 of NEMA have been taken into account.</b>	
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.	
<b>19. Please describe how the principles of environmental management as set out in section 2 of NEMA have been taken into account.</b>	
<p>The principle of environmental management as set out in section of NEMA states that:</p> <ul style="list-style-type: none"> <li>» 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;</li> <li>» Development must be sustainable socially (people), environmentally (planet) and economically (prosperity);and</li> <li>» Sustainable development requires the consideration of all the relevant factors,</li> </ul> <p>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.</p> <p>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</p>	



EMPr would provide mitigation measures in terms of disturbance to ecosystems, loss of biodiversity, pollution and degradation to the environment, waste and stormwater 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 Hennenman 5MW Solar Energy Facility.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
<b>National Legislation</b>			
<p>National Environmental Management Act (Act No 107 of 1998)</p>	<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>
<p>National Environmental Management Act (Act No 107 of 1998)</p>	<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>	<p>Department of Environmental Affairs</p>	<p>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.</p>
<p>Environment Conservation</p>	<p>National Noise Control Regulations (GN R154</p>	<p>Department of Environmental</p>	<p>Noise impacts are expected to be</p>

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	A water use license (WUL) is required to be obtained if drainage lines are impacts on. No drainage lines occur on the site and will not be impacted by the proposed layout of the facility.
National Water Act (Act No 36 of 1998)	In terms of S19, the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to prevent and remedy the effects of pollution to water resources from occurring, continuing, or recurring.	Department of Water Affairs  Provincial Department of Water Affairs	This section of the Act will apply with respect to the potential impact on drainage lines, primarily during the construction phase (i.e. pollution from construction vehicles).
Minerals and Petroleum Resources Development Act	A mining permit or mining right may be required where a mineral in question is to be	Department of Mineral Resources	As no borrow pits are expected to be required for the construction of the

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
(Act No 28 of 2002)	<p>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>		<p>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 by the applicant.</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 the person has failed to comply with the Act.</p>
National Heritage Resources Act (Act No 25 of 1999)	<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,</li> </ul>	South African Heritage Resources Agency Free State Heritage Resources	<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</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>pipeline, canal or other similar linear development or barrier exceeding 300 m in length; and</p> <p>» Any development or other activity which will change the character of a site exceeding 5 000 m<sup>2</sup> in extent.</p> <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>development.</p> <p>A HIA has been undertaken as part of the Basic Assessment Process to identify heritage sites. The remains of two features were recorded possibly associated with recent farm labourer dwellings on site alternative 2 and 3.</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 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</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 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>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>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>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 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>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 implemented. In addition, a weed control and management plan must be implemented.</p> <p>The permission of agricultural authorities will be required if the</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			Project requires the draining of vleis, marshes or water sponges on land outside urban areas.
National Forests Act (Act No. 84 of 1998)	<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>	National Department of Forestry	A permit would need to be obtained for any protected trees that are affected by the development. No protected trees will be impacted.
National Veld and Forest Fire Act (Act 101 of 1998)	<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>In terms of S17, the applicant must have such equipment, protective clothing, and trained personnel for extinguishing fires.</p>	Department of Water Affairs	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.
Hazardous Substances Act (Act No 15 of 1973)	This Act regulates the control of substances that may cause injury, or ill health, or death	Department of Health	It is necessary to identify and list all the Group I, II, III, and IV hazardous

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>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</p> <p>Group IV: any electronic product; and</p> <p>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>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 Act (Act No 67 of 1995)</p>	<p>Provides for the overall framework and administrative structures for planning throughout the Republic.</p> <p>S(2 - 4) provide general principles for land development and conflict resolution.</p>	<p>Local Municipality</p> <p>District Municipality</p>	<p>The applicant must submit a land 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</p>



Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
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	in the Act. The land will be leased from the municipality by the project company to be formed no subdivision application will be submitted.
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 921), 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 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</li> </ul>	<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>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>storage of waste.</p> <ul style="list-style-type: none"> <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>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 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</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 substation components may not meet specified dimensional limitations (height and width).</li> </ul>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	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	The protected geophyte <i>Ammocharis coranica</i> occurs on site alternative 2. Should this site be developed, a permit from the provincial conservation authority for the removal/relocation thereof will need to be applied for.

## 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> ✓	
± 8m <sup>3</sup> of solid construction waste consisting mainly of vegetation, spoil material from clearing activities and metal and cabling off cuts.	

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

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

It is anticipated that construction waste will be disposed of at the nearest licensed municipal landfill site. An area of the site of approximately 0.1 ha has been identified for a spoil heap.

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 the Hennenman Landfill site.

Will the activity produce solid waste during its operational phase?

	<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? **NO**✓

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? **NO**✓

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? **NO**✓

If YES, what estimated quantity will be produced per month? m<sup>3</sup>

Will the activity produce any effluent that will be treated and/or disposed of on site? **NO**✓

*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? **NO**✓

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:

During construction dust and vehicle emissions will be generated. The contractor is required to adhere to the mitigation measures stipulated in the Environmental Management Programme and the National Dust Control Regulations (1 November 2013) in terms of dust abatement and control.

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> ✓
--	-------------

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
--------------------	-------------	-------------	----------------------------	--------------	---------------------------------

The applicant will be trucking in water based on a purchase agreement with a 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.

### 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).

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.

**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?  YES ✓

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>	Lejeweleputswa District Municipality
<b>Local Municipality</b>	Matjhabeng Local Municipality
<b>Ward Number(s)</b>	2
<b>Farm name and number</b>	Farm Uitsig 723
<b>Portion number</b>	1 & 2 of 723
<b>SG Code</b>	F03500000000072300001/2

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)
------------------------------------

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?

**YES** ✓

### 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):

<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 S3 (if any):

<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		

### 2. LOCATION IN LANDSCAPE

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

#### All three site alternatives

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?

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

	<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>NO</b> ✓	<b>YES</b> ✓	<b>YES</b> ✓
Any other unstable soil or geological feature	<b>NO</b> ✓	<b>NO</b> ✓	<b>NO</b> ✓
An area sensitive to erosion	<b>YES</b> ✓	<b>YES</b> ✓	<b>YES</b> ✓

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. GROUNDCOVER

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).

##### Site alternative 1

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

Fallow lands are currently covered with a dominant layer of annual grasses, ruderals and alien invasives, with a small proportion of natural grass species slowly starting to re-establish. Soils remain exposed to the elements, and show a high degree of surface capping with the potential of sheet- and wind erosion. Fallow lands are ideal for the proposed development.

##### Site alternative 2

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

Over the bulk of the site, the grasslands have been subjected to prolonged periods of high intensity grazing, and therefore have a much lower and poorer vegetation cover. These portions of grassland thus have a low sensitivity and could be used for the proposed development, provided that protected plants are relocated. The eradication of invasives on these grasslands will be important. In intact areas of site alternative 2, the dominance of species varies from dense grasses, or small areas with high shrubs and some trees to occasional patches of a high density of the protected geophyte *Ammocharis coranica*.

### Site alternative 3

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

Site alternative 3 consists of degraded grasslands consisting of a very short and sparse grass and dominant forb layer. Occasionally, small patches of higher shrubs or single higher shrubs occur. Grass cover will remain low as it is continually grazed by roaming cattle.

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?

### Alternative S1:

Perennial River		NO ✓	
Non-Perennial River (Drainage lines)		NO ✓	
Permanent Wetland		NO ✓	
Seasonal Wetland		NO ✓	
Artificial Wetland		NO ✓	
Estuarine / Lagoonal wetland		NO ✓	

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

No watercourses are situated on the site. A canal runs parallel to the northern boundary of the site. A wetland is situated within 130m to the north of the site.

**Alternative S2:**

Perennial River		NO✓	
Non-Perennial River (Drainage lines)		NO✓	
Permanent Wetland		NO✓	
Seasonal Wetland		NO✓	
Artificial Wetland		NO✓	
Estuarine / Lagoonal wetland		NO✓	

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

No watercourses are situated on the site. A wetland is situated within 560m to the north of the site. The widespread occurrence of *Litogyne gariepina* as well as large patches of *Ammocharis coranica* on site alternative 2 indicate that soils are poorly drained and occasional seasonal waterlogging of soils may occur.

**Alternative S3:**

Perennial River		NO✓	
Non-Perennial River (Drainage lines)		NO✓	
Permanent Wetland		NO✓	
Seasonal Wetland		NO✓	
Artificial Wetland		NO✓	
Estuarine / Lagoonal wetland		NO✓	

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

No watercourses are situated on the site. A wetland is situated within 850m to the north of the site.

## 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:

### All three site alternatives

Natural area <sup>✓</sup>	Dam or reservoir	Polo fields
Low density residential	Hospital/medical centre	Filling station <sup>H</sup>
Medium density residential <sup>✓</sup>	School	Landfill or waste treatment site
High density residential <sup>✓</sup>	Tertiary education facility	Plantation
Informal residential <sup>A✓</sup>	Church	Agriculture <sup>✓</sup>
Retail commercial & warehousing	Old age home	River, stream or wetland <sup>✓</sup> (wetland)
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>	Railway line <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: A substation is located adjacent to Site Alternative 1</b>

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

N/A

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:

**Impact of the proposed facility on nearby receptors:** The proposed facility will have a visual impact on the formalised Phomolong residences to the east and informal settlement to the south of Phomolong. Proposed development alternatives 1 and 3 will be highly visible from the southern edge of Phomolong. It has to be highlighted that the affected area is largely comprised of informal settlement and that the development will not be visible to the majority of formalised residents.

Phomolong being largely comprised of low income housing, would fall into the category of a poorer community. This doesn't mean that within the community, people do not value their outlook, but it is suspected that in the main priorities are ensuring that the living environment is clean, healthy and safe. It is highly possible that over time as the settlement becomes more established, values will change and outlook may become important for a larger proportion of people.

**Impact on the proposed facility from nearby receptors:** The proximity of the proposed facility to informal settlement could lead to opportunistic incidences of theft by any criminal elements residing there. This could pose a potential security risk to the PV facility due to theft of project components. The facility will be fenced and provided security detail during operations.

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:

**Alternative S1:**

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> ✓

The north eastern tip of Site Alternative 1 nearest to the Hennenman Rural Substation falls on the edge of a remaining extent of a threatened ecosystem (Central Free State Grassland) mapped at a national level (in the absence of a provincial Biodiversity Plan for the province). This ecosystem is not officially listed as a threatened ecosystem, but it is regarded as vulnerable (Mucina and Rutherford 2006) due to large portions of it being

transformed either for cultivation or by dams, with only small portions that are protected such as in the nearby Rustfontein Dam Nature Reserve.

**Alternative S2:**

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> ✓

**Alternative S3:**

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.

**A map is attached 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:

**NO**✓

According to the Archaeological Impact Assessment, the demolished remains of two features possibly associated with recent farm labourer dwellings were recorded. These dwellings are probably not older than 60 years and are of low heritage significance. However there is a possibility of unmarked graves on these sites with the above mentioned characteristics. If during construction any possible finds such as stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped and a qualified archaeologist must be contacted for an assessment of the find.

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.

## 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:

According to the Matjhabeng Local Municipality profile, the unemployment rate in the municipality in 2011 was 14.4%.

Economic profile of local municipality:

Matjhabeng represents the hub of mining activity in the Free State province. The economy of the Matjhabeng Municipality was based on the gold mining industry, and although the gold mining industry has declined since 1991, three of the biggest gold producers in the world are still active in the area and some are even expanding. The mining activities located in and around Allanridge, Odendaalsrus, Welkom and Virginia. Manufacturing aimed at the mining sector exists to a limited extent in the above towns. Other manufacturing activities are limited.

Mining still dominates the local economic scene by contributing 58% of the GDP of the area and 19% of the province. Major strategies are in place to change the economic base away from the mining dependency. The FGF Development Centre, economic development arm of the Matjhabeng Council is devising major strategies to change the economic base away from the mining dependency (source: <http://www.rsa-overseas.com/about-sa/matjhabeng.htm>).

Level of education:

With regard to education levels, the portion of the population older than 20 years without formal education is 4.6%, while only 9% of the portion of the population has a higher education. 28% of the population older than 20 years has a matric.



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

What is the expected capital value of the activity on completion?	R100 million
What is the expected yearly income that will be generated by or as a result of the activity?	R 12 million
Will the activity contribute to service infrastructure?	<b>YES</b> ✓
Is the activity a public amenity?	<b>NO</b> ✓
How many new employment opportunities will be created in the development and construction phase of the activity/ies?	Approximately 80 5% highly skilled; 20% skilled; 75% unskilled
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?	80%
How many permanent new employment opportunities will be created during the operational phase of the activity?	Approximately 5 including technical and security staff. This excludes people employed for cleaning of the panels.
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)**

<b>Systematic Biodiversity Planning Category</b>				<b>If CBA or ESA, indicate the reason(s) for its selection in biodiversity plan</b>
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**

**Alternative S1:**

<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>
Natural	0%	-
Near Natural (includes areas with low to moderate level of alien invasive plants)	30%	Fallow land is regarded as the main cover on this site. This site is covered with a dominant layer of annual grasses, ruderals and alien invasives. A small proportion of natural grass species are slowly starting to re-establish.
Degraded (includes areas heavily invaded by alien plants)	70%	
Transformed (includes cultivation, dams, urban, plantation, roads, etc)	0%	-

**Alternative S2:**

<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>
Natural	0%	-
Near Natural (includes areas with low to moderate level of alien invasive plants)	50%	<i>Intact Central Free State Grassland:</i> The species composition is very variable within the grasslands, depending mostly on soil surface characteristics. Dominance of species varies from dense grasses, or small areas with high shrubs and some trees to occasional patches of a high density of the protected geophyte <i>Ammocharis coranica</i> .
Degraded (includes areas heavily invaded by alien plants)	50%	Degraded Central Free State Grassland: These grasslands have clearly been subjected to prolonged periods of high intensity grazing, and therefore have a much lower and poorer vegetation cover and contains <i>Themeda triandra</i> and <i>Eragrostis curvula</i> .
Transformed (includes cultivation, dams, urban, plantation, roads, etc)	0%	-

**Alternative S3:**

<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>
Natural	0%	-
Near Natural (includes areas with low to moderate level of alien invasive plants)	0%	-
Degraded	100%	Degraded Central Free State Grassland: These

<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>
(includes areas heavily invaded by alien plants)		grasslands have clearly been subjected to prolonged periods of high intensity grazing, and therefore have a much lower and poorer vegetation cover prevails containing <i>Themeda triandra</i> and <i>Eragrostis curvula</i> .
Transformed (includes cultivation, dams, urban, plantation, roads, etc)	0%	-

**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.

**Alternative S1:**

<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> ✓

**Alternative S2:**

<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> ✓

**Alternative S3:**

Terrestrial Ecosystems		Aquatic Ecosystems			
<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 ✓	NO ✓		NO ✓	NO ✓

**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)**

**Alternative S1:**

Fallow land is regarded as the main cover on this site. This site is covered with a dominant layer of annual grasses, ruderals and alien invasives. A small proportion of natural grass species are slowly starting to re-establish. There are no aquatic environments located on the site. A canal is situated parallel to the northern boundary of the site.

**Alternative S2:**

The following vegetation associations occur on site alternative 2:

- » Intact Central Free State Grassland: The species composition is very variable within the grasslands, depending mostly on soil surface characteristics. Dominance of species varies from dense grasses, or small areas with high shrubs and some trees to occasional patches of a high density of the protected geophyte *Ammocharis coranica*.
- » Degraded Central Free State Grassland: These grasslands have clearly been subjected to prolonged periods of high intensity grazing, and therefore have a much lower and poorer vegetation cover and contains *Themeda triandra* and *Eragrostis curvula*.

The widespread occurrence of *Litogyne gariepina* as well as large patches of *Ammocharis coranica* on site alternative 2 indicate that soils are poorly drained and occasional seasonal waterlogging of soils may occur, however no aquatic environments occur on the site.

**Alternative S3:**

Degraded Central Free State Grassland: These grasslands have clearly been subjected to prolonged periods of high intensity grazing, and therefore have a much lower and poorer vegetation cover prevails containing *Themeda triandra* and *Eragrostis curvula*.

## SECTION C: PUBLIC PARTICIPATION

### 1. ADVERTISEMENT AND NOTICES

<b>Publication name</b>	Process notification advertisement: Vista Newspaper	
<b>Date published</b>	Process notification advertisement: 8 December 2014)	
<b>Site notice position</b>	<b>Latitude</b>	<b>Longitude</b>
	1) 28° 0'59.64"S	27° 3'52.11"E
	2) 28° 1'20.42"S	27° 4'9.24"E
	3) 28° 1'33.59"S	27° 4'19.85"E
<b>Date placed</b>	8 December 2014	

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 each of the three site alternatives over a distance of approximately 1km along the R70
- » Adverts were placed in the Vista Newspaper to notify the public of the proposed project.
- » A Background Information Document (BID) was distributed to I&APs

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

<b>Summary of main issues raised by</b>	<b>Summary of response from EAP</b>
---	-------------------------------------

<b>I&amp;APs</b>	
This is the draft BAR. A completed issues and responses report will be included in the final BAR.	

#### **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**.

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
- South African Heritage Resources Agency
- Matjhabeng Local Municipality
- Lejweleputswa District Municipality
- SANRAL
- Eskom
- Square Kilometre Array (SKA)
- Department of Energy
- National Department of Agriculture, Forestry and Fisheries
- Department of Water and Sanitation
- Civil Aviation Authority

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 Hennenman 5MW Solar Energy Facility is provided in the table overleaf. The impact assessment is undertaken for all components of the facility, including:

- » PV array and associated buildings
- » Temporary laydown areas
- » Access roads
- » Power lines

Activity	Impact summary	Significance	Proposed mitigation		
<b>CONSTRUCTION</b>					
<b><u>Ecological impacts</u></b>					
<p>The proposed photovoltaic facility development on the site will not have significant impacts on the above-ground ecology of the site if all mitigation measures are followed, especially if listed alien invasive plants can be reduced. If such currently present disturbances can be sufficiently mitigated, the impact may be to some extent beneficial for more sensitive surrounding areas. The low ecological sensitivity of the larger portion of the study area is due to the past land-use history, during which these areas were transformed or degraded.</p> <p>Potentially significant negative impacts on the ecological environment will occur if remaining portions of non-degraded natural vegetation will be further disturbed. The impact on fauna is expected to be small to negligent. Presence of indigenous terrestrial vertebrates within the study area is low due to current land use. Animals that may be permanently present can be relocated or will move away during construction, and may resettle after construction, depending on safety specifications necessitated by the development. No restricted or specific habitat of vertebrates exists on the study area and will be affected by the proposed development</p>					
	<b>Site Alternative</b>	<b>S1</b>	<b>S2</b>	<b>S3</b>	
» Construction and operation of PV panels on previously transformed and/or highly degraded areas – site alternatives 1 and 3	<p><b>Direct impacts:</b>                      Loss of indigenous (-ve) and alien invasive (+ve) vegetation, increase in runoff and erosion, possible distribution of alien invasive species, possible disturbance and reduction of habitat or injury to burrowing vertebrates, possible change of natural runoff and drainage patterns, possible loss of protected species, possible permanent loss of revegetation potential of soil surface</p>	M	N/A	M	<p>» Considering the high impact despite mitigation expected, construction of PV panel arrays, access roads, substations or buildings must be avoided in remaining, non-degraded portions of the Central Free State Grassland (i.e. occurring on Site Alternative 2)</p> <p>» Site Alternative 1 should be selected as the preferred alternative.</p> <p>» Degraded portions of natural vegetation should be cleared of invasives as a minimum, and could be used for limited components of the development, provided that this is located on areas with the highest present level of disturbances</p> <p>» After the final layout has been approved, conduct a thorough footprint investigation to detect and map</p>
» Construction and operation of any development component(s) on remaining intact Central Free State Grassland vegetation – site alternative 2		N/A	H	N/A	
» Upgrading and/or creation of site access road and internal maintenance tracks. Note: all alternative sites are adjacent		M	M	M	

Activity	Impact summary	Significance			Proposed mitigation
to the R70, and on-site access will thus only constitute a short road					any protected plant species and animal burrows » During the design phase, aim to have connection routes coinciding with existing tracks or fence lines to reduce the disturbance to vegetation and avoid creating new tracks and areas of compaction by construction machinery.
» Construction of a short power line as part of the grid connection		L	L	L	
Vegetation clearing and construction activity leading to soil erosion	<b>Indirect impacts:</b> » Increased erosion risk as a result of soil disturbance and loss of vegetation cover during construction.	L	L	L	» Access roads and machinery turning points must be planned to minimise the impacted area, avoid the initiation of accelerated soil erosion and prevent unnecessary compaction and disturbance of top soils, prevent obstruction or alteration of natural water flow
	<b>Cumulative impacts:</b> If mitigation measures are not strictly adhered to, the following could occur: » Loss of and further fragmentation of remaining portions of natural grassland and associated ecosystem services such as pollination » Alteration of occupancy by terrestrial fauna, possible reduction of available habitat and food availability to terrestrial fauna » Spread and establishment of invasive species, and further associated degradation of remaining endangered vegetation » Loss of viable populations of	Low			» Adhere to strict mitigation measures during the construction phase.

Activity	Impact summary	Significance			Proposed mitigation
	indigenous flora				
<b><u>Visual Impacts</u></b>					
	<b>Site Alternative</b>	<b>S1</b>	<b>S2</b>	<b>S3</b>	
Impact of the construction phase on the following visual receptors: » The eastern edge of Hennenman » The southern edge of Phomolong » Farmsteads that are located close to and to the east west and south of the proposed development, » The R70 regional road which passes along the boundary of each alternative site.	<b>Direct impacts:</b> » Impact of initial site works, construction camp, site set up, setting out, laying services, ground works. » Construction of access roads, from junction at local road to site and through site. » Impact of the building construction works to completion.	L	L	L	» Establish screening structures to shield construction works from sensitive receptors; good traffic and site management and keeping local people informed. » Good traffic and site management, keeping local people informed. » Screening where needed good traffic and site management and keeping local people informed.
	<b>Indirect impacts:</b> » Hauling and delivery of construction materials regularly on local roads during contract period	L	L	L	» Operate site within construction industry management guidelines, time limit on contract period.
	<b>Cumulative impacts:</b> » None				» None
<b><u>Soil &amp; Agricultural Impacts</u></b>					
The cumulative footprint of the proposed development will be small do to the very small development footprint (15 ha), especially when Alternative 2 or 3 is selected for the development. Since Alternative 2 and 3 are only suitable for grazing the removal of 15 ha will translate in loss of livestock units from agricultural production. The impact of the loss of agricultural land will be slightly greater for Alternative 1, due to higher soil capability. Water erosion might occur following the alteration of flow paths and adequate erosion measures should be in place prior to construction.					

Activity	Impact summary	Significance			Proposed mitigation
		S1	S2	S3	
	<b>Site Alternative</b>				
<ul style="list-style-type: none"> <li>» Occupation of the site by development footprint</li> <li>» Construction activities which disturb the natural soil profile</li> <li>» Construction of access roads and vehicles operating during the construction phase.</li> </ul>	<p><b>Direct impacts:</b></p> <ul style="list-style-type: none"> <li>» Impact of the development footprint on the loss of agricultural land</li> </ul>	M	L	L	<ul style="list-style-type: none"> <li>» No mitigation possible.</li> <li>» Select site of lowest agricultural potential where possible for development.</li> </ul>
	Impact of the construction on the loss of topsoil	L	L	L	<ul style="list-style-type: none"> <li>» Strip and stockpile topsoil from areas where excavations are made. Re-spread topsoil after completion of construction.</li> </ul>
	Impact of the expansion on the road networks	L	L	L	<ul style="list-style-type: none"> <li>» Use existing roads as far as possible, adequate erosion measures are to be put in place</li> </ul>
	Impact of the development footprint on soil erosion	L	L	L	<ul style="list-style-type: none"> <li>» Ensure that adequate erosion measures are in place and limit direct footprint. Explore the potential to re-establish vegetation underneath panels.</li> </ul>
	Impact of increased vehicle activity	L	L	L	<ul style="list-style-type: none"> <li>» Limit vehicle movement and ensure that road surfaces are moist during maximum vehicle movement periods</li> </ul>
	<p><b>Indirect impacts:</b></p> <ul style="list-style-type: none"> <li>» None</li> </ul>	N/A			
	<p><b>Cumulative impacts:</b></p> <ul style="list-style-type: none"> <li>» The overall loss of agricultural land in the region due to other developments. The significance is low due to the limited agricultural potential of the development sites in the area, and the small extent of this proposed development.</li> </ul>	Low			<ul style="list-style-type: none"> <li>» No mitigation required</li> </ul>

Activity	Impact summary	Significance			Proposed mitigation
<b>Social impacts</b>					
Site Alternative		S1	S2	S3	
<b>Construction phase</b> (Including all related infrastructure such as power lines, access roads, office and warehouse components)	<b>Direct impacts:</b> <b>Positive social impacts:</b> » Creation of employment and business opportunities.	L (+)	L (+)	L (+)	» Where possible, the applicant 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; » Maximise the use of local labour for low – semi skilled jobs far as possible.
	<b>Potential negative impacts:</b> » Influx of construction workers employed on the project to the area and impact on hospitality sector » Increased risk of stock theft, poaching and damage to farm infrastructure associated with construction workers » Increased risk of veld fires associated with construction related activities » Impact of heavy vehicles, including damage to roads, safety, noise and dust	L	L	L	Implement mitigation measures to monitor and control the activities of construction workers and for the control of nuisance impacts.
	<b>Indirect impacts:</b> » Local employed people during the construction phase may learn new skills thereby making them more employable in the future.	Low (+)			» The developer should implement a training and skills development enhancement programme for locals during the operational phase. The aim of the programme should be to maximise the number of South African's and locals employed during the

Activity	Impact summary	Significance	Proposed mitigation						
	<p><b>Cumulative impacts:</b></p> <ul style="list-style-type: none"> <li>» Impacts on family and community relations</li> <li>» 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 affected individuals and/or their families and the community.</li> </ul>	Low	<p>operational phase of the project.</p> <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>						
<p><b><u>Heritage impacts</u></b></p> <p>Based on the results of the heritage study there are no significant archaeological risks associated with the proposed solar energy facility. No heritage features occur within the study area although the demolished remains of two features were recorded which are possibly associated with recent farm labourer dwellings. Due to the extent of the destruction of the features and the fact that these site are most probably not older than 60 years these sites are of low heritage significance. However sites like these might contain unmarked graves (graves are of high social significance) and therefore site alternative 1 is the preferred option from a heritage point of view. Development of site alternatives 2 and 3 is considered acceptable as there are no identified sites of high heritage significance but the possibility of unmarked graves associated with feature 1 and 2 cannot be excluded.</p>									
<p><b>Site Alternative</b></p>									
<p>Construction and operation of the PV array, access roads and associated infrastructure.</p>	<p><b>Direct impacts:</b></p> <ul style="list-style-type: none"> <li>» During the construction phase earthworks might impact on the recorded artefacts.</li> </ul> <p><b>Indirect impacts:</b></p> <ul style="list-style-type: none"> <li>» None</li> </ul>	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>S1</th> <th>S2</th> <th>S3</th> </tr> </thead> <tbody> <tr> <td style="background-color: #92d050;">L</td> <td style="background-color: #92d050;">L</td> <td style="background-color: #92d050;">L</td> </tr> </tbody> </table>	S1	S2	S3	L	L	L	<ul style="list-style-type: none"> <li>» During construction, implement chance find procedures at site alternatives 2 and 3 due to the possibility of unmarked graves in the vicinity of demolished structures</li> <li>» None</li> </ul>
S1	S2	S3							
L	L	L							



Activity	Impact summary	Significance	Proposed mitigation
	<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>

Activity	Impact summary	Significance			Proposed mitigation	
<b>OPERATION</b>						
<i>Ecological impacts</i>						
		Site Alternative	S1	S2	S3	
Maintenance of PV array components including regular washing and possible breakage of panels  Operation of power line	<p><b>Direct impacts:</b></p> <ul style="list-style-type: none"> <li>» Localised increase in runoff and accelerated erosion, possible release of toxic substances and/or heavy metals and associated contamination of soil and groundwater, possible contamination and damage to terrestrial fauna by broken glass</li> </ul>		L	L	L	<ul style="list-style-type: none"> <li>» Where panels need to be washed, no polluting chemicals may be used, and minimise the use of water as far as possible</li> <li>» Where water is used for washing, monitor areas around the PV arrays for signs of accelerated erosion and establishment of weeds or alien invasive species and manage according to the erosion- and invasive species management plan</li> <li>» Prior to construction and until decommissioning, clear instructions must be drafted and at all times available on site on how any breakages of PV panels will be dealt with, including:                             <ul style="list-style-type: none"> <li>○ A list of possible toxic substances, heavy metals or other potentially harmful substances that could be released during breakage</li> <li>○ How to contain and mitigate the release of such substances</li> <li>○ Correct salvage, disposal and preferably also</li> </ul> </li> </ul>

Activity	Impact summary	Significance			Proposed mitigation
					recycling methods (or possibilities) for any broken materials
	» Operation of an overhead power line could result in a collision or electrocution risk to avifauna	L	M- L	M- L	» Implement bird friendly tower designs and mark the entire power line with bird diverters.
	<b>Indirect impacts:</b> None				None
	<b>Cumulative impacts:</b> » Possible pollution of surrounding areas if no mitigation is implemented » Possible increase in and spread of alien invasive species beyond the site if no mitigation is implemented	Low			Avoidance of cumulative impacts through site specific mitigation

**Visual impacts**

Views from the eastern edge of Hennenman are unlikely to be subject to significant change due development of any of the proposed alternative sites. This is because of the screening capacity of existing landscape features and the relative elevation of the area which is set at around the same level as the proposed development.

During operation, proposed development alternatives 1 and 3 will be highly visible from the southern edge of Phomolong. It has to be highlighted that the affected area is largely comprised of informal settlement and that the development will not be visible to the majority of residents. A degree of screening is possible but the need for this is questionable given the extent of open space between the development and settled area and the likely focus of residents on a clean and healthy living space and perhaps not on visual amenity.

All three development alternatives could impact on the farmsteads in the immediate vicinity. However, the extent of surrounding vegetation is likely to mean that only small limited views are likely to be possible. Mitigation might focus on reinforcing existing vegetation around farmsteads.

The impact on views from R70 is likely to be extensive for all three development alternatives;

- » Intermittent long distance views over the array will be possible from higher ground to the east exposing the full extent of the development. Intermittent oblique views of the side profile are likely to be possible from lower level approaches from the east and the west.

Activity	Impact summary	Significance			Proposed mitigation	
» Close views of the full face / rear of the array will be possible from the road adjacent to each site. This impact is at least partly mitigated by the fact that the road is mainly used by local people and has little recreation / tourism significance. However, setting the array back as far as possible from the road edge should be considered.						
		Site Alternative	S1	S2	S3	
<p>Maintenance and operation of proposed PV plant and its impact on the following visual receptors:</p> <ul style="list-style-type: none"> <li>» The eastern edge of Hennenman</li> <li>» The southern edge of Phomolong</li> <li>» Farmsteads that are located close to and to the east west and south of the proposed development,</li> <li>» The R70 regional road which passes along the boundary of each alternative site.</li> </ul>	<p><b>Direct impacts:</b></p> <ul style="list-style-type: none"> <li>» Change of view in the south western edge of the residential area of Phomolong</li> </ul>	L	L	L	<ul style="list-style-type: none"> <li>» It is not anticipated that there will be significant objection to the likely change in view from the southern side of Phomolong.</li> <li>» There is already an open space between the closest houses and the alternative site boundary. Setting back the array any further is therefore only likely to have marginal benefit.</li> <li>» Should concern be raised by local people, there are two possible mitigation options; <ul style="list-style-type: none"> <li>o Constructing or planting a screen on the site boundary, or</li> <li>o Planting street trees on the southern edge of Phomolong.</li> </ul> </li> <li>» Both of the above are likely to be effective, although option 1 is unlikely to totally screen the array. Option 2 will not totally screen the array but it would soften views and is likely to add some amenity value to the local streetscape</li> </ul>	
	Change of view at adjacent farmsteads	L	L	L	<ul style="list-style-type: none"> <li>» It isn't anticipated that there will be significant objection to the likely change in view from the farmsteads.</li> <li>» There is already significant screening vegetation around the closest farmsteads. It is possible that in areas this might be improved. The most effective mitigation should people object to partial views</li> </ul>	

Activity	Impact summary	Significance			Proposed mitigation
					through existing screening vegetation would be to reinforce existing planting. This would have to be undertaken in consultation with landowners.
	Change of view at south eastern edge of Hennenman	L	L	L	» It isn't anticipated that there will be significant objection to the likely change in view from this area. The apparent landscape change is likely to be small and there is significant screening vegetation on the urban edge. Additional mitigation is not necessary.
	Change of view from the R70	L	L	L	» Whilst the change in view over a length of road between 2km and 3km is likely to be large, this will not result in the loss of important views but it will change the visual experience from the road. It is possible that this could result in concern from some local stakeholders. » As minimum mitigation, the proposed solar array should be set back as far as is possible from the road edge. It is possible to undertake screening either by planting, creation of earth berms, the construction of a visual barrier or a combination.
	<b>Indirect impacts:</b> » The proposed infrastructure is of such a nature that the status quo could be regained after decommissioning of the plant.	L	L	L	» Providing that the site is rehabilitated to its current state, the visual impact will also be removed.
	<b>Cumulative impacts:</b> » All three site alternatives will add a small extent of additional infrastructure to a landscape that is far from pristine and is already impacted to a large degree by infrastructure. Whilst they will add a small cumulative addition to the impact of this	L			» 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.

Activity	Impact summary	Significance			Proposed mitigation
	infrastructure, they will do little to change the overall landscape character.				
<b><i>Soil and agricultural impacts</i></b>					
Cleaning of solar arrays with water, detergents and soaps	<b><i>Direct impacts:</i></b> » Soil erosion » Soil and water contamination	L	L	L	» Practice proper run-off control and ensure good vegetation cover of the soil » Use water only for cleaning of solar arrays
	<b><i>Indirect impacts:</i></b> » Water and soil contamination downslope	L	L	L	» Use water only for cleaning of solar arrays
	<b><i>Cumulative impacts:</i></b> Water and soil contamination	L	L	L	» Use water only for cleaning of solar arrays
<b><i>Social impacts</i></b>					
Including all related infrastructure such as power lines, access roads, office and warehouse components	<b><i>Direct impacts:</i></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 (refer to visual impacts)	L	L	L	» Where possible, the developer should employ locals.

Activity	Impact summary	Significance	Proposed mitigation
	<p><b>Indirect impacts:</b></p> <ul style="list-style-type: none"> <li>» Once the construction phase is complete, locals may not be able to find future employment.</li> </ul>	<p>Low</p>	<ul style="list-style-type: none"> <li>» Where possible, the applicant should employ locals to form part of the operation phase team.</li> <li>» Develop a programme 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>» The cumulative impact on the social environment of other developments in the area would increase the positive and negative social impacts.</li> </ul>	<p>Medium to Low</p>	<p>The developer should be aware of the other projects in the area and work closely with the local municipality to development the community trust.</p>

Activity	Impact summary	Significance	Proposed mitigation
<b>DECOMMISSIONING AND CLOSURE</b>			
Decommissioning of the Solar Energy Facility	<p><b>Direct impacts:</b>                      Ecological impacts, soil erosion and increased alien plant invasion risk</p>	Low (all three site alternatives)	<ul style="list-style-type: none"> <li>» Investigate the establishment of a Rehabilitation Trust Fund to allocate sufficient funds during the operational phase to cover the costs of rehabilitation and closure.</li> <li>» Due to the disturbance at the site during decommissioning, alien plant species are likely to invade the site and a long-term control plan will need to be implemented for several years after decommissioning</li> <li>» Regular monitoring for alien plants within the development footprint for 2-3 years after decommissioning.</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>» A cover of indigenous grass should be established to stabilise the soil.</li> </ul>
	<p>Visual:</p> <ul style="list-style-type: none"> <li>» The major visual impact associated with the decommissioning of the facility is the residual visual effects such as scarring of the landscape.</li> </ul>	Low (all three site alternatives)	<ul style="list-style-type: none"> <li>» This would be short-term and would reduce through rehabilitation of the site.</li> </ul>
	<i>Indirect impacts:</i>		
	<b>Cumulative Impacts: Soil</b>	Low (all three	<ul style="list-style-type: none"> <li>» Stop soil erosion at the source</li> </ul>

Activity	Impact summary	Significance	Proposed mitigation
	» Siltation of watercourses downstream	site alternatives)	

NO-GO OPTION			
Construction, operation and decommissioning phase of the solar energy facility	<p><b>Direct impacts:</b></p> <ul style="list-style-type: none"> <li>» <b>Ecological impacts:</b> the no-go option would result in no ecological impact occurring.</li> <li>» <b>Agricultural impacts:</b> The 'do nothing' alternative will result in no impact on the current land use status. Site alternative 1 will likely continue to be used by pedestrians between Phomolong and the R70. Site alternatives 3 could potentially be occupied by informal settlement extending from Phomolong. Site alternative 2 will continue to serve as a grazing area.</li> <li>» <b>Social impacts:</b> The no-go option would result in job opportunities not being realised resulting in further unemployment in the area.</li> <li>» <b>Visual impacts:</b> The visual character of the area would remain unchanged.</li> <li>» <b>Heritage impacts</b> The do-nothing alternative would have no impact on the heritage environment as no development would be undertaken which could potentially impact upon heritage resources.</li> </ul>	Medium (-)	» The no-go option would result in a negative social cost due to the loss of construction phase employment opportunities and operational phase jobs. This could be mitigated by implementing the proposed project.
	<p><b>Indirect impacts:</b></p> <ul style="list-style-type: none"> <li>» The No-Development option would represent a lost opportunity for South Africa to</li> </ul>		



	<p>supplement is 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.</p>		
	<p><b>Cumulative impacts:</b></p> <p>» Contributing to further unemployment and unsustainable ways to produce electricity</p>	Low	» Implementation of the proposed project

**Comparison of Alternatives:**

<b>Alternatives</b>	<b>Preference of Alternatives</b>
Site Alternative 1	<p>» Most preferred from an ecological perspective due to transformed status and shortest power line.</p> <p>» Least preferred from an agricultural perspective due to moderately higher soil capability.</p> <p>» Most preferred from a heritage perspective.</p> <p>» Most preferred from a visual perspective due to:</p> <ul style="list-style-type: none"> <li>○ Least frontage against the R70.</li> <li>○ It is located to one side of Phomolong meaning that a large proportion of the rural outlook will be maintained from all residential areas.</li> </ul> <p>It will minimise the need for additional overhead power lines as it is located immediately adjacent to the Hennenman Rural substation.</p>
Site Alternative 2	<p>» Least preferred from an ecological perspective</p> <p>» Neutral from an agricultural perspective</p> <p>» Neutral from a visual perspective</p> <p>» Not preferred from a heritage perspective</p>
Site Alternative 3	<p>» Neutral from an ecological perspective</p> <p>» Neutral from an agricultural perspective</p> <p>» Not preferred from a heritage perspective</p> <p>» Least preferred from a visual perspective due to proximity to Phomolong</p>

.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.

### Site Alternative 1 (preferred alternative)

This section provides a summary of the environmental assessment and conclusions drawn for the proposed Hennenman 5MW Solar Energy Facility to be constructed on Site Alternative 1. 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 specialist studies undertaken within this Basic Assessment:

- » The overall impact on **ecology** as a result of the construction and operation of the proposed facility on Site Alternative 1 is likely to be of low to medium impact significance. The site for the proposed Solar Energy facility has been mapped to be of low overall ecological sensitivity. No listed or protected plant species were recorded by the ecologist within the development footprint and it is unlikely that any such species are abundant at the site. While there may be some fauna which utilise the area, the extent of the development is not very large and would not constitute a significant loss for these species. Similarly for avifauna, the loss of habitat is not considered significant and the proximity of the development to the Eskom substation would minimise any impacts resulting from the power lines. The proposed development area is considered to be relatively low sensitivity and development in this area is not likely to generate any impacts of broader significance and with standard environmental good practice, no highly significant ecological impacts can be expected to occur.
- » The proposed activity will have a low to medium impact significance on **soils** in the immediate area due. In general site alternative 1 has a higher agricultural potential than site alternative 2 and 3. The loss of agricultural land will however be small due to the small development footprint and the fragmented nature of site alternative 1 situated between the R70 and Phomolong. From this perspective, the site is not considered to be of strategic agricultural importance. The duration, probability and significance of agricultural impacts are regarded to be low.
- » The impacts to **heritage resources** by the proposed development are considered

to be of low significance due to the absence of heritage material on the site.

- » The **visual impact** assessment study concluded that the significance of the visual impact of the proposed development would be medium to low significance. The affected landscape is not pristine and is unlikely to be sensitive to the change associated with the proposed development. The proposed development will add to existing infrastructure that is visible but will not change the overriding character of the area in which it is set, which is that of a rural lowland productive agricultural area.
- » The overall **social** and **socio-economic impact** in terms of positive and negative impacts is likely to be of a low significance 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.

### **Comparison of Alternatives:**

Three site alternatives have been assessed. Site alternative 1, despite presenting nominally higher soil capability than site alternatives 2 and 3, is preferred from an ecological, heritage and visual perspective. It is also the preferred alternative from a technical perspective due to its close proximity to the Hennenman Rural Substation which presents the shortest grid connection.

### **Cumulative Impacts:**

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 **Hennenman 5MW 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 Bluewave Capital SA 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 17GW 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.

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 Hennenman 5MW 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:

### **Preferred alternative:**

Site Alternative 1 has emerged as the most environmentally and technically preferred site alternative considered in this assessment based on the lower overall impacts and shorter power line. Site alternative 2 is considered to be the least ecologically preferred option due to the occurrence of intact grasslands of higher sensitivity not characteristic to the other site alternatives. None of the alternatives are however considered to be fatally flawed as the associated impacts are regarded as tolerable due to nominal increases in impacts due to their limited extent.

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

- » 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 development footprint should be kept to a minimum, and not exceed 19.5ha.
- » Temporary laydown areas should be located within identified previously transformed areas or disturbed areas. These areas should be rehabilitated after use.
- » Reduce and control construction dust through the use of approved dust suppression techniques as and when required (i.e. whenever dust pollution becomes apparent).
- » Rehabilitate all adjacent or peripheral disturbed areas, laydown areas, access roads, etc. immediately after the completion of construction works not lost to the final development footprint in terms of the re-vegetation and habitat rehabilitation plan included in the EMPr. 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.
- » All declared alien plants must be identified and managed in accordance with the Conservation of Agricultural Resources Act (Act No. 43 of 1983), the implementation of a monitoring programme in this regard is recommended.
- » Training, skills development and the use of local labour.

**Mitigation - Operation Phase:**

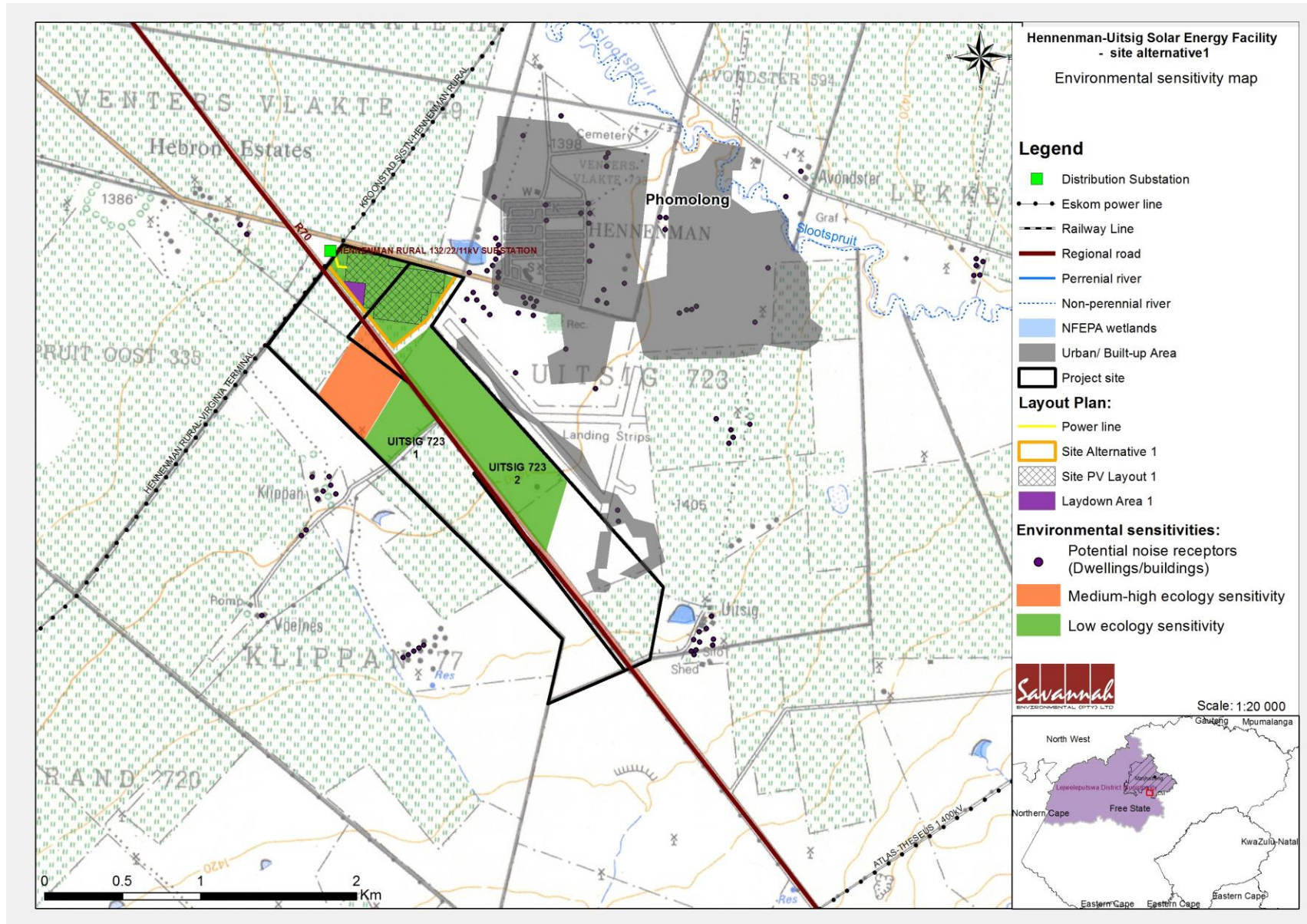
The mitigation and management measures previously listed in this Basic Assessment Report should be implemented in order to minimise potential environmental impacts. The following mitigation measures should also be implemented.

- » Maintenance of erosion control measures
- » Development and implementation of a stormwater 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 8:** Environmental sensitivity overlay of the proposed Hennenman 5MW 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

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