

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

**PROPOSED BOSHOF - LES MARAIS / BUITENFONTEIN
SOLAR ENERGY FACILITY, NEAR BOSHOF, FREE STATE
PROVINCE
(DEA REF No: 14/12/16/3/3/1/1090)**

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

MARCH 2014

Prepared for:

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environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

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File Reference Number:

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Date Received:

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

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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

- Title** : Environmental Basic Assessment Process
Final Basic Assessment Report: Proposed Boshof -
Les Marais / Buitenfontein Solar Energy Facility,
Near Boshof, Free State Province
- Authors** : Savannah Environmental
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(Heritage specialist)
Karen Hansen (Visual specialist)
Johann Lanz (Soil scientist)
Dr John Almond (Palaeontologist)
- Client** : Bluewave Capital SA (Pty) Ltd
- Report Status** : Final Basic Assessment Report for submission to
Department of Environmental Affairs (DEA)

When used as a reference this report should be cited as: Savannah Environmental (2014)
Final Basic Assessment Report: Proposed Boshof - Les Marais / Buitenfontein Solar Energy Facility,
Near Boshof, Free State Province.

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SUMMARY AND OVERVIEW OF THE PROPOSED PROJECT

Bluewave Capital SA (Pty) Ltd (Bluewave Capital), an Independent Power Producer (IPP), 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 south east of the town of Boshof, on the eastern point of the Farm Les Marais 137, in the Free State Province. The proposed project will be referred to as the **Boshof - Les Marais / Buitenfontein Solar Energy Facility**.

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

The facility development footprint will be less than 19.5 ha in extent within which the following infrastructure will be established:

- » Photovoltaic (PV) panels up to 4-6m in height (fixed or tracking technology) with a capacity of up to 5MW.
- » Mounting structures to be either rammed steel piles or piles with pre-manufactured concrete footing to support the PV panels.
- » Cabling between the project components, to be lain in trenches ~ 1-2m deep.
- » Power inverters between the PV arrays ($\pm 4.5\text{m}^2$).
- » Power lines to evacuate the power into the Eskom grid via the existing Bosplaat Rural substation.
- » Main and internal access roads (up to 7m wide).
- » Water storage facilities/ reservoirs ($1\ 000\ \text{m}^3$).
- » Office, workshop area for maintenance and storage (50m^2).
- » During construction (temporary infrastructure) such a laydown area (~1 hectare in extent) will also be required.
- » Fencing.

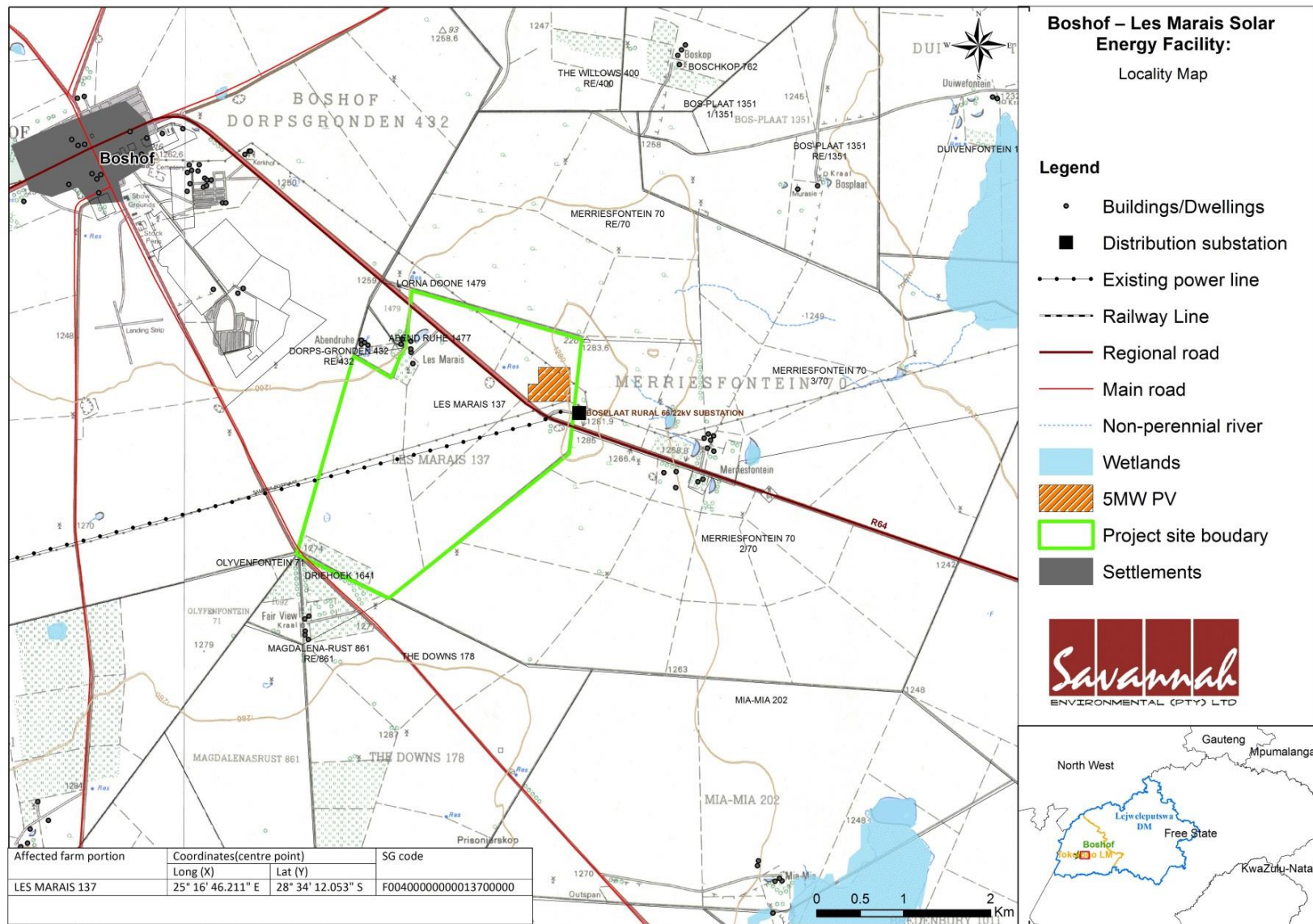


Figure 1: Locality map showing the development area for the proposed Boshof - Les Marais / Buitenfontein Solar Energy Facility

1.1 NEED FOR THE PROPOSED DEVELOPMENT

Critical services needed in the Tokologo Local Municipality include bulk supply of electricity which includes transmission, distribution and where applicable, generation. The Tokologo Local Municipality lists the following objectives in the Integrated Development Plan(IDP):

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

Although the municipality's IDP makes no specific reference to renewable energy, it does advocate the following in order to slow climate change:

- » Reduce emissions of heat trapping gases
- » Increase energy efficiency
- » Use of renewable energy sources like wind, solar and biomass.

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

In addition, the current landuse for the proposed site is grazing. No land on that part of the farm where the PV site is proposed has been cultivated. Current land use across the entire farm is grazing of cattle only. Because of the soil depth and climate constraints the site is only suitable for agricultural use as grazing land. The most viable agricultural land use is the current one of cattle grazing.

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

The current electricity imbalances in South Africa highlight the significant role that renewable energy can play in terms of power supplementation. Given that renewables can generally be deployed in a decentralised manner close to consumers, they offer the opportunity for improving grid strength and supply quality, while reducing expensive transmission and distribution losses. At present, South Africa is some way off from exploiting the diverse gains from renewable energy and from achieving a considerable market share in the industry. In order to meet the long-term goal of a sustainable renewable energy industry, a target of 17.8 GW of renewables by 2030 has been set by the Department of Energy (DoE) within the Integrated Resource Plan (IRP) 2010 and incorporated in the REIPPP 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	The construction of facilities or infrastructure for the generation of electricity where; ii. the electricity output is 10 megawatts or less but the total extend of the facility is covers an area in excess of 1 hectare	The proposed facility will have an export capacity of up to 5 MW and will be constructed over an area larger than 1 hectare in extend.
GN 544, 18 JUNE 2010	10	The construction of facilities or infrastructure for the transmission and distribution of electricity – outside urban areas or industrial complexes with a capacity of more than 33kv but less than 275kv.	The project will require the construction of a new overhead power line (outside an urban area) to connect to the Bosplaat Rural 66/22kV Substation.
GN 544, 18 JUNE 2010	23	The transformation of undeveloped, vacant or derelict land to- ii residential, retail, commercial, recreational, industrial or institutional use, outside an urban area and where the total area to be transformed is bigger than 1 hectare but less than 20 hectares.	The area to be developed for the solar energy facility will be outside an urban area with a footprint greater than 1 hectare and less than 20 hectare in extent.
GN 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 may require the clearance of an area whereby more than 75% of vegetation constitutes indigenous 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 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. 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:

- » Umeshree Naicker, the principle author of this report, holds an Honours Bachelor of Science degree in Environmental Management and has 5 years' experience in environmental management and has undertaken EIAs for a number of proposed solar energy facilities across South Africa, including a number of facilities in the Free State Province.
- » 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:

Specialist Studies Undertaken	Specialists
Ecology Impact Assessment	Simon Todd of Simon Todd Consulting (Ecologist)
Soil and Agricultural Potential Impact Assessment	Johann Lanz (Soil Scientist)
Heritage Impact Assessment	Jaco van der Walt of Heritage Contracts and Archaeological Consulting (Archaeologist)
Palaeontology Desktop Study	Dr John Almond (Palaeontologist)
Visual Impact Assessment	Karen Hansen (Visual specialist)

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

REVIEW OF DRAFT BASIC ASSESSMENT

The Draft Basic Assessment Report was prepared by Savannah Environmental in order to assess the potential environmental impacts associated with the **Boshof - Les Marais / Buitenfontein Solar Energy Facility**. The report was made available for public review at the following places:

- » Boshof Library – Voortrekker Street, Boshof
- » www.savannahSA.com

SECTION A: ACTIVITY INFORMATION

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

NO ✓

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

1. PROJECT DESCRIPTION

Describe the project associated with the listed activities applied for

Bluewave Capital is proposing the development of a small-scale photovoltaic solar energy facility near Boshof in the Free State Province. The project is referred to as the proposed **Boshof - Les Marais / Buitenfontein Solar Energy Facility**. The facility is proposed to be situated on the Farm Les Marais 137 and have a generating capacity of up to 5MW and a development footprint approximately 16ha in extent.

The existing Bosplaat Rural 66/22 kV Substation occurs within 200m from the proposed PV facility site. The solar energy facility will have a development footprint of ~16ha, within which the following typical infrastructure will be established:

- » Photovoltaic (PV) panels up to 4-6m in height (fixed or tracking technology) with a capacity of up to 5MW.
- » Mounting structures to be either rammed steel piles or piles with pre-manufactured concrete footing to support the PV panels.
- » Cabling between the project components, to be laid in trenches ~ 1-2m deep.
- » Power inverters between the PV arrays ($\pm 4.5\text{m}^2$).
- » Power line to evacuate the power into the Eskom grid via the existing Bosplaat Rural substation. ¹
- » Main and internal access roads (up to 7m wide).
- » Water storage facilities/ reservoirs ($1\,000\text{m}^3$).
- » Office, workshop area for maintenance and storage (50m^2).
- » During construction (temporary infrastructure) such a laydown area (~1 hectare in extent) will also be required.
- » Fencing.

An estimated 1.5 to 2 million litres of water would be required for the construction of the PV facility. Water will be trucked from the nearest licenced water user,

¹ Eskom is considering the possibility of decommissioning the 66kV line that feeds the substation and replace the entire system with a feeder line that runs from a new substation to be built on the 132kV line ~12km to the north. The reason could be the capacity constraints of the 66kV line. A 5MW generation facility might bolster the capacity at the substation thereby giving Eskom alternative options.

municipality or abstracted from a suitable borehole. In addition to standard water use for an office and toilets during the operational phase, the PV panels may need to be cleaned. Two cleaning events per year are estimated which should accommodate dust storm events and regular cleaning.

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 1: 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 2: 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' will track the sun from east to west, while a dual axis tracker will in addition be equipped to account for the seasonal waning of the sun. These systems utilise moving parts and complex technology, including solar irradiation sensors to optimise the exposure of PV panels to sunlight. 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, collects 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.

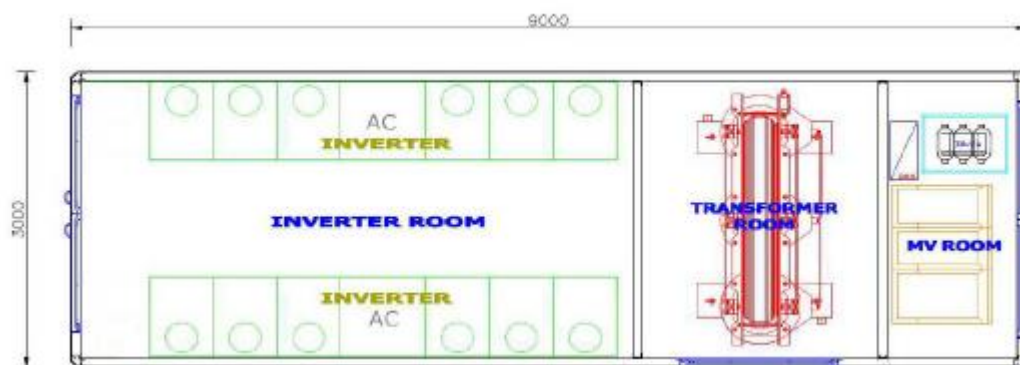


Figure 3: Inverter schematic diagram (courtesy of Bonfiglioli SA)



Figure 4: 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 R64. The site is therefore appropriately located for easy transport of components and equipment as well as labour movement to and from the site. No access road to the proposed site from the R64 currently exists however the length of the access road will be between 50m – 100m depending on the configuration of the layout.

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 250m in length to tie into the existing Bosplaat Rural Substation located within the farm boundaries.

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 Bosplaat 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 33kV overhead power line into the Bosplaat Rural 66/22kV 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 m³) 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	The construction of facilities or infrastructure for the generation of electricity where; ii. the electricity output is 10 megawatts or less but the total extend of the facility is covers an area in excess of 1 hectare	The proposed facility will have an export capacity of up to 5 MW and will be constructed over an area larger than 1 hectare in extend.
GN 544, 18 June 2010	10	The construction of facilities or infrastructure for the transmission and distribution of electricity – outside urban areas or industrial complexes with a capacity of more than 33kv but less than 275kv.	The project will require the construction of a new overhead power line (outside an urban area) to connect to the Bosplaat Rural 66/22kV Substation.
GN 544, 18 June 2010	23	The transformation of undeveloped, vacant or derelict land to- ii residential, retail, commercial, recreational, industrial or	The area to be developed for the solar energy facility will be outside an urban area with a footprint greater than 1 hectare

Notice Number	Activity	Description	Relevance of Regulation to Project
		institutional use, outside an urban area and where the total area to be transformed is bigger than 1 hectare but less than 20 hectares.	and less than 20 hectare 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. (b) Free State i. All areas outside urban areas	The solar energy facility will be located outside urban areas and may 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. Therefore no site alternatives have been considered.

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

Site Extent - space is an important factor for the development of a PV facility. An area of approximately 16 ha would be required for the 5MW facility. 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 R64 requiring only a short access road (between 50m – 160m) in order to access the site. The site is therefore appropriately located for easy transport of components and equipment as well as labour movement to and from the site. The only criteria from the landowner was that the 5MW facility should not fragment other areas of the farm already traversed by the 11/22kV power lines thereby rendering them unviable. Existing farm infrastructure also needed to be avoided. This aspect informed the siting of the 5MW facility.

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 - 66kV power lines currently provide the town of Boshof and surrounding farmers with electricity. 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 Boshof and bolster the local grid during constrained energy supply periods. Grid connection is optimized due to the positioning of the facility adjacent to the Bosplaat Rural Substation, allowing for a short grid connection. Eskom is considering the possibility of decommissioning the 66kV line that feeds the substation and replace the entire system with a feeder line that runs from a new substation to be built on the 132kV line ~12km to the north. The reason could be the capacity constraints of the 66kV line. A 5MW generation facility might bolster the capacity at the substation thereby supplying Eskom with alternative options.

Alternative 1 (S1)		
The proposed Boshof - Les Marais / Buitenfontein Solar Energy Facility is expected to have a developmental footprint (~16ha) which is smaller than the broader site area. Therefore the facility and associated infrastructure (i.e. PV panels, internal roads, etc.) can be appropriately located to avoid sensitive areas within the broader study area. This area 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. No site alternatives for the 5MW PV area are provided for assessment.	Lat 28° 33' 50.98" S	Long 25° 17' 34.44" E
Alternative 2		
Alternative 3		

In the case of linear activities:

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

Linear infrastructure - Route Alternative 1

Power line (~250m)	Latitude (S):			Longitude (E):		
• Starting point of the activity	28°	33'	56.82"	25°	17'	40.88"
• Middle/Additional point of the activity	28°	33'	59.63"	25°	17'	45.70"
• End point of the activity	28°	34'	02.01"	25°	17'	47.05"

Access road (~50m)	Latitude (S):			Longitude (E):		
• Starting point of the activity	28°	33'	57.05''	25 °	17'	23.74''
• Middle/Additional point of the activity						
• End point of the activity	28°	33'	57.11''	25 °	17'	21.69''

Power line Alternative 1:

Two power line route alternatives are included for the PV facility, with existing road and electrical infrastructure on the greater farm portion presenting opportunities for aligning the proposed linear infrastructure with existing linear infrastructure to minimise the potential impacts.

Route Alternative 1 (overhead) will originate at the south eastern point of the PV array and will then run east to connect to the eastern side of the Bosplaat Rural Substation. This route alternative will be approximately 250m in length and the shortest of the route alternatives assessed.

Access road alternative 1:

Route Alternative 1 will originate on the western boundary of the PV facility. The proposed access road between the PV facility and the R64 will be approximately 50m in length.

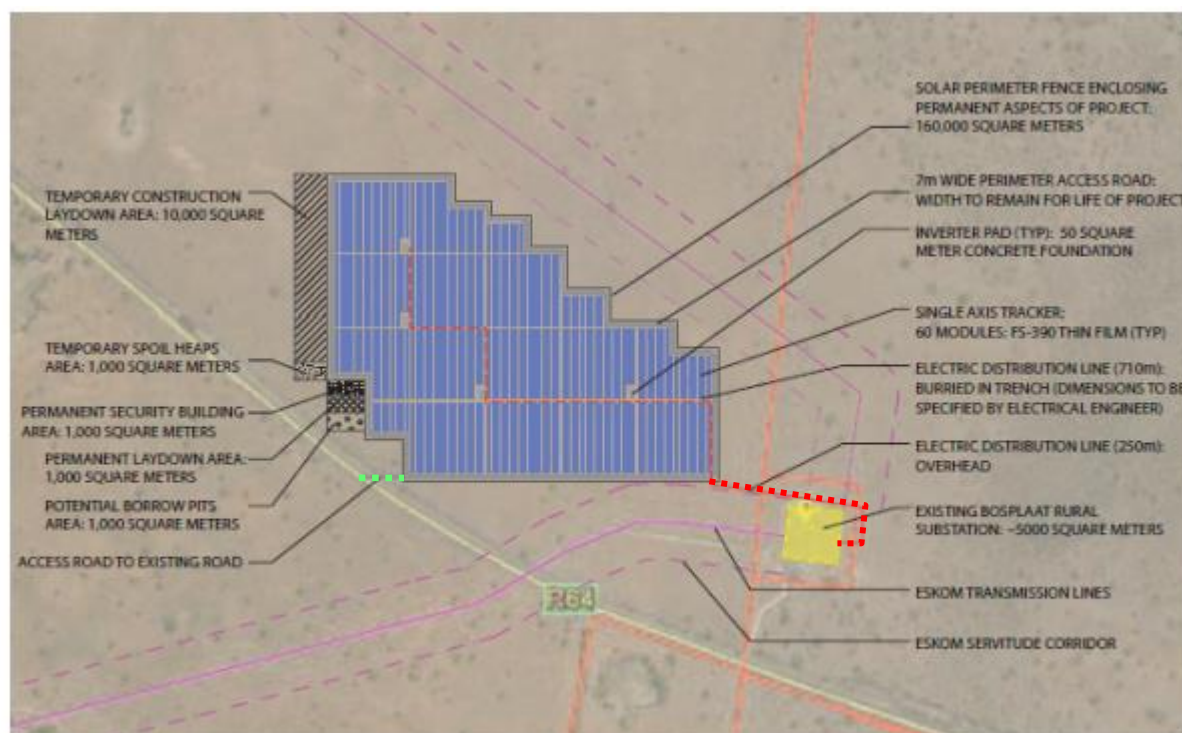


Figure 5: Route Alternative 1 for power line and access road (indicated by red and green line respectively).

Linear infrastructure - Route Alternative 2

Power line (~310m)	Latitude (S):			Longitude (E):		
• Starting point of the activity	28°	33'	56.82''	25°	17'	40.88''
• Middle/Additional point of the activity	28°	34'	03.82''	25°	17'	44.80''
• End point of the activity	28°	34'	02.16''	25°	17'	47.20''
Access road (~165m)	Latitude (S):			Longitude (E):		
• Starting point of the activity	28	33	57.20	25	17	33.31
• Middle/Additional point of the activity	28	34	00.10	25	17	33.45
• End point of the activity	28	34	02.88	25	17	31.91

Power Line Alternative 2:

Power Line Route Alternative 2 (overhead) will originate at the south eastern point of the PV array, and move in a southerly direction before turning east and to the south of the Bosplaat Rural Substation and then diverging north to enter at the eastern boundary of the Bosplaat Rural Substation. This route alternative will be approximately 310m in length.

Access Road Alternative 2:

Access Road Alternative 2 will originate on the southern boundary of the PV facility. The proposed access road between the PV facility and the R64 will be approximately 160m in length.

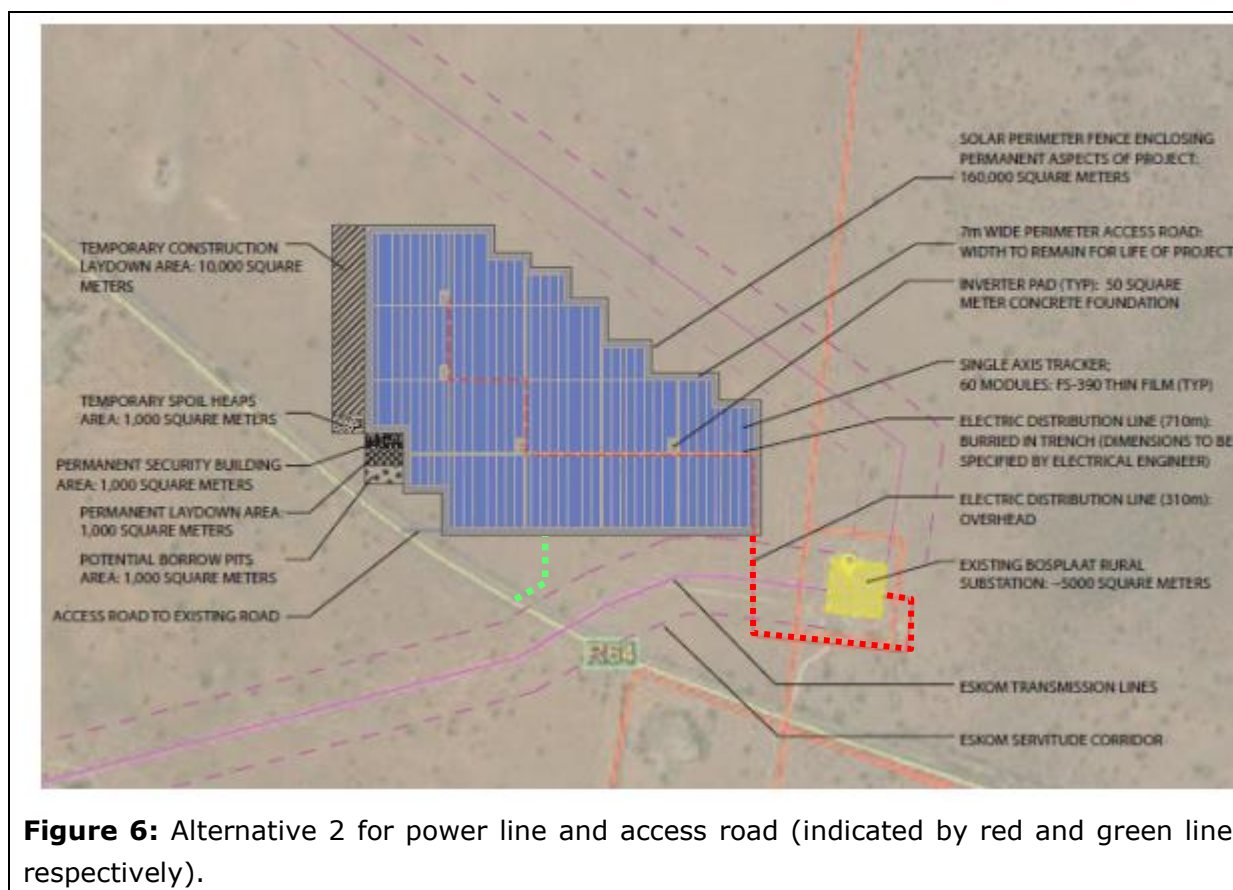


Figure 6: Alternative 2 for power line and access road (indicated by red and green line respectively).

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)
<p>The proposed Boshof - Les Marais / Buitenfontein Solar Energy Facility is expected to have a developmental footprint (~16ha) which is smaller than the broader site.</p> <p>Contiguous rectangular configurations of PV panel arrays are easier to construct. However, the constraints of the land parcel requires several smaller rectangle configurations in order to conform to the farm boundary and not conflict</p>	<p>Lat 28° 33' 50.98" S</p>	<p>Long 25° 17' 34.44" E</p>

<p>with the power lines to the north and south as well as the R64 to the west. 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>		
Alternative 2		
Description	Lat (DDMMSS)	Long (DDMMSS)
Alternative 3		
Description	Lat (DDMMSS)	Long (DDMMSS)

c) Technology alternatives

Alternative 1 (preferred alternative)
<p>As it is the intention of Bluewave Capital to develop renewable energy projects as part of the DoE’s Small-scale (i.e. ≤5MW) Renewable Energy Independent Power Procurement (REIPPP) 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"> » Fixed / static PV panels; » Tracking PV panels (with solar panels that rotate to follow the sun’s movement).
<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)

Alternative 1 (preferred alternative)
<p><i>Operating Alternatives</i></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 Boshof - Les Marais / Buitenfontein 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 A1² (preferred activity alternative)

Alternative A2 (if any)

Alternative A3 (if any)

Size of the activity:

~160 000 m ²
m ²
m ²

or, for linear activities:

Alternative: Power lines

Alternative A1 (preferred activity alternative)

Alternative A2 (if any)

Alternative A3 (if any)

Length of the activity:

Approximately 250 m
Approximately 310 m
m

Alternative: Access roads

Alternative A1 (preferred activity alternative)

Alternative A2 (if any)

Alternative A3 (if any)

Length of the activity:

Approximately 50 m
Approximately 160 m
m

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

Alternative:

Alternative 1 (preferred route)

Alternative 2 (alternative route)

Alternative A3 (if any)

Size of the site/servitude:

Power line- 5 500 m ² (22m X 250m)
Access road – 350m ² (7m x 50m)
Power line- 6 820 m ² (22m X 310m)
Access road– 1120m ² (7m x 160m)
m ²

4. SITE ACCESS

Does ready access to the site exist?

NO

² "Alternative A.." refer to activity, process, technology or other alternatives.

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

Approximately 50 m
or
Approximately 160 m

Describe the type of access road planned:

The identified site is accessible from R64. The proposed access road which will be approximately 7m wide and there are two access alternatives presented from the R64.

Alternative Access Road 1: This gravel access road will enter the PV facility at the south western boundary of the site and be approximately 50m in length.

Alternative Access Road 2: This gravel access road will run parallel to an existing power line to the south of the site before turning north to enter the PV facility at the southern boundary and will be approximately 160m in length.

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**.

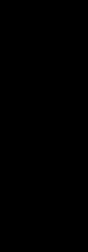


10. ACTIVITY MOTIVATION

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

1. Is the activity permitted in terms of the property's existing land use rights?	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.			
2. Will the activity be in line with the following?			
(a) Provincial Spatial Development Framework (PSDF)	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.			

<p>(b) Urban edge / Edge of Built environment for the area</p>	<p>YES ✓</p>		<p>Please explain</p>
<p>The proposed site is located approximately 5km south east of the town of Boshof in the Free State Province and thus falls outside of the urban edge.</p>			
<p>(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?).</p>	<p>Yes ✓</p>		<p>Please explain</p>
<p>Critical services needed in the Tokologo Local Municipality include bulk supply of electricity which includes transmission, distribution and where applicable, generation. The Tokologo Local Municipality lists the following objectives in the IDP:</p> <ul style="list-style-type: none"> » Creating conditions for economic growth and sustainability; » Improving access to basic services; » Promoting social upliftment through improved education, skills development and job opportunities; » Ensuring cooperative, transparent and democratic governance through community participation and involvement; » Creating a healthy and safe environment; and » Improving sport and recreation facilities. <p>Although the municipality's IDP makes no specific reference to renewable energy, it does advocate the following in order to slow climate change:</p> <ul style="list-style-type: none"> » Reduce emissions of heat trapping gases » Increase energy efficiency » Use of renewable energy sources like wind, solar and biomass. <p>The proposed solar energy facility is in line with the municipality's IDP and it will assist in meeting the set objectives. The solar facility will also create direct and indirect job opportunities that will stimulate local economic growth. The project will not compromise the integrity of the IDP.</p>			
<p>(d) Approved Structure Plan of the Municipality</p>	<p>YES ✓</p>		<p>Please explain</p>
<p>One of the municipality's objectives is to upgrade bulk electricity networks and associated infrastructure. This project will assist with the upgrading of this infrastructure and creating jobs.</p>			

<p>(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?)</p>		<p>NO ✓</p>	<p>Please explain</p>
<p>Tokologo Local Municipality does not have an Environmental Management Framework as a development guiding tool in its jurisdiction. The Free State Department of Tourism and Economic Development is in the process of developing a provincial biodiversity plan.</p>			
<p>(f) Any other Plans (e.g. Guide Plan)</p>	<p>YES</p>	<p>NO</p>	<p>Please explain</p>
<p>N/A</p>			
<p>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)?</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>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.)</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>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.)</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 Tokologo Local Local Municipality are of adequate capacity to absorb the proposed small-scale 5MW PV development.</p> <p>Roads: Access provision from the R64 which traverses the larger farm portion 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 of water for the construction phase. Approximately 500m³ 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>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.)</p>		<p>NO ✓</p>	<p>Please explain</p>
<p>The proposed project is to be developed by a private developer (i.e. Bluewave Capital) 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>7. Is this project part of a national programme to address an issue of national concern or importance?</p>	<p>YES ✓</p>		<p>Please explain</p>
<p>This project is proposed to be developed under the Department of Energy REIPPP 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-</p>			

<p>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>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.)</p>	<p>YES ✓</p>	<p>Please explain</p>
<p>» <i>Site access</i> The identified site is accessible via an existing gravel access road off the R64. 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> The economic viability of a photovoltaic plant is directly dependent on the annual direct solar irradiation values. A study of available radiation data shows that the proposed site is uniformly irradiated by the sun.</p> <p>» <i>Gradient</i> A level surface area is preferred for the installation of PV panels. 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.</p> <p>» <i>Grid Connection</i> 66kV power lines currently provide the town of Boshof and surrounding farmers with electricity. 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 Boshof 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 Bosplaat Rural Substation, allowing for a short grid connection. A connection application has been made to Eskom.</p>		
<p>9. Is the development the best practicable environmental option for this land/site?</p>	<p>YES ✓</p>	<p>Please explain</p>
<p>Electrical infrastructure: The Bosplaat Rural Substation is located adjacent to the proposed PV facility within the greater farm portion. The immediate area around the proposed PV site is already characterised by two overhead power lines to the north and south which feed into the Bosplaat Rural Substation and is therefore 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.</p>		

<p>Agricultural potential: The site has a land capability classification, on the 8 category scale, as Class 5 - non-arable, moderate potential grazing land. The natural grazing capacity of the site is given as 11-13 hectares per large stock unit. From this perspective, the site is not considered to be of strategic agricultural importance.</p> <p>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.</p>		
<p>10. Will the benefits of the proposed land use/development outweigh the negative impacts of it?</p>	<p>YES ✓</p>	<p>Please explain</p>
<p>The negative impacts associated with the proposed activity include impacts on vegetation, soils and land use and are expected to be limited to the development footprint, and are not considered to be of high significance. All impacts can be managed and mitigated to acceptable levels, as outlined in the Environmental Management Programme.</p> <p>Positive impacts associated with the facility include i) an alternative income source for the landowner; ii) generation of electricity from a renewable resource also reduces reliance (albeit limited) on conventional power sources; iii) local economic upliftment and job creation. These positive impacts will extend beyond the boundary of the site and are expected to outweigh the negative impacts.</p>		
<p>11. Will the proposed land use/development set a precedent for similar activities in the area (local municipality)?</p>	<p>NO ✓</p>	<p>Please explain</p>
<p>There are two PV project applications within 25km from the site, being the Wag'nbietjie Span Solar CSP project to the south-west of Boshof and the Rabenthal PV project to the north west of Boshof within the Tolologo Municipality (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>12. Will any person's rights be negatively affected by the proposed activity/ies?</p>	<p>NO ✓</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</p>		

by the construction of the facility are consulted with regards to the proposed project through the EIA process.		
13. Will the proposed activity/ies compromise the “urban edge” as defined by the local municipality?	NO ✓	Please explain
The proposed site is located approximately 5km south east of the town of Boshof in the Free State Province and thus falls outside of the urban edge. The project will not undermine the urban edge in any way.		
14. Will the proposed activity/ies contribute to any of the 17 Strategic Integrated Projects (SIPS)?	YES ✓	Please explain
The proposed activity covers the objectives of Strategic Infrastructure Projects (SIPS) 8, 9 and 10:		
<ul style="list-style-type: none"> • 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) • 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. • SIP 10: Electricity transmission and distribution for all - Expansion of the transmission and distribution network for all and support economic development. 		
15. What will the benefits be to society in general and to the local communities?		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.).		
16. Any other need and desirability considerations related to the proposed activity?		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.		
17. How does the project fit into the National Development Plan for 2030?		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.		
18. Please describe how the general objectives of Integrated Environmental Management as set out in section 23 of NEMA have been taken into account.		
The general objectives of Integrated Environmental Management have been taken into account for this Basic Assessment Report by means of identifying, predicting and evaluating the actual and potential impacts on the environment, socio-economic conditions and cultural heritage component. The risks, consequences, alternatives as		

well as options for mitigation of activities have also been considered with a view to minimise negative impacts, maximise benefits, and promote compliance with the principles of environmental management.

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

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

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

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

These principles of sustainable development is further taken into account by including measures within the Environmental Management Programme (EMPr) to mitigate impacts that may occur thereby further reducing the environmental impacts. The EMPr would provide mitigation measures in terms of disturbance to ecosystems, loss of biodiversity, pollution and degradation to the environment, waste and 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 Boshof - Les Marais / Buitenfontein Solar Energy Facility.

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

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

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
<p>Minerals and Petroleum Resources Development Act (Act No 28 of 2002)</p>	<p>prevent and remedy the effects of pollution to water resources from occurring, continuing, or recurring.</p> <p>A mining permit or mining right may be required where a mineral in question is to be mined (e.g. materials from a borrow pit) in accordance with the provisions of the Act. Requirements for Environmental Management Programmes and Environmental Management Plans are set out in S39 of the Act.</p> <p>S53 Department of Mineral Resources: Approval from the Department of Mineral Resources (DMR) may be required to use land surface contrary to the objects of the Act in terms of section 53 of the Mineral and Petroleum Resources Development Act, (Act No 28 of 2002): In terms of the Act approval from the Minister of Mineral Resources is required to ensure that proposed activities do not sterilise a mineral resources that might occur on site</p>	<p>Affairs</p> <p>Department of Mineral Resources</p>	<p>construction phase (i.e. pollution from construction vehicles).</p> <p>As no borrow pits are expected to be required for the construction of the facility, no mining permit or right is required to be obtained.</p> <p>A Section 53 application will be submitted the Free State DMR office by the applicant.</p>
<p>National Environmental Management: Air Quality Act (Act No 39 of 2004)</p>	<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>	<p>Department of Environmental Affairs</p>	<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</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
<p>National Heritage Resources Act (Act No 25 of 1999)</p>	<p>S38 states that Heritage Impact Assessments (HIAs) are required for certain kinds of development including:</p> <ul style="list-style-type: none"> » The construction of a road, power line, pipeline, canal or other similar linear development or barrier exceeding 300 m in length; and » Any development or other activity which will change the character of a site exceeding 5 000 m² in extent. <p>Stand alone HIAs are not required where an EIA Process is carried out as long as the EIA contains an adequate HIA component that fulfils the provisions of S38. In such cases only those components not addressed by the EIA should be covered by the heritage component.</p>	<p>South African Heritage Resources Agency</p> <p>Free State Heritage Resources</p>	<p>the Act.</p> <p>A permit may be required should identified cultural/heritage sites on site be required to be disturbed or destroyed as a result of the proposed development.</p> <p>A HIA has been undertaken as part of the Basic Assessment Process to identify heritage sites. The Middle Stone Age artefacts found are considered to be of low significance. See Appendix D2.</p>
<p>National Environmental Management: Biodiversity Act (Act No 10 of 2004)</p>	<p>In terms of S57, the Minister of Environmental Affairs has published a list of critically endangered, endangered, vulnerable, and protected species in GNR 151 in Government Gazette 29657 of 23 February 2007 and the regulations associated therewith in GNR 152 in GG29657 of 23 February 2007, which came into effect on 1 June 2007.</p> <p>In terms of GNR 152 of 23 February 2007: Regulations relating to listed threatened and protected species, the relevant specialists</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),</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>must be employed during the EIA Phase of the project to incorporate the legal provisions as well as the regulations associated with listed threatened and protected species (GNR 152) into specialist reports in order to identify permitting requirements at an early stage of the EIA Phase.</p> <p>The Act provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (G 34809, GoN 1002), 9 December 2011).</p>		<p>endangered (EN), vulnerable (VU) or protected ecosystems and the potential for them to be affected has been considered, this report is contained in Appendix D 1.</p>
<p>Conservation of Agricultural Resources Act (Act No 43 of 1983)</p>	<p>Regulation 15 of GNR1048 provides for the declaration of weeds and invader plants, and these are set out in Table 3 of GNR1048. Weeds are described as Category 1 plants, while invader plants are described as Category 2 and Category 3 plants. These regulations</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</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>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>control and management plan must be implemented.</p> <p>The permission of agricultural authorities will be required if the Project requires the draining of vleis, marshes or water sponges on land outside urban areas.</p>
<p>National Forests Act (Act No. 84 of 1998)</p>	<ul style="list-style-type: none"> » 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”. » GN 1042 provides a list of protected tree species. 	<p>National Department of Forestry</p>	<p>A permit would need to be obtained for any protected trees that are affected by the development.</p>
<p>National Veld and Forest Fire Act (Act 101 of 1998)</p>	<p>In terms of S21 the applicant would be obliged to burn firebreaks to ensure that should a veldfire occur on the property, that it does not spread to adjoining land.</p> <p>In terms of S12 the applicant must ensure that the firebreak is wide and long enough to have a reasonable chance of preventing the fire from spreading, not causing erosion, and is reasonably free of inflammable material.</p>	<p>Department of Water Affairs</p>	<p>While no permitting or licensing requirements arise from this legislation, and this Act will find application during the construction and operational phase of the project.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
<p>Hazardous Substances Act (Act No 15 of 1973)</p>	<p>In terms of S17, the applicant must have such equipment, protective clothing, and trained personnel for extinguishing fires.</p> <p>This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products.</p> <p>Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc, nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance Group IV: any electronic product; and Group V: any radioactive material.</p> <p>The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.</p>	<p>Department of Health</p>	<p>It is necessary to identify and list all the Group I, II, III, and IV hazardous substances that may be on the site and in what operational context they are used, stored or handled. If applicable, a license is required to be obtained from the Department of Health.</p>
<p>Development Facilitation Act (Act No 67 of 1995)</p>	<p>Provides for the overall framework and administrative structures for planning</p>	<p>Local Municipality</p>	<p>The applicant must submit a land development application in the</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>throughout the Republic.</p> <p>S(2 - 4) provide general principles for land development and conflict resolution.</p>	<p>District Municipality</p>	<p>prescribed manner and form as provided for in the Act. A land development applicant who wishes to establish a land development area must comply with procedures set out in the Act.</p>
<p>Subdivision of Agricultural Land Act (Act No 70 of 1970)</p>	<p>Details land subdivision requirements and procedures. Applies for subdivision of all agricultural land in the province</p>	<p>Local Municipality District Municipality</p>	<p>The land will be leased by the municipality and no subdivision application will be submitted.</p>
<p>National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)</p>	<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"> » Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. <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>	<p>National Department of Water and Environmental Affairs</p> <p>Provincial Department of Environmental Affairs (general waste)</p>	<p>As no waste disposal site is to be associated with the proposed project, no permit is required in this regard.</p> <p>Waste handling, storage and disposal during construction and operation is required to be undertaken in accordance with the requirements of the Act, as detailed in the EMP (refer to Appendix G).</p> <p>The volumes of waste to be generated and stored on the site during construction and operation of the facility will not require a waste license (provided these remain below the prescribed thresholds).</p> <ul style="list-style-type: none"> » in excess of 100m³ of general waste » in excess of 35m³ of hazardous waste

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<ul style="list-style-type: none"> » The containers in which any waste is stored, are intact and not corroded or in » any other way rendered unfit for the safe storage of waste. » Adequate measures are taken to prevent accidental spillage or leaking. » The waste cannot be blown away. » Nuisances such as odour, visual impacts and breeding of vectors do not arise; and » Pollution of the environment and harm to health are prevented. 		
<p>National Road Traffic Act (Act No 93 of 1996)</p>	<ul style="list-style-type: none"> » 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. » 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. » The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also 	<ul style="list-style-type: none"> » South African National Roads Agency Limited (national roads) » Provincial Department of Transport 	<ul style="list-style-type: none"> » 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. » Transport vehicles exceeding the dimensional limitations (length) of 22m. » Depending on the trailer configuration and height when loaded, some of the substation components may not meet specified dimensional limitations (height and width).

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.		
Provincial Legislation			
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	Only <i>Boophone disticha</i> was observed at the site and is restricted to the rocky ridge and would not be impacted by the development. Although <i>Acacia erioloba</i> is common in the broader area.

12. WASTE, EFFLUENT, EMISSION AND NOISE MANAGEMENT

a) Solid waste management

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

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

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

It is anticipated that construction waste will be disposed of at the 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 Landfill (to be confirmed in consultation with the municipality).

Will the activity produce solid waste during its operational phase?

	NO ✓
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If YES, what estimated quantity will be produced per month?

n/a

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)?

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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 ³
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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:

Facility name:			
Contact person:			
Postal address:			
Postal code:			
Telephone:		Cell:	
E-mail:		Fax:	

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?

	NO ✓

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?

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

e) Generation of noise

Will the activity generate noise?

	NO ✓

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):

Municipal ✓	Water board	Groundwater	River, stream, dam or lake	Other	The activity will not use water
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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?

	NO ✓

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:

Province	Free State Province
District Municipality	Lejeweleputswa District Municipality
Local Municipality	Tokologo Local Municipality
Ward Number(s)	2
Farm name and number	Farm Les Marais 137
Portion number	RE/137
SG Code	F00400000000013700000

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) - Soils are predominantly shallow soils on underlying rock (or rock outcrops) with interspersed pockets of deeper Hutton soils between them.

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 ✓	
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1. GRADIENT OF THE SITE

Indicate the general gradient of the site.

Alternative S1:

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

Alternative S2 (if any):

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

Alternative S3 (if any):

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

2. LOCATION IN LANDSCAPE

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

2.1 Ridgeline	<input type="checkbox"/>	2.4 Closed valley	<input type="checkbox"/>	2.7 Undulating plain / low hills	<input type="checkbox"/>
2.2 Plateau	<input type="checkbox"/>	2.5 Open valley	<input type="checkbox"/>	2.8 Dune	<input type="checkbox"/>
2.3 Side slope of hill/mountain	<input type="checkbox"/>	2.6 Plain	<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)		NO	YES	NO	YES	NO
Dolomite, sinkhole or doline areas		NO	YES	NO	YES	NO
Seasonally wet soils (often close to water bodies)		NO	YES	NO	YES	NO
Unstable rocky slopes or steep slopes with loose soil		NO	YES	NO	YES	NO
Dispersive soils (soils that dissolve in water)		NO	YES	NO	YES	NO

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

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

4. GROUND COVER

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

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

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

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

5. SURFACE WATER

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

Perennial River	NO ✓
Non-Perennial River (Drainage lines)	NO ✓
Permanent Wetland	NO ✓
Seasonal Wetland	NO ✓
Artificial Wetland	NO ✓

Estuarine / Lagoonal wetland		NO✓	
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If any of the boxes marked YES or UNSURE is ticked, please provide a description of the relevant watercourse.

N/A

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:

Natural area ✓	Dam or reservoir	Polo fields
Low density residential	Hospital/medical centre	Filling station ^H
Medium density residential	School	Landfill or waste treatment site
High density residential	Tertiary education facility	Plantation
Informal residential ^A	Church	Agriculture ✓
Retail commercial & warehousing	Old age home	River, stream or wetland✓ (Drainage Line)
Light industrial	Sewage treatment plant ^A	Nature conservation area
Medium industrial ^{AN}	Train station or shunting yard ^N	Mountain, koppie or ridge
Heavy industrial ^{AN}	Railway line ^N ✓	Museum
Power station	Major road (4 lanes or more) ^N	Historical building
Office/consulting room	Airport ^N	Protected Area
Military or police base/station/compound	Harbour	Graveyard
Spoil heap or slimes dam ^A	Sport facilities	Archaeological site
Quarry, sand or borrow pit	Golf course	Other land uses: 1. An existing power line (Samaria-Bosplaat) bisects the property. 2. The R64 is traverses the property

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:

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

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

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

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

7. CULTURAL/HISTORICAL FEATURES

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

NO✓

A specialist heritage study was conducted. The only archaeological remains consist of highly weathered MSA "scatters" (MSA 1 - 5) located on the northern periphery of the development footprint. This occurrence is of low significance as they consist of ex situ material with no stratigraphy and no further mitigation is required for this aspect. Apart from the Stone Age component, no buildings exist on the site and no cultural landscape elements were noted.

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

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

NO ✓

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

NO ✓

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

PALAEONTOLOGY

A paleontological study was commissioned by Heritage Contracts and Archaeological Consulting CC by Dr John Almond. He indicated that the area is part of the Kimberley sheet area and that the study area is underlain by dolerite, calcrete as well as Tierberg Formation (Ecca Group).

Large portions of the broader study area of the proposed Boshof - Les Marais / Buitenfontein Solar Energy Facility are underlain by Permian basinal mudrocks of the Tierberg Formation (Ecca Group) and Late Caenozoic calcretes and pan sediments. However, the proposed solar facility development site is underlain by Early Jurassic intrusive igneous rocks of the Karoo Dolerite Suite that are entirely unfossiliferous. The palaeontological potential for the proposed PV site is therefore considered to be low.

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:

Overview of level of unemployment in the Tokologo Local Municipality

Employment Status:

Population group	AFRICAN		WHITE		COLOURED		INDIAN		TOTALS
	F	M	F	M	F	M	F	M	
Gender									
Status –employed	2330	4630	380	766	175	460	0	3	8774
Unemployed	1797	1151	9	19	155	75	0	0	3206
Economically not achieved	4439	2494	562	150	373	175	0	0	8193

Unemployment rate is 38.9 %

(Source: Tokologo Local Municipality)

Economic profile of local municipality:

Most commercial and industrial activities are situated in Boshof itself and the CBD of Boshof can be broadly demarcated between Oranje, Fourie and Fontein streets. Primary activities in Boshof are restricted to agriculture which includes livestock farming, game farming and crop farming. The commercial sector mainly consists of service provision to the agricultural community in the rural hinterland.

Level of education:

With regard to education levels, the portion of the population older than 20 years without formal education is 20.80%, while only 5.10% of the portion of the population has a higher education. Only 17.80 % 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?	YES ✓
Is the activity a public amenity?	NO ✓
How many new employment opportunities will be created in the development and construction phase of the activity/ies?	Approximately 80 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. Information is also available on compact disc (cd) from the Biodiversity-GIS Unit, Ph (021) 799 8698. This information may be updated from time to time and it is the applicant/ EAP's responsibility to ensure that the latest version is used. A map of the relevant biodiversity information (including an indication of the habitat conditions as per (b) below) and must be provided as an overlay map to the property/site plan as **Appendix D** to this report.

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

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

b) Indicate and describe the habitat condition on site

Habitat Condition	Percentage of habitat condition class (adding up to 100%)	Description and additional Comments and Observations (including additional insight into condition, e.g. poor land management practises, presence of quarries, grazing, harvesting regimes etc).
Natural	95%	The open plains where the development area itself is located is characterised by occasional scattered trees of <i>Searsia lancea</i> and <i>Acacia tortillis</i> with a grassy ground layer dominated by <i>Themeda triandra</i> , <i>Eragrostis lehmanniana</i> , <i>Eragrostis superba</i> , <i>Aristida canescens</i> and <i>Tragus koelerioides</i> . Low shrubs are also relatively common and dominated by <i>Lycium cinereum</i> , <i>Chrysocoma ciliata</i> , <i>Hertia pallens</i> and <i>Selago saxatilis</i> . The open plains habitat is relatively

Habitat Condition	Percentage of habitat condition class (adding up to 100%)	Description and additional Comments and Observations (including additional insight into condition, e.g. poor land management practises, presence of quarries, grazing, harvesting regimes etc).
		homogenous and apart from some variation in the density of trees, there is little variation in cover or composition across the study area within this habitat type. No listed species were observed during the site visit in this habitat, but conditions on the site were dry during the time of the site visit and any such species present may have been dormant. This habitat is not considered highly sensitive and of the different habitats present at the site would be most suitable as the receiving environment for the development, which is indeed the case.
Near Natural (includes areas with low to moderate level of alien invasive plants)	0%	
Degraded (includes areas heavily invaded by alien plants)	5%	Alien plant species abundance at the site was low. The only alien species observed at the site were a few individuals of <i>Opuntia humifusa</i> and a single pepper tree <i>Schinus molle</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.

Terrestrial Ecosystems		Aquatic Ecosystems		
Ecosystem threat status as per the National Environmental Management:	Critical	Wetland (including rivers, depressions, channelled and unchannelled wetlands, flats, seeps pans, and artificial wetlands)	Estuary	Coastline
	Endangered			
	Vulnerable			
	Least			

Terrestrial Ecosystems		Aquatic Ecosystems			
Biodiversity Act (Act No. 10 of 2004)	Threatened ✓	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)

According to the national vegetation map (Mucina & Rutherford 2006), there are two vegetation types present within the broader site, Kimberly Thornveld and Western Free State Clay Grassland. Within the vicinity of the proposed development area, only Kimberly Thornveld is present. Kimberly Thornveld is an extensive vegetation type that occupies 19 512 km² of the Northern Cape, Free State and North-West province, within the Kimberly, Hartswater, Bloemhof and Hoopstad districts as well as substantial parts of the Warrenton, Christiana, Taung, Boshof and Barkley West districts. The vegetation type consists of open or irregular plains with a with developed tree layer of *Acacia erioloba*, *Acacia tortillis*, *Acacia karoo* and *Boscia albitrunca* with a well developed shrubs layer including occasional dense stands of *Tarchonanthus champhoratus* and *Acacia mellifera*. Kimberly Thornveld is usually associated with deep sandy to loamy soils of the Hutton soil form on the Ae and Ah land types.

Kimberly Thornveld is classified as Least Threatened and 82.3% of the original extent is still intact, transformation for cultivation being the primary impact to date. Only 2% is however formally conserved. Important and dominant species usually characteristic of this vegetation type include trees such as *Acacia erioloba*, *Acacia karoo*, *Acacia mellifera*, *Acacia tortilis*, *Searsia lancea*, *Tarchonanthus camphoratus*, *Ehretia rigida* and *Grewia flava*; shrubs such as *Lycium hirsutum*, *Lycium cinereum*, *Rhus tridactyla*, *Acacia hebeclada*, *Hermannia comosa* and *Melolobium mincrophyllum*; grasses such as *Eragrostis lehmanniana*, *Aristida canescens*, *Cymbopogon pospischilli*, *Digitaria eriantha*, *Enneapogon cenchroides*, *Heteropogon contortus*, *Themeda triadra*. Biogeographically important species which are endemic to the region include *Blepharis marginata*, *Euphorbia bergii*, *Panicum kalaharensense*, *Lithops aucampiae* subsp *aucampiae*, *Helichrysum arenicola*, *Neuradopsis bechuanensis* and *Tridentea marientalensis* subsp *marientalensis*.

SECTION C: PUBLIC PARTICIPATION

1. ADVERTISEMENT AND NOTICES

Publication name	Volksblad (Afrikaans) and Snuffelblad (English)	
Date published	18 November 2013 and 22 November 2013 respectively 06 December 2013 (Afrikaans)	
Site notice position	Latitude	Longitude
	28° 33' 56.82" S	25° 17' 22.25" E
	27° 34' 06.69" S	25° 17' 42.61" E
Date placed	18 November 2013	

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

2. DETERMINATION OF APPROPRIATE MEASURES

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

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

- » Site notices were placed at the farm entrance gate.
- » Adverts were placed in the Volksblad (Regional newspaper) and Snuffelblad (local newspapers) to notify the public of the proposed project.
- » A Background Information Document (BID) was placed on the website: www.savannahsa.com.

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

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

3. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

Summary of main issues raised by I&APs	Summary of response from EAP
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Acknowledgment Letters Received From Organs Of State

- » Department of Agriculture, Forestry & Fisheries (DAFF)
- » Department of Water Affairs (DWA) – development accepted and approval recommended.
- » South African National Roads Agency (SANRAL)

Impacts On Eskom Infrastructure

- » Eskom (Management Group Capital: Land Development)

Heritage Impacts

- » Andrew Salomon (Heritage Officer: Archaeology South African Heritage Resources Agency (SAHRA)

As there is apparently no evidence of any significant archaeological or palaeontological material in this area, the SAHRA Archaeology, Palaeontology and Meteorites Unit has no objection to the development on condition that, if any new evidence of archaeological sites or artefacts, palaeontological fossils, graves or other heritage resources is found during development, SAHRA and an archaeologist and/or palaeontologist, depending on the nature of the finds, must be alerted immediately.

- » Free State Department of Police, Roads & Transport
The Department supports the above-mentioned solar energy facility subject to conditions (refer to Comments and Responses Report)

- » Free State: The department of Economic, Development, Tourism and Environmental Affairs
The department has no objection to the proposed project, provided the mitigation measures in the Environmental Management Programme are adhered to.

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
- Tokologo Local Municipality
- Lejweleputswa District Municipality
- SANRAL
- Eskom
- Square Kilometre Array (SKA)
- Department of Energy
- National Department of Agriculture, Forestry and Fisheries
- Department of Water Affairs
- 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 Heuningspruit PV 1 Facility is provided in the table overleaf.

Activity	Impact summary	Significance	Proposed mitigation
CONSTRUCTION			
Linear Infrastructure (road and power line) Alternative 1			
Ecological impacts			
GN R.544 Item 1(ii): The proposed 5MW PV facility would be less than 10MW in capacity but cover an area greater than 1 hectare but less than 20 hectares GN R.544 Item 10(i): The project will require the construction of a new overhead power line (outside an urban area) to connect to the Bosplaat Rural 66/22kV Substation. GN R.544 Item 23(ii): The site is outside urban areas, and the proposed facility will have a footprint of more than 1 hectare but less than 20 hectares. GN R.546 Item 14a(i): The solar energy facility will be located outside urban areas and may require the clearance of an area whereby more than 75% of vegetation constitutes indigenous vegetation			
Vegetation clearing and construction activity	Direct impacts: » Negative impact on vegetation & listed plant species	Low	» Avoid sensitive areas such as the rocky ridge » Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared. » All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed. » Temporary lay-down areas should be located within previously transformed areas.
	Negative faunal impact due to disturbance, transformation and loss of habitat	Low	» Site access should be controlled and no unauthorized persons should be allowed onto the site. » Any fauna directly threatened by the construction activities should be removed to a safe location by the ECO or other suitably qualified person. » The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the demarcated construction site. » Fires should not be allowed on site. » No fuel wood collection should be allowed on-site. » No dogs should be allowed on site. » If the site must be lit at night for security purposes,

Activity	Impact summary	Significance	Proposed mitigation
			this should be done with low-UV type lights (such as most LEDs), which do not attract insects. » All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. » All construction vehicles should adhere to a low speed limit to avoid collisions with susceptible species such as snakes and tortoises.
	Indirect impacts: » Increased erosion risk as a result of soil disturbance and loss of vegetation cover during construction.	Low	» All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk. » During construction, runoff from the site should be bunded and should not be allowed to enter local drainage systems.
	Cumulative impacts: » Possible erosion of areas lower than the access road, possible contamination of lower-lying drainage lines due to oil or other spillage, » Possible spread and establishment of alien invasive species » Possible excessive fragmentation and thus reduction of core habitats that may negatively influence species population viability.	Low	» Cumulative impacts of developments on population viability of species can be reduced significantly if new developments are kept as close as possible to existing developed areas or, where such is not possible, different sections of a development be kept as close together as possible.
<u>Visual Impacts</u>			
GN R.544 Item 1(ii): The proposed 5MW PV facility would be less than 10MW in capacity but cover an area greater than 1 hectare but less than 20			

Activity	Impact summary	Significance	Proposed mitigation
hectares GN R.544 Item 10(i): The project will require the construction of a new overhead power line (outside an urban area) to connect to the Bosplaat Rural 66/22kV Substation. GN R.544 Item 23(ii): The site is outside urban areas, and the proposed facility will have a footprint of more than 1 hectare but less than 20 hectares.			
Construction and operation of the PV array, access roads and associated infrastructure.	Direct impacts: » 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.	Medium	» 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.
	Indirect impacts: » Hauling and delivery of construction materials regularly on local roads during contract period	Medium	» Operate site within construction industry management guidelines, time limit on contract period.
	Cumulative impacts: » None		» None
<u>Soil & Agricultural Impacts</u>			
GN R.544 Item 1(ii): The proposed 5MW PV facility would be less than 10MW in capacity but cover an area greater than 1 hectare but less than 20 hectares GN R.544 Item 10(i): The project will require the construction of a new overhead power line (outside an urban area) to connect to the Bosplaat Rural 66/22kV Substation. GN R.544 Item 23(ii): The site is outside urban areas, and the proposed facility will have a footprint of more than 1 hectare but less than 20 hectares.			
Site clearing and construction of development footprint infrastructure Direct occupation of land by footprint of energy facility infrastructure	Direct impacts: » Loss of agricultural land use	Low	» No mitigation possible
	» Soil erosion caused by alteration of run-off characteristics due to panel surfaces and access roads and having the effect of loss and deterioration of soil resources.	Low	Implement an effective system of run-off control which collects and disseminates run-off water from hardened surfaces and prevents potential down slope erosion. This should be in place and maintained during all phases of the development.
	» Loss of topsoil caused by poor topsoil	Low	» Strip and stockpile topsoil from all areas where soil

Activity	Impact summary	Significance	Proposed mitigation
	management (burial, erosion, etc) during construction related soil profile disturbance (levelling, excavations, disposal of spoils from excavations etc.)		will be disturbed. » After cessation of disturbance, re-spread topsoil over the surface. » Dispose of any sub-surface spoils from excavations where they will not impact on agricultural land, or where they can be effectively covered with topsoil.
	Indirect impacts: » None		N/A
	Cumulative impacts: » 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.	Low	» No mitigation required
<u>Social impacts</u>			
GN R.544 Item 1(ii): The proposed 5MW PV facility would be less than 10MW in capacity but cover an area greater than 1 hectare but less than 20 hectares GN R.544 Item 10(i): The project will require the construction of a new overhead power line (outside an urban area) to connect to the Bosplaat Rural 66/22kV Substation. GN R.544 Item 23(ii): The site is outside urban areas, and the proposed facility will have a footprint of more than 1 hectare but less than 20 hectares.			
Construction phase (Including all related infrastructure such as power lines, access roads, office and warehouse components)	Direct impacts: Positive social impacts: » Creation of employment and business opportunities. Potential negative impacts: » Influx of construction workers employed on the project to the area and impact on hospitality sector; » Increased risk of stock theft, poaching and	Medium - Low	» 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.

Activity	Impact summary	Significance	Proposed mitigation
	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; » Loss of agricultural land associated with construction related activities.		
	Indirect impacts: » 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 operational phase of the project.
	Cumulative impacts: » Impacts on family and community relations » 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.	Low	» Attention should be given to the extension and improvement of the existing HIV/Aids awareness programmes in the area.
<i>Heritage impacts</i>			
GN R.544 Item 1(ii): The proposed 5MW PV facility would be less than 10MW in capacity but cover an area greater than 1 hectare but less than 20 hectares GN R.544 Item 10(i): The project will require the construction of a new overhead power line (outside an urban area) to connect to the Bosplaat Rural 66/22kV Substation.			
Construction and operation of the PV	Direct impacts: » During the construction phase earthworks	Low	» The MSA occurrence is of low significance and no further action is necessary.

Activity	Impact summary	Significance	Proposed mitigation
array, access roads and associated infrastructure.	might impact on the recorded artefacts. » The only archaeological remains consist of highly weathered Middle Stone Age (MSA) "scatters" (MSA 1 - 5) located on the northern periphery of the development footprint. This occurrence is of low significance as they consist of ex situ material with no stratigraphy and no further mitigation is needed for this aspect.		
	Indirect impacts: » None		» None
	Cumulative impacts: » The loss of a number of archaeological sites.		» None
<u>Palaeontology impacts</u>			
GN R.544 Item 1(ii): The proposed 5MW PV facility would be less than 10MW in capacity but cover an area greater than 1 hectare but less than 20 hectares GN R.544 Item 10(i): The project will require the construction of a new overhead power line (outside an urban area) to connect to the Bosplaat Rural 66/22kV Substation.			
Construction and operation of the PV array, access roads and associated infrastructure.	Direct impacts: The broader study area near Boshof is generally of medium to low palaeontological sensitivity. However, the proposed development footprint lies within the Karoo dolerite outcrop area that is of very low palaeontological sensitivity. » Any damage that occurs to fossil material during the excavation and construction phase of the project would be permanent and irreversible.	Low	» Any substantial fossil remains (e.g. stromatolites, fossil shells, petrified wood or plant remains, vertebrate bones, teeth) encountered during excavation should be reported to SAHRA.
	Indirect impacts:		» None

Activity	Impact summary	Significance	Proposed mitigation
	None		
	<p>Cumulative impacts:</p> <ul style="list-style-type: none"> » The loss of a number of palaeontological findings. 	Low	» None
Linear Infrastructure (road and power line) Alternative 2			
Ecological impacts			
<p>GN R.544 Item 1(ii): The proposed 5MW PV facility would be less than 10MW in capacity but cover an area greater than 1 hectare but less than 20 hectares GN R.544 Item 10(i): The project will require the construction of a new overhead power line (outside an urban area) to connect to the Bosplaat Rural 66/22kV Substation. GN R.544 Item 23(ii): The site is outside urban areas, and the proposed facility will have a footprint of more than 1 hectare but less than 20 hectares. GN R.546 Item 14a(i): The solar energy facility will be located outside urban areas and may require the clearance of an area whereby more than 75% of vegetation constitutes indigenous vegetation</p>			
Vegetation clearing and construction activity	<p>Direct impacts:</p> <ul style="list-style-type: none"> » Negative impact on vegetation & listed plant species 	Low	<ul style="list-style-type: none"> » Avoid sensitive areas such as the rocky ridge » Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared. » All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed. » Temporary lay-down areas should be located within previously transformed areas.
	Negative faunal impact due to disturbance, transformation and loss of habitat	Low	<ul style="list-style-type: none"> » Site access should be controlled and no unauthorized persons should be allowed onto the site. » Any fauna directly threatened by the construction activities should be removed to a safe location by the ECO or other suitably qualified person. » The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the demarcated construction site.

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

Activity	Impact summary	Significance	Proposed mitigation
	reduction of core habitats that may negatively influence species population viability.		
<u>Visual Impacts</u>			
GN R.544 Item 1(ii): The proposed 5MW PV facility would be less than 10MW in capacity but cover an area greater than 1 hectare but less than 20 hectares GN R.544 Item 10(i): The project will require the construction of a new overhead power line (outside an urban area) to connect to the Bosplaat Rural 66/22kV Substation. GN R.544 Item 23(ii): The site is outside urban areas, and the proposed facility will have a footprint of more than 1 hectare but less than 20 hectares.			
Construction and operation of the PV array, access roads and associated infrastructure.	Direct impacts: » 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.	Medium	» 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.
	Indirect impacts: » Hauling and delivery of construction materials regularly on local roads during contract period	Medium	» Operate site within construction industry management guidelines, time limit on contract period.
	Cumulative impacts: » None		» None
<u>Soil & Agricultural Impacts</u>			
GN R.544 Item 1(ii): The proposed 5MW PV facility would be less than 10MW in capacity but cover an area greater than 1 hectare but less than 20 hectares GN R.544 Item 10(i): The project will require the construction of a new overhead power line (outside an urban area) to connect to the Bosplaat Rural 66/22kV Substation. GN R.544 Item 23(ii): The site is outside urban areas, and the proposed facility will have a footprint of more than 1 hectare but less than 20 hectares.			
Site clearing and construction of development footprint infrastructure Direct occupation of land by	Direct impacts: » Loss of agricultural land use	Low	» No mitigation possible
	» Soil erosion caused by alteration of run-off characteristics due to panel surfaces and	Low	Implement an effective system of run-off control which collects and disseminates run-off water from

Activity	Impact summary	Significance	Proposed mitigation
footprint of energy facility infrastructure	access roads and having the effect of loss and deterioration of soil resources.		hardened surfaces and prevents potential down slope erosion. This should be in place and maintained during all phases of the development.
	» Loss of topsoil caused by poor topsoil management (burial, erosion, etc) during construction related soil profile disturbance (levelling, excavations, disposal of spoils from excavations etc.)	Low	» Strip and stockpile topsoil from all areas where soil will be disturbed. » After cessation of disturbance, re-spread topsoil over the surface. » Dispose of any sub-surface spoils from excavations where they will not impact on agricultural land, or where they can be effectively covered with topsoil.
	Indirect impacts: » None	N/A	
	Cumulative impacts: » 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.	Low	» No mitigation required
<u>Social impacts</u>			
GN R.544 Item 1(ii): The proposed 5MW PV facility would be less than 10MW in capacity but cover an area greater than 1 hectare but less than 20 hectares GN R.544 Item 10(i): The project will require the construction of a new overhead power line (outside an urban area) to connect to the Bosplaat Rural 66/22kV Substation. GN R.544 Item 23(ii): The site is outside urban areas, and the proposed facility will have a footprint of more than 1 hectare but less than 20 hectares.			
Construction phase (Including all related infrastructure such as power lines, access roads, office and	Direct impacts: Positive social impacts: » Creation of employment and business opportunities. Potential negative impacts:	Medium - Low	» 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

Activity	Impact summary	Significance	Proposed mitigation
warehouse components)	<ul style="list-style-type: none"> » 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; » Loss of agricultural land associated with construction related activities. 		<ul style="list-style-type: none"> » have on local family and social networks; » Maximise the use of local labour for low – semi skilled jobs far as possible.
	<p>Indirect impacts:</p> <ul style="list-style-type: none"> » Local employed people during the construction phase may learn new skills thereby making them more employable in the future. 	Low (+)	<ul style="list-style-type: none"> » 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 operational phase of the project.
	<p>Cumulative impacts:</p> <ul style="list-style-type: none"> » Impacts on family and community relations » 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. 	Low	<ul style="list-style-type: none"> » Attention should be given to the extension and improvement of the existing HIV/Aids awareness programmes in the area.
Heritage impacts			
GN R.544 Item 1(ii): The proposed 5MW PV facility would be less than 10MW in capacity but cover an area greater than 1 hectare but less than 20			

Activity	Impact summary	Significance	Proposed mitigation
hectares GN R.544 Item 10(i): The project will require the construction of a new overhead power line (outside an urban area) to connect to the Bosplaat Rural 66/22kV Substation.			
Construction and operation of the PV array, access roads and associated infrastructure.	<p>Direct impacts:</p> <ul style="list-style-type: none"> » During the construction phase earthworks might impact on the recorded artefacts. » The only archaeological remains consist of highly weathered Middle Stone Age (MSA) "scatters" (MSA 1 - 5) located on the northern periphery of the development footprint. This occurrence is of low significance as they consist of ex situ material with no stratigraphy and no further mitigation is needed for this aspect. 	Low	<ul style="list-style-type: none"> » The MSA occurrence is of low significance and no further action is necessary.
	<p>Indirect impacts:</p> <ul style="list-style-type: none"> » None 		<ul style="list-style-type: none"> » None
	<p>Cumulative impacts:</p> <ul style="list-style-type: none"> » The loss of a number of archaeological sites. 		<ul style="list-style-type: none"> » None
<p><u>Palaeontology impacts</u></p>			
GN R.544 Item 1(ii): The proposed 5MW PV facility would be less than 10MW in capacity but cover an area greater than 1 hectare but less than 20 hectares GN R.544 Item 10(i): The project will require the construction of a new overhead power line (outside an urban area) to connect to the Bosplaat Rural 66/22kV Substation.			
Construction and operation of the PV array, access roads and associated infrastructure.	<p>Direct impacts:</p> <p>The broader study area near Boshof is generally of medium to low palaeontological sensitivity. However, the proposed development footprint lies within the Karoo dolerite outcrop area that is of very low palaeontological sensitivity.</p> <ul style="list-style-type: none"> » Any damage that occurs to fossil material during the excavation and construction phase 	Low	<ul style="list-style-type: none"> » Any substantial fossil remains (e.g. stromatolites, fossil shells, petrified wood or plant remains, vertebrate bones, teeth) encountered during excavation should be reported to SAHRA.

Activity	Impact summary	Significance	Proposed mitigation
	of the project would be permanent and irreversible.		
	Indirect impacts: None		» None
	Cumulative impacts: » The loss of a number of palaeontological findings.	Low	» None
Alternative 3			
	<i>Direct impacts:</i>		
	<i>Indirect impacts:</i>		
	<i>Cumulative impacts:</i>		

Activity	Impact summary	Significance	Proposed mitigation
OPERATION			
Linear Infrastructure (road and power line) Alternative 1			
<u>Ecological impacts</u>			
GN R.544 Item 23(ii): The site is outside urban areas, and the proposed facility will have a footprint of more than 1 hectare but less than 20 hectares.			
Construction of PV array, access roads and associated infrastructure.	Direct impacts: » Negative faunal impacts due to operation	Low	<ul style="list-style-type: none"> » No unauthorized persons should be allowed onto the site. » Any unwanted fauna such snakes or fauna threatened by the maintenance and operational activities should be removed to a safe location. » The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. » No fires should only be allowed at the site.

Activity	Impact summary	Significance	Proposed mitigation
			<ul style="list-style-type: none"> » No fuel wood collection should be allowed on-site. » No dogs should be allowed on site. » If the site must be lit at night for security purposes, this should be done with low-UV type lights (such as most LEDs), which do not attract insects. » All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. » All vehicles accessing the site should adhere to a low speed limit (30km/h max) to avoid collisions with susceptible species such as snakes and tortoises
	Negative avifaunal impacts due to the presence of overhead power lines at the site	Low	<ul style="list-style-type: none"> » All new power line infrastructure should be bird-friendly in configuration and adequately insulated (Lehman et al. 2007). These activities should be supervised by someone with experience in this field. » Any electrocution and collision events that occur should be recorded, including the species affected and the date. If repeated collisions occur within the same area, then further mitigation and avoidance measures may need to be implemented.
	Negative effects of alien plant invasion	Low	<ul style="list-style-type: none"> » Due to the disturbance at the site as well as the increased runoff generated at the site, alien plant species are likely to be a long-term problem at the site and a long-term control plan will need to be implemented. » Rehabilitation of cleared areas with indigenous species after construction to reduce alien invasion

Activity	Impact summary	Significance	Proposed mitigation
			potential. » Regular monitoring for alien plants within the development footprint. » 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.
	Increased erosion risk as a result of the presence of the facility		» All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk. » Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance. » All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques.
	Indirect impacts: None		None
	Cumulative impacts: » Reduced landscape connectivity due to the presence of the facility	Low	» The natural vegetation at the site should be encouraged to return following construction. » Fauna within the site which do not pose a danger to humans or the operation of the facility should be tolerated.
Visual impacts			
GN R.544 Item 23(ii): The site is outside urban areas, and the proposed facility will have a footprint of more than 1 hectare but less than 20 hectares.			
The character of the landscape is defined as open, undulating, sparsely populated land, extensively agricultural. Vertical elements in the immediate landscape are the transmission pylons, telegraph poles and the cell phone masts beside the substation. These introduce some limited industrial character into this rural area. The site could be held in view by users of the road and nearby farmsteads.			
Maintenance and	Direct impacts:	Medium-low	» Use of appropriate materials and colours for

Activity	Impact summary	Significance	Proposed mitigation
operation of proposed PV plant	<ul style="list-style-type: none"> » Effect on people living and working locally, change of local site character from agriculture to industry. » Impact from regular but not frequent, maintenance visits to clean the panels, etc » Impact of the colours, finishes, heights of the buildings, perimeter treatments. 		<ul style="list-style-type: none"> » maintenance of buildings. » All built form should be erected in locations with minimal visual impact; i.e. buildings and inverters, etc should be grouped together as far as practicable.
	<p>Indirect impacts:</p> <ul style="list-style-type: none"> » The proposed infrastructure is of such a nature that the status quo could be regained after decommissioning of the plant. 	Low	<ul style="list-style-type: none"> » Providing that the site is rehabilitated to its current state, the visual impact will also be removed.
	<p>Cumulative impacts:</p> <ul style="list-style-type: none"> » The proposed activities will contribute to an increased cumulative visual impact » The introduction of the PV plant would increase cumulative visual impact. 	Medium	<ul style="list-style-type: none"> » 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.
<u>Soil and agricultural impacts</u>			
GN R.544 Item 23(ii): The site is outside urban areas, and the proposed facility will have a footprint of more than 1 hectare but less than 20 hectares.			
Cleaning of solar arrays with water, detergents and soaps	<p>Direct impacts:</p> <ul style="list-style-type: none"> » Soil erosion » Soil and water contamination 	Low	<ul style="list-style-type: none"> » Practice proper run-off control and ensure good vegetation cover of the soil » Use water only for cleaning of solar arrays
	<p>Indirect impacts:</p> <ul style="list-style-type: none"> » Water and soil contamination downstream 	Low	<ul style="list-style-type: none"> » Use water only for cleaning of solar arrays
	<p>Cumulative impacts:</p> <p>Water and soil contamination</p>	Low	<ul style="list-style-type: none"> » Use water only for cleaning of solar arrays
<u>Social impacts</u>			
GN R.544 Item 23(ii): The site is outside urban areas, and the proposed facility will have a footprint of more than 1 hectare but less than 20 hectares.			
Including all related infrastructure such as transmission lines,	<p>Direct impacts:</p> <p>Positive social impacts:</p> <ul style="list-style-type: none"> » Creation of employment and business 	Medium -Low	<ul style="list-style-type: none"> » Where possible, the developer should employ locals.

Activity	Impact summary	Significance	Proposed mitigation
access roads, office and warehouse components	operations » Benefits associated with the establishment of a local community trust; » The establishment of renewable energy infrastructure. Potential negative impacts: » The visual impacts and associated impact on sense of place » Impact on Tourism		
	Indirect impacts: » Once the construction phase is complete, locals may not be able to find future employment.	Low	» Where possible, the applicant should employ locals to form part of the operation phase team. » Develop a programme to maximise the number of South African's and locals employed during the operational phase of the project.
	Cumulative impacts: » The cumulative impact on the social environment of other developments in the area would increase the positive and negative social impacts.	Medium to Low	The developer should be aware of the other projects in the area and work closely with the local municipality to development the community trust.
Linear Infrastructure (road and power line) Alternative 2			
<u>Ecological impacts</u>			
GN R.544 Item 23(ii): The site is outside urban areas, and the proposed facility will have a footprint of more than 1 hectare but less than 20 hectares.			
Construction of PV array, access roads and associated infrastructure.	Direct impacts: » Negative faunal impacts due to operation	Low	» No unauthorized persons should be allowed onto the site. » Any unwanted fauna such snakes or fauna threatened by the maintenance and operational activities should be removed to a safe location. » The collection, hunting or harvesting of any plants or

Activity	Impact summary	Significance	Proposed mitigation
			animals at the site should be strictly forbidden. » No fires should only be allowed at the site. » No fuel wood collection should be allowed on-site. » No dogs should be allowed on site. » If the site must be lit at night for security purposes, this should be done with low-UV type lights (such as most LEDs), which do not attract insects. » All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. » All vehicles accessing the site should adhere to a low speed limit (30km/h max) to avoid collisions with susceptible species such as snakes and tortoises
	Negative avifaunal impacts due to the presence of overhead power lines at the site	Low	» All new power line infrastructure should be bird-friendly in configuration and adequately insulated (Lehman et al. 2007). These activities should be supervised by someone with experience in this field. » Any electrocution and collision events that occur should be recorded, including the species affected and the date. If repeated collisions occur within the same area, then further mitigation and avoidance measures may need to be implemented.
	Negative effects of alien plant invasion	Low	» Due to the disturbance at the site as well as the increased runoff generated at the site, alien plant species are likely to be a long-term problem at the site and a long-term control plan will need to be implemented.

Activity	Impact summary	Significance	Proposed mitigation
			<ul style="list-style-type: none"> » Rehabilitation of cleared areas with indigenous species after construction to reduce alien invasion potential. » Regular monitoring for alien plants within the development footprint. » 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.
	Increased erosion risk as a result of the presence of the facility		<ul style="list-style-type: none"> » All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk. » Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance. » All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques.
	Indirect impacts: None		None
	Cumulative impacts: » Reduced landscape connectivity due to the presence of the facility	Low	<ul style="list-style-type: none"> » The natural vegetation at the site should be encouraged to return following construction. » Fauna within the site which do not pose a danger to humans or the operation of the facility should be tolerated.
<u>Visual impacts</u>			
GN R.544 Item 23(ii): The site is outside urban areas, and the proposed facility will have a footprint of more than 1 hectare but less than 20 hectares.			
The character of the landscape is defined as open, undulating, sparsely populated land, extensively agricultural. Vertical elements in the immediate landscape are the transmission pylons, telegraph poles and the cell phone masts beside the substation. These introduce some limited industrial character			

Activity	Impact summary	Significance	Proposed mitigation
into this rural area. The site could be held in view by users of the road and nearby farmsteads.			
Maintenance and operation of proposed PV plant	Direct impacts: » Effect on people living and working locally, change of local site character from agriculture to industry. » Impact from regular but not frequent, maintenance visits to clean the panels, etc » Impact of the colours, finishes, heights of the buildings, perimeter treatments.	Medium-low	» Use of appropriate materials and colours for maintenance of buildings. » All built form should be erected in locations with minimal visual impact; i.e. buildings and inverters, etc should be grouped together as far as practicable.
	Indirect impacts: » The proposed infrastructure is of such a nature that the status quo could be regained after decommissioning of the plant.	Low	» Providing that the site is rehabilitated to its current state, the visual impact will also be removed.
	Cumulative impacts: » The proposed activities will contribute to an increased cumulative visual impact » The introduction of the PV plant would increase cumulative visual impact.	Medium	» 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.
<i>Soil and agricultural impacts</i>			
GN R.544 Item 23(ii): The site is outside urban areas, and the proposed facility will have a footprint of more than 1 hectare but less than 20 hectares.			
Cleaning of solar arrays with water, detergents and soaps	Direct impacts: » Soil erosion » Soil and water contamination	Low	» Practice proper run-off control and ensure good vegetation cover of the soil » Use water only for cleaning of solar arrays
	Indirect impacts: » Water and soil contamination downstream	Low	» Use water only for cleaning of solar arrays
	Cumulative impacts: Water and soil contamination	Low	» Use water only for cleaning of solar arrays
<i>Social impacts</i>			
GN R.544 Item 23(ii): The site is outside urban areas, and the proposed facility will have a footprint of more than 1 hectare but less than 20 hectares.			
Including all related	Direct impacts:	Medium -Low	» Where possible, the developer should employ locals.

Activity	Impact summary	Significance	Proposed mitigation
infrastructure such as transmission lines, access roads, office and warehouse components	<p>Positive social impacts:</p> <ul style="list-style-type: none"> » Creation of employment and business operations » Benefits associated with the establishment of a local community trust; » The establishment of renewable energy infrastructure. <p>Potential negative impacts:</p> <ul style="list-style-type: none"> » The visual impacts and associated impact on sense of place » Impact on Tourism 		
	<p>Indirect impacts:</p> <ul style="list-style-type: none"> » Once the construction phase is complete, locals may not be able to find future employment. 	Low	<ul style="list-style-type: none"> » Where possible, the applicant should employ locals to form part of the operation phase team. » Develop a programme to maximise the number of South African's and locals employed during the operational phase of the project.
	<p>Cumulative impacts:</p> <ul style="list-style-type: none"> » The cumulative impact on the social environment of other developments in the area would increase the positive and negative social impacts. 	Medium to Low	The developer should be aware of the other projects in the area and work closely with the local municipality to development the community trust.
Alternative 3			
	<i>Direct impacts:</i>		
	<i>Indirect impacts:</i>		
	<i>Cumulative impacts:</i>		

Activity	Impact summary	Significance	Proposed mitigation
DECOMMISSIONING AND CLOSURE			
Both Power Line Alternative 1 and Alternative 2			
Decommissioning of Solar Energy Facility	<p>Direct impacts:</p> <p>Social:</p> <ul style="list-style-type: none"> » A retrenchment and downscaling programme 	Medium -Low	<ul style="list-style-type: none"> » Bluewave Capital should also investigate the option of establishing an Environmental Rehabilitation Trust Fund to cover the costs of decommissioning and rehabilitation of disturbed areas. The Trust Fund should be funded by a percentage of the revenue generated from the sale of energy to the national grid over the 20 year operational life of the facility. The rationale for the establishment of a Rehabilitation Trust Fund is linked to the experiences with the mining sector in South Africa and failure of many mining companies to allocate sufficient funds during the operational phase to cover the costs of rehabilitation and closure.
	Ecological:	Low	<ul style="list-style-type: none"> » 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 » Regular monitoring for alien plants within the development footprint for 2-3 years after decommissioning. » 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. » A cover of indigenous grass should be established to stabilise the soil.
	<p>Visual:</p> <ul style="list-style-type: none"> » The major visual impact associated with the decommissioning of the facility is the residual visual effects such as scarring of the 	Medium -Low	<ul style="list-style-type: none"> » This would be short-term and would reduce through rehabilitation of the site.

Activity	Impact summary	Significance	Proposed mitigation
	landscape.		
	» Soil: » Soil Erosion	Medium	» Care should be taken to control and contain storm water run-off and not to concentrate its runoff.
	» Dust production and dust pollution	Low	» Apply appropriate dust control measures, i.e. water spraying.
	» Interference with the day-to-day management of the grazing and livestock	Medium	» Decommissioning activities must be communicated and co-ordinated with the land owner to put him in a position to properly plan his management activities.
	» Negative faunal impacts due to decommissioning activities.	Low	» Site access to be controlled and no unauthorized persons should be allowed onto the site. » The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. » No fires to be allowed on site. » No fuelwood collection should be allowed on-site. » No dogs should be allowed on site. » No hazardous materials should be stored on site. Any accidental chemical, fuel and oil spills that occur at the site during preconstruction should be cleaned up in the appropriate manner as related to the nature of the spill. » No open excavations, holes or pits should be left at the site as fauna can fall in and become trapped.
	» Increased alien plant invasion risk	Low	» 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 » Regular monitoring for alien plants within the development footprint for 2-3 years after

Activity	Impact summary	Significance	Proposed mitigation
			decommissioning. » 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. » A cover of indigenous grass should be established to stabilise the soil.
	<i>Indirect impacts:</i>		
	Cumulative Impacts: Soil » Siltation of watercourses downstream	Low	» Stop soil erosion at the source

NO-GO OPTION			
Construction, operation and decommissioning phase of the solar energy facility	Direct impacts: » Ecological impacts: the no-go option would result in in no ecological impact » Agricultural impacts: The 'do nothing' alternative will result in no impact on the current grazing use. In terms of the site selection within the farm boundary, the farm is very uniform in terms of soil potential and the positioning of the solar development on any portion of the farm therefore has very little agricultural impact. » Social impacts: The no-go option would result in job opportunities not being realised resulting in further unemployment in the area. » Visual impacts: The visual character of the area would remain unchanged. » Heritage impacts 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.	Low	» None

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

Comparison of Alternatives:

Alternatives	Preference of Alternatives	Impact and significance
<p>Alternative 1 - Linear components (road and power line option 1)</p>	<p>Most preferred</p>	<p>Power line - Low - Shorter route of 250m and further from the R64, will therefore have minimal impacts on ecology, avifauna and soil. Access road - Low - Shortest route of approximately 50m.</p>
<p>Alternative 2 - Linear components (road and power line option 2)</p>	<p>Least preferred</p>	<p>Power Line - Low - Longer route of 250m and closer to the R64. This route will therefore have a potentially slightly higher ecological, avifaunal, visual and soil impact. Access road - Low - Longer route of approximately 160m.</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.

Alternative A (preferred alternative)

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

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

The overall impact on **ecology** as a result of the construction and operation of the proposed facility is likely to be of **low to medium significance**. The site for the proposed Boshof - Les Marais / Buitenfontein Solar Energy facility has been mapped to be of low overall ecological sensitivity. No listed or protected plant species were recorded by the ecological within the development footprint and it is unlikely that any such species are abundant at the site. While there may be some listed 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. In terms of features present off the site, the rocky ridge east of the site and substation is identified as a locally sensitive feature. The ridge is however outside of the development footprint and would not be affected under the current project design. 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 on soils** in the immediate and surrounding areas. The development will have low to medium negative impact on agricultural resources and productivity, but it will also deliver low to medium positive impacts on agriculture. Grazing, the only current land use, will be able to continue unaffected on all other parts of the farm for the duration of and after the project. The significance of agricultural impacts is influenced by the fact that the proposed PV site has limited agricultural potential, and that it is small

in relation to other available land on the farm. The farm has a land capability classification of class 5, non-arable, and moderate potential grazing land. 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**. The only archaeological remains consist of highly weathered Middle Stone Age (MSA) "scatters" (MSA 1 - 5) located on the northern periphery of the development footprint. This occurrence is of low significance as they consist of ex situ material with no stratigraphy and no further mitigation is needed for this aspect. Apart from the Stone Age component no buildings exist on the site and no cultural landscape elements were noted.
- » The broader study area is generally of medium to low palaeontological sensitivity. However, the proposed development footprint lies within the Karoo dolerite outcrop area that is of **very low palaeontological sensitivity**.
- » The visual impact assessment study concluded that the significance of the visual impact of the proposed development would be medium to **low significance**, due to its extent, long term duration and medium magnitude. Also considered were the scale of the development, the numbers and types of receptors directly affected and its compatibility with the local landscape.
- » The overall **social** and socio-economic impact in terms of positive and negative impacts is likely to be of a **medium to 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:

Two linear alternatives for the power line and the access road have been assessed. Both power line and access road alternatives are considered to be environmentally

acceptable as the potential impact to soils, flora, fauna, avifauna and heritage have been assessed to be of low significance. The preferred alternative from a technical perspective is the power line with the shorter power line and access road route which is Linear Route Alternative 1.

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 **Boshof - Les Marais / Buitenfontein 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 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 and the benefits associated with the establishment of a Community Trust. This also represents a negative social cost. On a local level, should the development proceed, the landowner will benefit from the proposed development financially. The study area is not suitable for cultivation and therefore the landowner will not be able to benefit agriculturally. The no-development

option will therefore not be beneficial to the landowner or the broader community.

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

SECTION E. RECOMMENDATION OF PRACTITIONER

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

YES ✓

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

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

There are no insurmountable environmental or social constraints that prevent the establishment of the proposed 5MW PV 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:

The linear (power line and access road) components assessed under Route Alternative 1 are preferred due to their low environmental impact. Development of the longer alternative power line and access road routes assessed in this Basic Assessment Report (Alternative 2), in order to accommodate potential technical adjustments, are regarded as permissible as these impacts will only be slightly higher, but tolerable 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 and 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.**

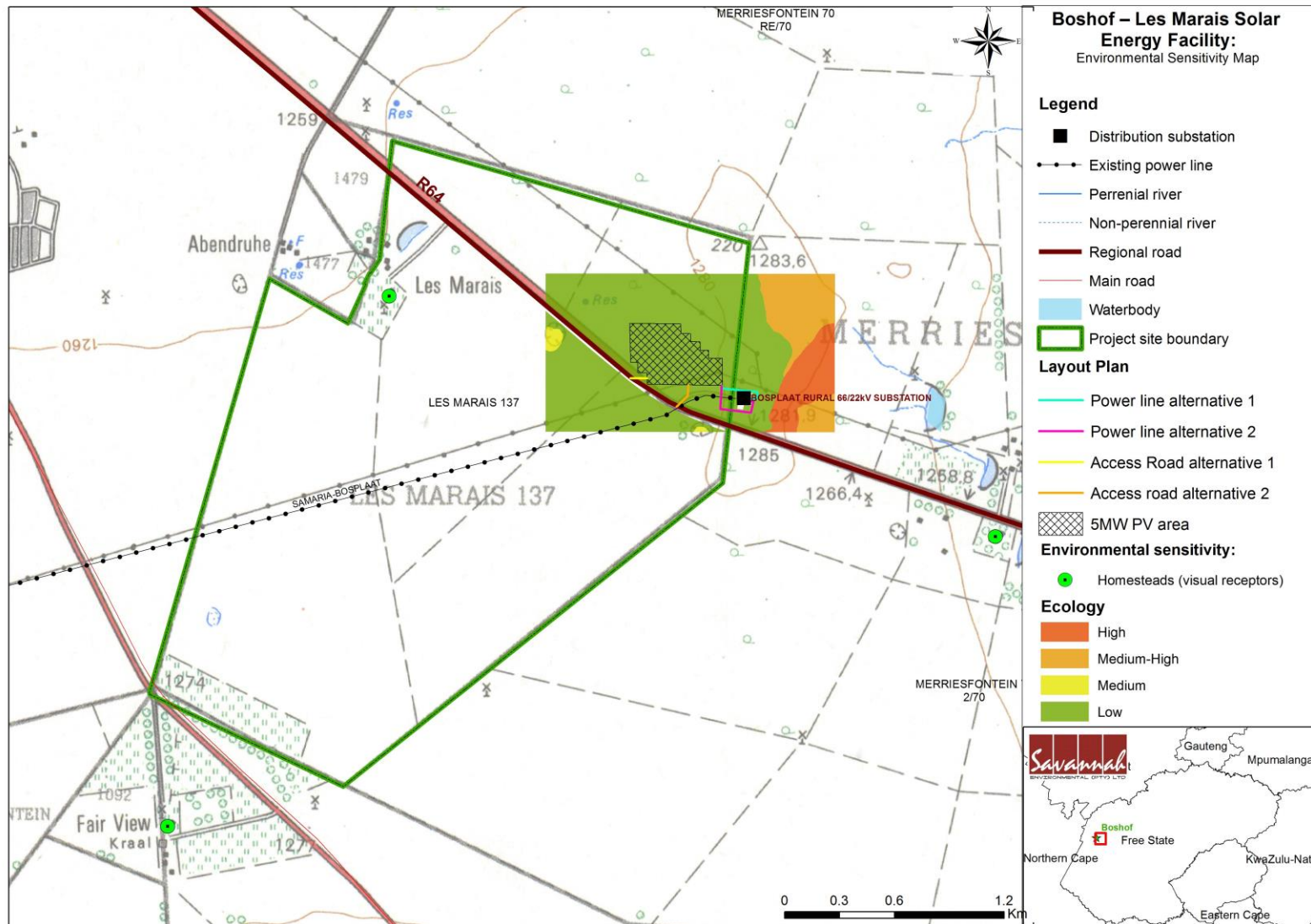


Figure 8: Sensitivity map of the proposed Boshof - Les Marais / Buitenfontein 5MW Solar Energy Facility

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