

**ENVIRONMENTAL IMPACT ASSESSMENT
PROCESS
DRAFT BASIC ASSESSMENT REPORT**

**PROPOSED ABERDEEN SOLAR FACILITY
PHOTOVOLTAIC (PV)/ CONCENTRATED
PHOTOVOLTAIC (CPV) SOLAR ENERGY
FACILITY -PHASE 2, EASTERN CAPE PROVINCE**

DEA Ref No: 14/12/16/3/3/1/552

**DRAFT FOR PUBLIC REVIEW
25 May - 25 June 2012**

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environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

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File Reference Number:

Application Number:

Date Received:

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

Kindly note that:

1. This **basic assessment report** is a standard report that may be required by a competent authority in terms of the EIA Regulations, 2010 and is meant to streamline applications. Please make sure that it is the report used by the particular competent authority for the activity that is being applied for.
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10. A competent authority may require that for specified types of activities in defined situations only parts of this report need to be completed.

PROJECT DETAILS

DEA Reference No.	: 14/12/16/3/3/1/552
Title	: Environmental Basic Assessment Process Draft Basic Assessment Report: Proposed Aberdeen Photovoltaic (PV)/ Concentrated photovoltaic (CPV) Solar Energy Facility on Wildebeest Poorje Farm, Phase 2 (up to 20MW), Eastern Cape Province.
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SUMMARY AND OVERVIEW OF THE PROPOSED PROJECT

BioTherm Energy (Pty) Ltd is proposing the establishment of a commercial solar energy facility (using either photovoltaic or concentrated photovoltaic technology) for electricity generation of up to 20 MW in capacity. The facility is proposed on Portion 1 of the Farm Wildebeest Poorje, located approximately 17 km south-west of Aberdeen along the N9 national road in the Eastern Cape Province of South Africa (refer to Figure 1).

The purpose of the proposed facility is to sell the electricity to Eskom as part of the Renewable Energy Independent Power Producers (IPP) Procurement Programme. The IPP Procurement Programme has been introduced by the Department of Energy (DoE) to promote the development of renewable power generation facilities by IPPs. Selling of electricity according to the IPP Procurement Programme has the advantage of giving developers long-term stability and predictability, as well as providing the opportunity for the South African Government to introduce renewable energy into the power generation technology mix within the country.

The facility is expected to require an area of less than 20 ha within which the following infrastructure will be established (refer to Figure 2).

- » Photovoltaic (PV) panels or Concentrated photovoltaic (CPV) panels with an installed capacity of up to 20MW.
- » A new on-site substation to evacuate the power from the facility into the Eskom grid via the Aberdeen Substation located adjacent to the proposed development site.
- » Mounting structure to be either rammed steel piles or piles with pre-manufactured concrete footings to support the PV/CPV panels.
- » Cabling between the project components, to be lain underground where practical.
- » Internal access roads and fencing.
- » Workshop area for maintenance, storage, and offices.

The proposed project will be referred to as **Aberdeen Photovoltaic (PV)/ Concentrated Photovoltaic (CPV) Solar Energy Facility**.

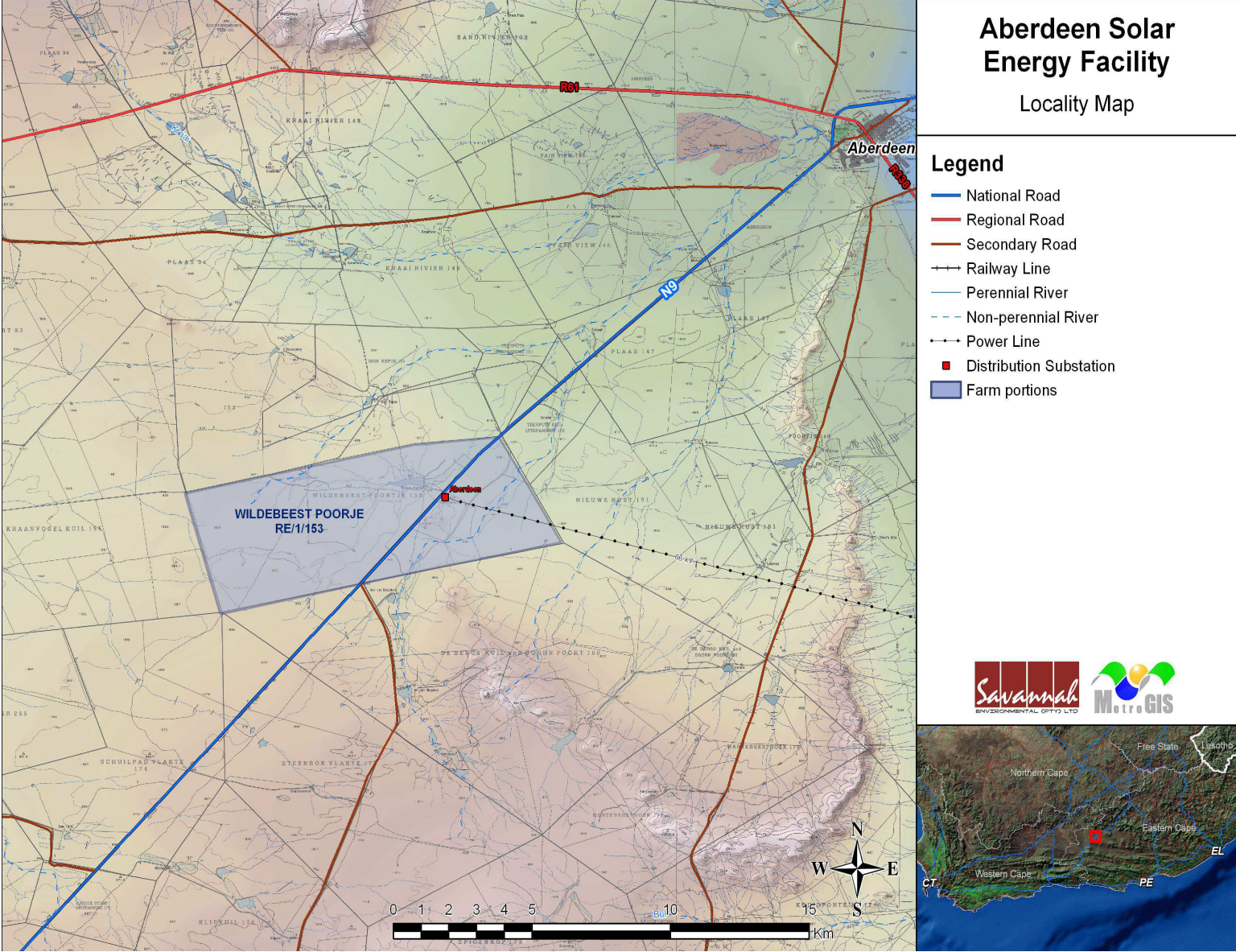


Figure 1: Locality map showing the Farm Wildebeest Pooorje

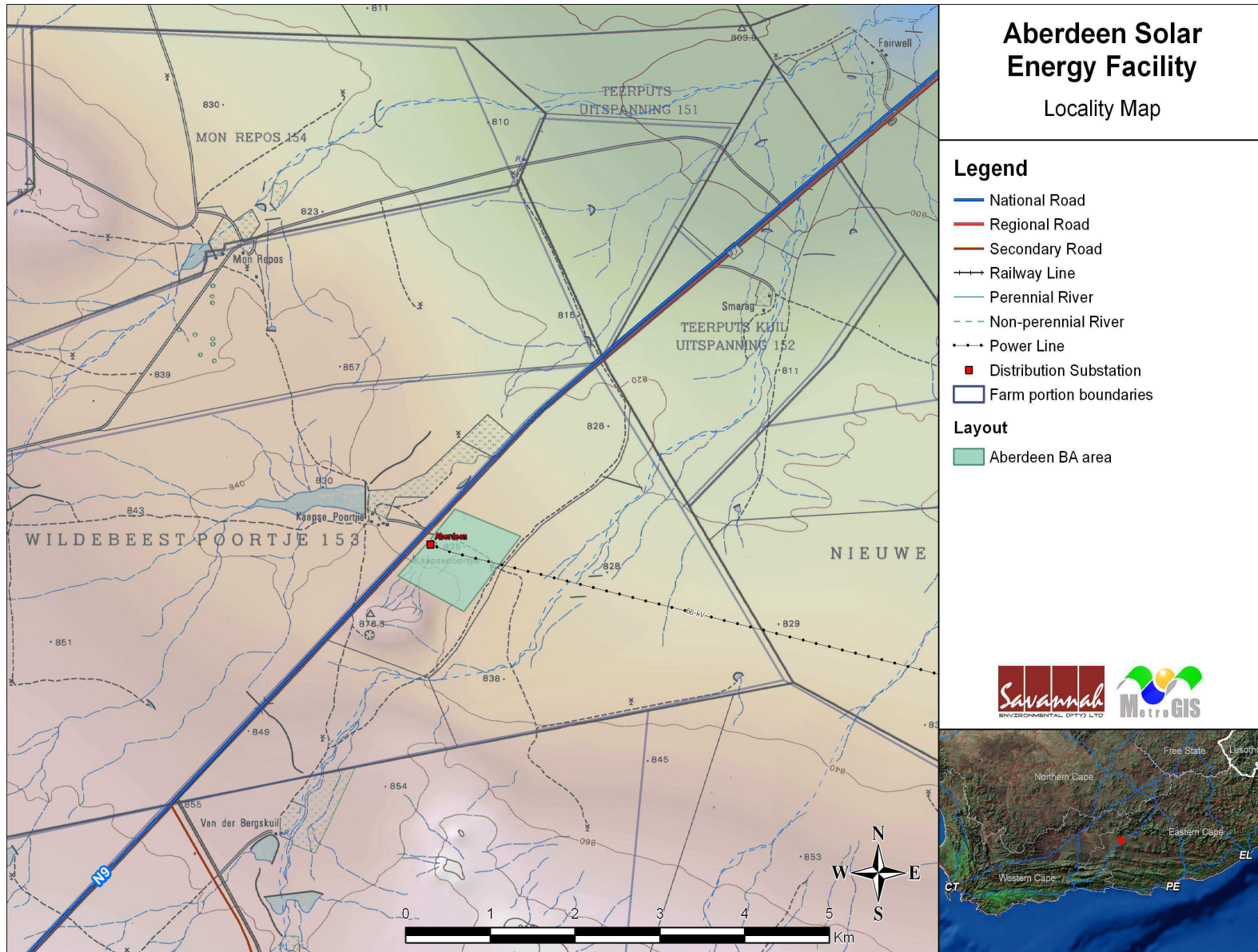


Figure 2: Map showing the development area for the proposed facility

1.1. Project Location

The Aberdeen PV/CPV Facility is located on Portion 1 on Farm Wildebeest Poorje, which is located in the Camdeboo Local Municipality (CLM) area (Cacadu District Municipality) in the Eastern Cape Province of South Africa. The site is easily accessible from the N9.

1.2. Rationale for the Development of the Proposed Facility

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 power stations are nearing the end of their economic life which is coupled with the expense of the re-commissioning of older power stations (i.e. Camden, Komati, and Grootvlei which is expected to cost in the region of R20 billion to return on line).

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

1.4. Details of BioTherm Energy

BioTherm Energy (Pty) Limited ("BioTherm") is one of South Africa's first Independent Power Producers ("IPP"). Previously, BioTherm focused on the development of waste heat and gas cogeneration projects, seeking to take advantage of the power shortages and steep tariff increases in South Africa by entering into private Power Purchase Agreements ("PPAs) with large Corporates

and intensive energy users, as well as selling power from these cogeneration projects in terms of the Department of Energy's ("DoE") Medium Term Power Purchase Program ("MTPPP") and Pilot National Cogeneration Project ("PNCP") programs.

In October 2007 BioTherm commissioned its 4.2 MW Biogas Project at the PetroSA refinery in Mosselbay in the Eastern Cape Province. This project was the first non-recourse project financed IPP deal to be concluded in South Africa. This project was also the first project to successfully register for Carbon Credits ("CERs"), and is also the first project to monetise CER's in South Africa.

BioTherm is in the process of commissioning an anaerobic digester at Kanhym, the largest piggery in Africa, in Middelburg, Mpumalanga and has also been responsible for the development of a fuel switch from coal to biomass, at Letaba Citrus Estates, South Africa's largest citrus estate, based in Tzaneen, Limpopo Province. The fuel switch is being used for two of the estates peel drying plants and results in a carbon saving of 20 960 t CO₂e per annum.

In June 2009, with the announcement of the National Regulator of South Africa's ("NERSA") Renewable Energy Feed-in Tariff ("REFIT") Programme, BioTherm initiated its wind and solar business development platform. Today BioTherm is one of the leading renewable energy players in South Africa and has growing pipeline of wind and solar projects geographically spread across the Eastern, Western and North Cape Provinces. It is anticipated that over the next three years, BioTherm's pipeline for wind and solar will be 1 400MW and 1 000MW respectively.

In December 2010 the business was restructured and has discontinued further investment in cogeneration projects. The business has been refocused to primarily pursue wind and solar projects.

BioTherm has created a fully vertically integrated development team who can deliver across all stages of wind and solar development activities including project sourcing, site development, project financing, construction and operation of its projects. The current team has over 100 years of wind and solar development and investment expertise, with a successful track record of over 1,000 MW's of projects built and operational in the US and Europe. Further to this the team has approximately 30 years and over 10GWs of related power experience.

In November 2008, Denham Capital Management LP ("Denham"), a leading energy and commodities focused global private equity firm (www.denhamcapital.com) with over US\$ 4.3 billion of assets under management, committed an equity investment of up to US\$150.0 million in

BioTherm to build and acquire a pipeline of renewable energy projects. At the time of making this investment, this transaction was the largest renewable energy investment in Africa.

BioTherm is committed to being one of the leading South African renewable energy project developers and operators and has a strong desire to build financially attractive projects that catalyse sustainable local economic development in the communities in which the projects are located.

1.5. 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 Eastern Cape Department of Economic Development and Environmental Affairs (DEDEA), 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 R543 – R546, a Basic Assessment process is required to be undertaken for the proposed project. The project has been registered with the National Department of Environmental Affairs as the competent authority under application reference number 14/12/16/3/3/1/551.

Notice Number	Activity	Description	Relevance of Regulation to Project
544, 18 June 2010	1(i)	<i>The construction of facilities or infrastructure for the generation of electricity where: i. the electricity output is more than 10 megawatts but less than 20 megawatts;</i>	<i>The proposed facility has a capacity of up to 20MW.</i>
544, 18 June 2010	10(i)	<i>The construction of facilities or infrastructure for the transmission and distribution of electricity: i. Outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts;</i>	<i>The construction of a 132kV overhead power line from the solar facility to the Eskom electricity grid.</i>
544, 18 June 2010	11(xi)	<i>The construction of: xi. Infrastructure or structures covering 50 square metres or more. Where such construction occurs within a watercourse or within 32</i>	<i>The construction of the proposed solar facility and associated infrastructure may impede on drainage lines on the site.</i>

Notice Number	Activity	Description	Relevance of Regulation to Project
		<i>metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.</i>	
GN 544, 18 June 2010	18	<i>The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock or more than 5 cubic metres from: (i) a watercourse</i>	<i>Potential infilling or depositing may occur as a result of the construction of the proposed facility and associated infrastructure.</i>
544, 18 June 2010	23	<i>The transformation of undeveloped, vacant or derelict land to: i. 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.</i>	<i>The area to be transformed by the proposed facility is less than 20ha.</i>
GN546, 18 June 2010	4 (a)(ii)(ee)	<i>The construction of a road wider than 4 metres with a reserve less than 13,5 metres, that may occur in: The applicability of this activity for the development site will be confirmed through the EIA process</i>	<i>The specialist ecology study revealed that no Critical Biodiversity Areas have been identified for this site (bgis.sanbi.org). This activity is therefore not applicable.</i>
GN546	10 (a) (ii) (ee)	<i>The construction of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres</i>	<i>The specialist ecology study revealed that no Critical Biodiversity Areas have been identified for this site (bgis.sanbi.org). This activity is therefore not applicable.</i>
GN546	14 (a) (i)	<i>The clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation</i>	<i>The site constitutes natural vegetation.</i>

Notice Number	Activity	Description	Relevance of Regulation to Project
GN546	19 (a) (ii) (ee)	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.	The specialist ecology study revealed that no Critical Biodiversity Areas have been identified for this site (bgis.sanbi.org). This activity is therefore not applicable.

1.1. Details of the Environmental Assessment Practitioner

Savannah Environmental was contracted by BioTherm Energy (Pty) Ltd as the independent environmental assessment practitioners (EAP) 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 BioTherm Energy (Pty) Ltd. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed project.

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

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

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

- » Jo-Anne Thomas - a registered Professional Natural Scientist and holds a Master of Science degree. She has 14 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.

- » Umeshree Naicker - the principle author of this report, holds an Honours Bachelor of Science degree in Environmental Science and has 3 years' experience in environmental management.

Savannah Environmental has gained extensive knowledge and experience on potential environmental impacts associated with electricity generation projects through their involvement in related EIA processes. Savannah Environmental has completed the EIA process and received environmental authorisations for numerous solar energy facilities.

Curricula vitae for the Savannah Environmental project team consultants are included in Appendix G.

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

- » Ecology: Simon Todd (of Simon Todd Consulting)
- » Soil and Agricultural Potential: Iain Paton (of Outeniqua Geotechnical Services Cc)
- » Heritage resources: Jaco van der Walt
- » Social: Tony Barbour (of Tony Barbour Consulting)
- » Visual: Johan Claassen (of Zone Land Solutions)

Curricula vitae for the specialist project team consultants are included in Appendix G.

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 appointment of a specialist for each specialist thus appointed:
 Any specialist reports must be contained in Appendix D.

1. ACTIVITY DESCRIPTION

Describe the activity, which is being applied for, in detail¹:

BioTherm Energy (Pty) Ltd is proposing the establishment of a photovoltaic (PV)/concentrated photovoltaic (CPV) solar energy facility with a generation capacity of up to 20 MW to be established over an area of ~ 20 ha on a site located approximately 17 km south-west of Aberdeen in the Eastern Cape Province of South Africa. Project details are indicated on the table below.

PV Technology	PV or CPV
Installed capacity	Up to 20MW
Panel Specification	Up to 350kW DC
Panel Dimensions	2000x1000x50
Number of Panels	Up to 80 000
Number of inverters	Up to 35
Distribution Transformers	Up to 35
Main Transformer capacity	Up to 20MVA
Final Height of installed panels from ground level	PV – approx. 3m CPV – approx. 20m
Height of inverters	Up to 4 meters
Height of Transformers	Up to 4 meters
Height of Buildings	Up to 10 meters
Height of Fencing	Up to 4 meters
Total area used for the plant	up to 20 ha

The facility will use the light energy from the sun to generate electricity through a process known as the Photovoltaic Effect. The proposed facility will either utilise Photovoltaic (PV) technology or Concentrated Photovoltaic (CPV) technology.

Photovoltaic (PV) Technology

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 (see Figure 3).

¹ Please note that this description should not be a verbatim repetition of the listed activity as contained in the relevant Government Notice, but should be a brief description of activities to be undertaken as per the project description.

This effect refers to photons of light colliding with electrons, and therefore placing the electrons into a higher state of energy to create electricity. The Solar PV facility will comprise of the following components:

The Photovoltaic Cell

Individual PV cells are linked and placed behind a protective glass sheet to form a photovoltaic panel. Other technologies that can be used include thin film

The Inverter

The photovoltaic effect produces electricity in direct current. Therefore an inverter must be used to change it to alternating current.

The Support Structure

The PV panels will be attached to a support structure approximately 2 meters off the ground set at an angle so to receive the maximum amount of solar radiation. The angle of the panel is dependent on the latitude of the proposed facility and the angles may be adjusted to optimise for summer or winter solar radiation characteristics.

The PV panels are designed to operate continuously for more than 20 years, unattended and with low maintenance.



Figure 3: Illustration of a photovoltaic solar facility

Concentrated Photovoltaic (CPV) Technology

Concentrated photovoltaic (CPV) technology uses optics such as lenses to concentrate a large amount of sunlight onto a small area of solar photovoltaic materials to generate electricity. Although more expensive than traditional, more conventional flat panel systems, CPV systems result in higher returns as the concentration allows for the production of energy from a much smaller area of solar cells.

The Concentrated Photovoltaic Cell

The light energy from the sun is concentrated through lenses onto the individual CPV cells. This serves to increase the efficiency of the CPV panels (i.e. up to 29% efficiency), as compared to conventional PV technology (i.e. 8 % – 18% efficiency) (refer to Figure 4).

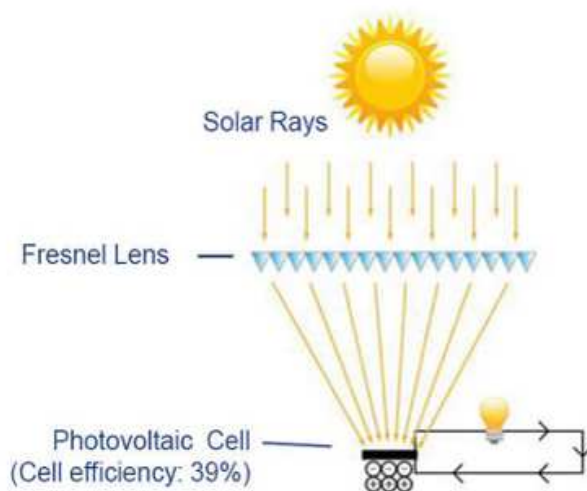


Figure 4: The efficiency of the CPV panels is increased through the use of Fresnel Lenses which concentrates the amount of light entering the CPV cells (Source: AmonixTM)

The Inverter

An inverter is used to convert the electricity which is produced as direct current into alternating current for the purpose of grid connection. In order to connect a large solar facility to the national grid, numerous inverters will be arranged in several arrays to collect, and convert the produced power.

The Support Structure

The CPV Modules will be elevated up to 2m above ground level by a support structure and have a total height of up to 20m. The modules will be able to track the path of the sun during the day, thereby increasing the efficiency of the panels (refer to Figure 5).

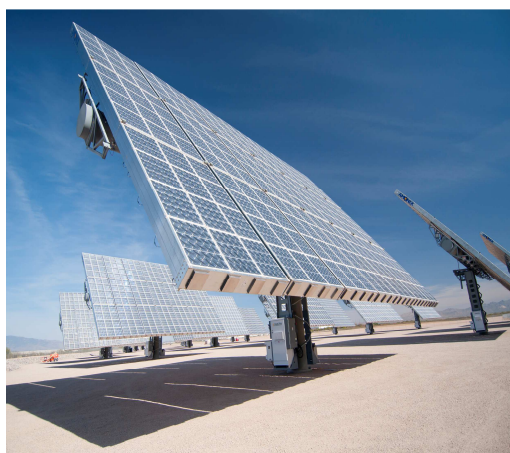


Figure 5: The support structures elevate the panels and allow for dual axis tracking of the sun for increased efficiency (Source: AmonixTM)

Each panel will be approximately 22 m wide and 12.5 m high. As such when the tracking panel is vertical the structure will be a maximum height of approximately 20m.

In order to construct the proposed solar energy facility and its associated infrastructure, a series of activities will need to be undertaken during the design, pre-construction, construction, operation, and decommissioning phases which are discussed in more detail below.

2.1.1. Construction Phase

The facility is proposed to have a maximum installed capacity of up to 20 MW. Approximately 140 people are expected to be required during the construction phase which is expected to take place over a period of 12 months). Low/semi-skilled positions will ideally be filled by locals living in and around Aberdeen and potentially from places further afield. Workers not living in the area, including those employed for skilled positions, will not be housed on site. Workers will be housed in the nearest local town and transported by EPC and O&M Contractors.

The following construction activities are expected to form part of the project's scope of works.

Activity	Description
Pre-construction surveys	Prior to initiating construction, a number of detailed surveys will be required including, but not limited to: <ul style="list-style-type: none"> » Geotechnical survey – a geotechnical survey will be required in order to detail the geology and topography of the study area. The geotechnical study will also consider flood potential, foundation conditions, and the potential for excavations. This study will serve to inform the Engineering, Procurement, and Construction (EPC) Contractors regarding soil conditions, required to specify foundations required for the support structures, and the extent of earthworks and compaction required in the establishment of any internal access roads. » Site survey – this will be required to finalise the design layout of the PV/CPV solar field and other associated infrastructure. The finalisation will need to be confirmed in line with the Environmental Authorisation issued for the facility.
Establishment of access roads	<ul style="list-style-type: none"> » The project development site is accessible from the N9 » Temporary access roads may be required during the construction phase; however these are likely to be single track gravel roads of less than 4 m wide.
Undertake site preparation	<ul style="list-style-type: none"> » Site preparation activities will include clearance of vegetation at the footprint of the following

	<p>infrastructure within the development footprint:</p> <ul style="list-style-type: none"> * Support structure/pedestals for the PV/CPV panels (1 m² for each unit). Approximately 148 units are proposed to be constructed. * Switchgear * Transformers * Workshop * Trenches for the underground cabling. <p>These activities may require the stripping of topsoil which will need to be stockpiled, backfilled and/or spread on site.</p>
<p>Transport of components and equipment to site</p>	<ul style="list-style-type: none"> » The components will be transported to site (in sections and components), likely from the N9 » In addition, civil engineering construction equipment will be required on site (e.g. excavators, trucks, ready mix cement trucks, etc.) as well as components required for the establishment of the switchgear.
<p>Establishment of a construction camps and laydown areas</p>	<ul style="list-style-type: none"> » Once the required construction equipment has been transported to site, a dedicated equipment camp and laydown areas may be required. These will serve to confine activities and storage of equipment and/or fuel to designated area(s) to limit the potential ecological impacts associated with this phase of the project. » Fuel required for the on-site construction vehicles and the generator will need to be secured in a temporary bunded area within the construction camp(s) to prevent leakages and soil contamination. » Electricity required during the construction phase will be supplied via a generator.
<p>Establishment of the PV/CPV panels (refer to Figure 4)</p>	<ul style="list-style-type: none"> » A support structure unit will be erected by excavating an area for the foundation. » Ready mix cement will be used to stabilise the foundation. Ready-mix cement will be prepared off-site and transported from the closest centre to the development. This however, does not rule out the possibility of onsite batching. » A service cage will be erected around the foundation unit to allow for the establishment of the electrical and hydraulic infrastructure). This includes the inverter. » A drive head will be positioned on top of the foundation unit as a connection point for the PV/CPV panel which allows for the dual axis tracking.

	<ul style="list-style-type: none"> » The CPV mega module will be lifted via a crane onto the drive head. » The installation of the underground cables between the PV/CPV panels, the transformers, the switchgear, and the new Substation will require the excavation of trenches of approximately 1 m deep within which they can then be laid.
Undertake site rehabilitation	<ul style="list-style-type: none"> » Once construction is complete and all construction equipment is removed, 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 prepared for rehabilitation.

2.1.2. Operation and Maintenance Phase

Approximately 2 permanent and 12 semi-permanent workers are expected to be required on-site of which the latter will be low skilled positions required to clean the panels (once every 3 months). The facility is expected to be operational for 20 years.

The following operation and maintenance activities are expected to form part of the project scope of works.

Activity	Description
Operation of the PV/CPV panels and associated electrical infrastructure	<ul style="list-style-type: none"> » The PV/CPV panels will convert the light energy from the incoming radiation into electrical energy (i.e. as direct current). » The transformers will change the power to alternating current, where after the electricity will be conveyed to the switchgear, the underground cables and then to the existing Aberdeen Substation.
Cleaning of the PV/CPV panels	<ul style="list-style-type: none"> » The PV/CPV panels will be cleaned once every three months, or more often if deemed necessary. » Water is likely to be sourced from the Aberdeen Municipality and will be trucked to the site when required. » It is assumed that approximately 6 tankers (each tanker holding 30 000 litres) will be required for each cleaning session.
Site operation and maintenance	<ul style="list-style-type: none"> » Each component within the solar energy facility will be operational except under circumstances of mechanical breakdown, unfavourable weather conditions, or routine maintenance activities. » As the PV/CPV technology the hydraulic oil may need to be supplemented occasionally.

2.1.3. Decommissioning Phase

The solar energy facility is expected to have a lifespan of 20 years (i.e. with routine maintenance). The power plant infrastructure would only be decommissioned and rehabilitated once it has reached the end of its economic life. It is most likely that decommissioning activities would comprise the disassembly and replacement of the individual components with more appropriate technology/infrastructure available at that time.

The following decommissioning and rehabilitation activities will form part of the project scope.

Activity	Description
Site preparation	Site preparation activities will include confirming the integrity of the access to the site to accommodate the required equipment (e.g. decommissioning camp) and the mobilisation of decommissioning equipment.
Disassemble and replace existing components	The components would be disassembled, and reused and recycled (where possible), or disposed of in accordance with regulatory requirements.

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. Alternatives should include a consideration of all possible means by which the purpose and need of the proposed activity 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 are 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.

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

The placement of a solar facility is strongly dependent on several factors such as local irradiation, site extent, site access, climatic conditions and gradient of the site. A Portion

of the Farm Wildebeest Poortje No. 153 has been identified by BioTherm Energy (Pty) Ltd as being highly desirable from a technical perspective for the establishment of a photovoltaic (PV) or concentrated photovoltaic (CPV) plant as per the following technical, logistical and environmental reasons:

Site Alternative

A site alternative refers to the identification of more than one potential site which may be suitable for the establishment of a proposed facility. However, the nature of the site required for renewable energy generation projects often means that assessment of site alternatives is not possible. This specific site has been selected based on the following preferences:

- » Site access (i.e. the site is easily accessible from the N9)
- » Site slope and topography (i.e. generally flat terrain, this portion gently slopes downwards in a north-eastern direction).
- » Access to the national electricity grid for power evacuation (i.e. underground cables will convey the power from the PV/CPV units, through the transformers, to the switchgear and directly to the Aberdeen export Substation located at 32°35'7.73"S, 23°55'29.91"E).

No feasible site alternatives have been proposed for the establishment of the proposed solar energy facility. Therefore, no site alternatives are assessed within this Basic Assessment Report.

Activity Alternative

The technology under consideration for the proposed project is either a photovoltaic (PV) or concentrated photovoltaic (CPV) solar facility. CPV is favoured over PV from a technical perspective by virtue of its improved efficiency. The site is not considered to be suitable for wind energy (due to the local climatic conditions), and the project is too limited in size to make consideration of CSP technology a viable option. In addition, the water availability constraints would result in CSP technology being unviable at this location.

Layout Alternatives

Although a single site is being considered, the site is larger than required for the development and as a result there is scope within the preferred development area for adjusting the final development footprint to account for environmentally sensitive areas which may occur.

Operating Alternatives

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.

The option of not implementing the activity

The 'do-nothing' alternative is the option of not constructing the proposed PV/CPV Solar Energy Facility. Should this alternative be selected then there will be impacts at a local

and a broader scale. From a local perspective, the identified site is currently used for grazing livestock (cattle, sheep, goats and game). However, at a broader scale, the benefits of additional capacity to the electricity grid and those associated with the introduction of renewable energy and the reduction in the need to mine non-renewable resources such as coal would not be realised. This alternative is further assessed within this report.

3. ACTIVITY POSITION

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.

List alternative sites, if applicable.

Alternative:

Alternative S1²

Alternative S2 (if any)

Alternative S3 (if any)

Latitude (S):

Longitude (E):

32	35 10.9	23	55 40.0

In the case of linear activities:

Alternative:

Alternative S1 (preferred or only route alternative)

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

Latitude (S):

Longitude (E):

Alternative S2 (if any)

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

Alternative S3 (if any)

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

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

4. PHYSICAL SIZE OF THE ACTIVITY

² "Alternative S." refers to site alternatives

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

Alternative:

- Alternative A1³
- Alternative A2 (if any)
- Alternative A3 (if any)

Size of the activity:

~200 000 m ²
m ²
m ²

Or, for linear activities:

Alternative:

- Alternative A1
- Alternative A2 (if any)
- Alternative A3 (if any)

m
m
m

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

Alternative:

- Alternative A1
- Alternative A2 (if any)
- Alternative A3 (if any)

Size of the site/servitude:

m ²
m ²
m ²

5. SITE ACCESS

Does ready access to the site exist?

YES ✓	
m	

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

Describe the type of access road planned:

The project development site is accessible from the N9. A new gravel road will be constructed from the N9 to the facility. This road will not be more than 6 meters wide and will consist of crushed aggregate.

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 (refer to Appendix C).

6. SITE OR 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:

- 6.1 The scale of the plan which must be at least a scale of 1:500;
- 6.2 The property boundaries and numbers of all the properties within 50 metres of the site;

³ "Alternative A." refers to activity, process, technology or other alternatives.

- 6.3 The current land use as well as the land use zoning of each of the properties adjoining the site or sites;
- 6.4 The exact position of each element of the application as well as any other structures on the site;
- 6.5 The position of services, including electricity supply cables (indicate above or underground), water supply pipelines, boreholes, street lights, sewage pipelines, storm water infrastructure and telecommunication infrastructure;
- 6.6 All trees and shrubs taller than 1.8 metres;
- 6.7 Walls and fencing including details of the height and construction material;
- 6.8 Servitudes indicating the purpose of the servitude;
- 6.9 Sensitive environmental elements within 100 metres of the site or sites including (but not limited thereto):
 - Rivers;
 - 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);
- 6.10 For gentle slopes the 1 metre contour intervals must be indicated on the plan and whenever the slope of the site exceeds 1:10, the 500mm contours must be indicated on the plan; and
- 6.11 The positions from where photographs of the site were taken.

A detailed site/route plan has been included in **Appendix A**.

7. 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 form. It must be supplemented with additional photographs of relevant features on the site, *if applicable*.

Photographs are included in **Appendix B**.

8. FACILITY ILLUSTRATION

A detailed illustration of the activity must be provided at a scale of 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 Site layout is attached in **Appendix C**.

9. ACTIVITY MOTIVATION

9(a) Socio-economic value of the activity

What is the expected capital value of the activity on completion?	PV: R 400 million CPV: R 600 million	
What is the expected yearly income that will be generated by or as a result of the activity?	R15 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 phase of the activity?	~140 (16 skilled, 72 semi-skilled and 52 low skilled)	
What is the expected value of the employment opportunities during the development phase?	Unknown at this stage	
What percentage of this will accrue to previously disadvantaged individuals?	Unknown at this stage	
How many permanent new employment opportunities will be created during the operational phase of the activity?	17 (5 skilled and 12 semi-skilled)	
What is the expected current value of the employment opportunities during the first 10 years?	R 30 million	
What percentage of this will accrue to previously disadvantaged individuals?	Unknown at this stage	

9(b) Need and desirability of the activity

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

NEED:		
1.	Was the relevant provincial planning department involved in the application?	NO ✓
2.	Does the proposed land use fall within the relevant provincial planning framework?	YES ✓
3.	If the answer to questions 1 and / or 2 was NO, please provide further motivation / explanation: The provincial planning department will be provided the opportunity to comment on this draft report.	

DESIRABILITY:			
1.	Does the proposed land use / development fit the surrounding area?	YES✓	
2.	Does the proposed land use / development conform to the relevant structure plans, SDF, and planning visions for the area?	YES✓	
3.	Will the benefits of the proposed land use / development outweigh the negative impacts of it?	YES✓	
4.	If the answer to any of the questions 1 - 3 was NO, please provide further motivation / explanation:		
5.	Will the proposed land use / development impact on the sense of place?		NO✓
6.	Will the proposed land use / development set a precedent?		NO✓
7.	Will any person's rights be affected by the proposed land use / development?		NO✓
8.	Will the proposed land use / development compromise the "urban edge"?		NO✓
9.	If the answer to any of the question 5 - 8 was YES, please provide further motivation / explanation.		

BENEFITS:			
1.	Will the land use / development have any benefits for society in general?	YES✓	
2.	Explain: 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.		
3.	Will the land use / development have any benefits for the local communities where it will be located?	YES✓	
4.	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.). Refer to the Social Impact Assessment contained in Appendix D.		

10. 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:

Title of legislation, policy or guideline: **Administering authority:** **Date:**

Promotion of Access to Information Act (Act No. 2 of 2000)	» National Department of Environmental Affairs	2000
Promotion of Administrative Justice Act (Act No. 3 of 2000)	» National Department of Environmental Affairs	2000
Guideline Documents		
Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads	» Provincial Department of Transport	
Provincial and Local Planning		
Land Use Planning Ordinance 15 of 1985	» Details land subdivision and rezoning requirements and procedures	1985
Camdeboo Local Municipality	» IDP	2012-2017
Policies and White Papers		
The White Paper on the Energy Policy of the Republic of South Africa (December 1998)	» N/A	1998
The White Paper on Renewable Energy (November 2003)	» N/A	2003
The White Paper on the Energy Policy of the Republic of South Africa (December 1998)	» N/A	N/A

11. WASTE, EFFLUENT, EMISSION AND NOISE MANAGEMENT

11(a) Solid waste management

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

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

YES ✓	
Packaging materials for the various components, excess concrete spillage and excess building materials will be produced on site during the construction phase.	

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

Waste bins/skips will be placed on site to collect the waste materials and these will be disposed of on a weekly/monthly basis dependent on quantities.

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

Reputable waste disposal companies will be used to dispose of the waste. These companies will be audited to ensure they dispose of waste effectively and legally.

Will the activity produce solid waste during its operational phase?

	NO ✓
m ³	

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

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

--

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

--

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

Can any part of the solid waste be classified as hazardous in terms of the relevant legislation?

	NO ✓
--	-------------

If yes, inform the competent authority and request a change to an application for scoping and EIA.

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.

11(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	
----------------	--

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.

Note: Effluent and wastewater will be collected in either conservancy tanks or portable toilets and will be removed from site on an on-going basis.

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:

--

11(c) Emissions into the atmosphere

Will the activity release emissions into the atmosphere?

	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 emissions in terms of type and concentration:

Solar energy installations operate by converting solar energy into electricity. This is characterised as a non-consumptive use of a natural resource and consumes no fuel for its continuing operation. Solar power produces an insignificant quantity of greenhouse gases over its lifecycle as compared to conventional coal-fired power stations. The operational phase of a solar facility does not produce carbon dioxide, sulphur dioxide, mercury, particulates, or any other type of air pollution.

11(d) 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:

There will be limited noise during construction. No noise will be generated during the operation of the facility.

12. WATER USE

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

Municipal ✓	Water board	Groundwater (Borehole) ✓	River, stream, dam or lake	Other	The activity will not use water
--------------------	-------------	---------------------------------	----------------------------	-------	---------------------------------

Water will be used to clean the PV/CPV panels once every three months, or more frequently if deemed necessary. It is anticipated that 500 m³ per annum is required during the operational phase. The volume of water that will be required during the construction phase is estimated to be 800 m³ over 12 months, peaking at 7m³ per day. If water is sourced from the municipality, it will be trucked into site. If the water is sourced from an on-site borehole, it will be transferred by piping as required to a central point from which it will be dispersed.

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:

42m ³ (operation)
YES ✓

Does the activity require a water use permit from the Department of Water Affairs?

If yes, please submit the necessary application to the Department of Water Affairs and attach proof thereof to this application if it has been submitted.

13. ENERGY EFFICIENCY

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

Not applicable.

Describe how alternative energy sources have been taken into account or been built into the design of the activity, if any:

This is not applicable, as the installation itself is a renewable/alternative energy project.

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 C and indicate the area, which is covered by each copy No. on the Site Plan.

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

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

2. 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.

All specialist reports must be contained in **Appendix D**.

Property description/physical address:

On Portion 1 on Farm Wildebeest Poorje
--

(Farm name, portion etc.) Where a large number of properties are involved (e.g. linear activities), please attach a full list to this application.

N/A

In instances where there is more than one town or district involved, please attach a list of towns or districts to this application.

Current land-use zoning:

Agriculture for Grazing

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✓	
------	--

Must a building plan be submitted to the local authority?

YES✓	
------	--

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 indication of the project site position as well as the positions of the alternative sites, if any;
- 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).

The locality map has been included and attached as **Appendix A**:

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	

Note: This portion gently slopes downwards in a north-eastern direction

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:

Alternative S1:

- 2.1 Ridgeline
- 2.2 Plateau
- 2.3 Side slope of hill/mountain
- 2.4 Closed valley
- 2.5 Open valley

2.6 Plain

2.7 Undulating plain / low hills

- 2.8 Dune
- 2.9 Seafront

Note: Region typifies a Karoo landscape of great open spaces surrounded by mountain chains that from the escarpment

3. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

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

	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
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.	YES ✓	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).

Alternative S1:

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.

The site lies within the Eastern Lower Karoo vegetation type Eastern Lower Karoo occupies 8321 km² of the plains and low hills of the southern Nama Karoo, from between Beaufort West and Aberdeen in the west to Pearston in the east. From north to south it is bounded by the mountains of the escarpment to the north and mountains and valleys of the Sundays River and Baviaans mountains. The vegetation type is listed as Least Threatened and less than 2% has been transformed.

Several different habitats and plant communities were evident. These different plant communities were associated with the different substrates present at the site. Three different plant communities were identified:

- The vegetation of the rocky hill which forms the south-western extent of the site
- The vegetation of the flat open plains which characterise the northern extent of the site
- A transitional vegetation type which occurs between the above two units

Typical and dominant species of the rocky slopes include shrubs such as *Rhigozum obovatum*, *Felicia filifolia*, *Phymaspermum parvifolium* and *Euryops anthemoides* and grasses such as *Aristida congesta*, *Aristida diffusa* and *Digitaria eriantha*. The vegetation of the rocky hill contained a greater proportion of taller shrubs and small trees such as *Boscia albitrunca*, *Carissa bispinosa*, *Diospyros glabra* and *Rhus longispina*. This vegetation type also contained a number of geophytes such as *Haemanthus albiflos*, *Whiteheadia bifolia*, and *Tritonia laxifolia* as well as succulents such as *Pleiospilos bolusii* and *Astroloba congesta*. Overall, this is considered to be a sensitive vegetation type on account of the higher slope of the area as well as the higher plant diversity and presence of several listed plant species. The lower slopes of the hill contained coarse soils and gravel and represent a transitional area between the rocky slope and the plain which is characterised by silty clay soils. As this area also contained some protected plant species and was quite steep and vulnerable to erosion, it is also considered a somewhat sensitive

habitat. Although there was some very minor drainage coming off the hill, these formed small channels cut into the gravel and specific vegetation had not developed around them.

The vegetation of the open plains is dominated by typical karoo shrubs and grasses such as *Pentzia incana*, *Rosenia glandulosa*, *Felicia muricata*, *Lycium cinereum*, *Eragrostis lehmanniana*, *Aristida adscensionis*. Scattered trees and large shrubs such as *Acacia karoo*, *Rhus longispina* and *Lycium oxycarpum* also occur. The only protected species observed on the plains was a single colony of *Aloe claviflora*, which was outside the proposed development footprint.

According to the SANBI SIBIS database, only one endangered species *Asparagus stipulaceus* is known from the area. No species which resemble *Asparagus stipulaceus* were observed at the site. A number of protected species were observed at the site, this includes *Aloe claviflora*, *Boscia albitrunca*, *Haemanthus albiflos* and *Pleiospilos bolusii*.

The site was relatively free of alien species and there were no serious problems with aliens, although a number of alien species were present such as *Nicotiana glauca*, *Argemone mexicana*, *Malva parviflora* and *Salsola kali* (refer to Appendix D1).

5. LAND USE CHARACTER OF SURROUNDING AREA

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

5.1 Natural area ✓

- 5.2 Low density residential
- 5.3 Medium density residential
- 5.4 High density residential
- 5.5 Informal residential ^A
- 5.6 Retail commercial and warehousing
- 5.7 Light industrial
- 5.8 Medium industrial ^{AN}
- 5.9 Heavy industrial ^{AN}
- 5.10 Power station
- 5.11 Office/consulting room
- 5.12 Military or police base/station/compound
- 5.13 Spoil heap or slimes dam ^A
- 5.14 Quarry, sand, or borrow pit
- 5.15 Dam or reservoir
- 5.16 Hospital/medical centre
- 5.17 School
- 5.18 Tertiary education facility
- 5.19 Church
- 5.20 Old age home
- 5.21 Sewage treatment plant ^A
- 5.22 Train station or shunting yard ^N
- 5.23 Railway line ^N

- 5.24 Major road (4 lanes or more) ^N
- 5.25 Airport ^N
- 5.26 Harbour
- 5.27 Sport facilities
- 5.28 Golf course
- 5.29 Polo fields
- 5.30 Filling station ^H
- 5.31 Landfill or waste treatment site
- 5.32 Plantation
- 5.33 Agriculture ✓ (Grazing)**
- 5.34 River, stream or wetland
- 5.35 Nature conservation area
- 5.36 Mountain, koppie or ridge
- 5.37 Museum
- 5.38 Historical building
- 5.39 Protected Area
- 5.40 Graveyard
- 5.41 Archaeological site
- 5.42 Other land uses (describe)

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

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

If YES, specify and explain:

If YES, specify:

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

If YES, specify and explain: If YES, specify:

6. 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

	NO ✓
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Archaeological or palaeontological sites, on or close (within 20m) to the site?

	NO ✓
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If YES, explain:

Note: No sites of heritage significance were found during the survey. However, the larger area is known for its fossil record and the palaeontological component of the project needs to be addressed as per the recommendations in Section 7 of the Heritage Report in Appendix D.

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

Briefly explain the findings of the specialist:

As above.

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 submit or, make sure that the applicant or a specialist submits the necessary application to SAHRA or the relevant provincial heritage agency and attach proof thereof to this application if such application has been made.

SECTION C: PUBLIC PARTICIPATION

1. ADVERTISEMENTS AND NOTICES

- » A stakeholder letter was distributed to the database which included key stakeholders and organs of state relevant to the proposed project. The stakeholder letters served to announce the proposed project, and announce the review period for the draft Basic Assessment Report.
- » The Background Information Document was distributed to relevant stakeholders, Organs of State and adjacent landowners.
- » An advert was placed in **Die Burger – Oos Kaap** (24 May 2012) and **Graaff Reinet Advertiser** (25 May 2012) to advertise the Basic Assessment process, the availability of the draft Basic Assessment Report and the public meeting.

Refer to **Appendix E** for proof of advert placement and distribution of the letters to stakeholders.

2. CONTENT OF ADVERTISEMENTS AND NOTICES

The contents of the notices and adverts were in accordance with the following requirements:

- (a) Indicate the details of the application which is subjected to public participation; and
- (b) State –
 - (i) That the application has been submitted to the competent authority in terms of these Regulations, as the case may be;
 - (ii) Whether basic assessment or scoping procedures are being applied to the application, in the case of an application for environmental Authorisation;
 - (iii) The nature and location of the activity to which the application relates;
 - (iv) Where further information on the application or activity can be obtained; and
 - (iv) The manner in which and the person to whom representations in respect of the application may be made.

3. PLACEMENT OF ADVERTISEMENTS AND NOTICES

Where the proposed activity may have impacts that extend beyond the municipal area where it is located, a notice must be placed in at least one provincial newspaper or national newspaper, indicating that an application will be submitted to the competent authority in terms of these regulations, the nature and location of the activity, where further information on the proposed activity can be obtained and the manner in which representations in respect of the application can be made, unless a notice has been placed in any Gazette that is published specifically for the purpose of providing notice to the public of applications made in terms of the EIA regulations.

Advertisements and notices must make provision for all alternatives.

The proposed installation is unlikely to result in any direct environmental impacts that extend beyond the municipal area where it is located. As such it was only deemed necessary to advertise in a regional and local newspaper.

The advertisement placed detailed the Basic Assessment process, the nature, and location of the proposed project, where further information on the proposed activity could be obtained and the manner in which representations on the application could be made. The advertisement also indicated the availability of the draft Basic Assessment Report for public review and the public meeting.

Copies of the advertisement and proof of placement is included within Appendix E.

4. DETERMINATION OF APPROPRIATE MEASURES

The practitioner must ensure that the public participation is adequate and must determine whether a public meeting or any other additional measure is appropriate or not based on the particular nature of each case. Special attention should be given to the involvement of local community structures such as Ward Committees, ratepayers associations and traditional authorities where appropriate. Please note that public concerns that emerge at a later stage that should have been addressed may cause the competent authority to withdraw any authorisation it may have issued if it becomes apparent that the public participation process was inadequate.

The use of a stakeholder database, stakeholder letters, advertisements, site notices, focus group meetings, and a public meeting (to be held on 7 June 2012 at the Aberdeen Public Library) is deemed adequate for the involvement of the public in the process.

5. COMMENTS AND RESPONSE REPORT

The practitioner must record all comments and respond to each comment of the public before the application 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 this application. The comments and response report must be attached under Appendix E.

No comments have been received to date. All comments received, as well as responses provided will be captured and recorded within the Comments and Response Report attached with the final Basic Assessment Report.

6. AUTHORITY PARTICIPATION

Please note that a complete list of all organs of state and or any other applicable authority with their contact details must be appended to the basic assessment report or scoping report, whichever is applicable.

Authorities are key interested and affected parties in each application and no decision on any application will be made before the relevant local authority is provided with the opportunity to give input.

Authorities were informed of the Basic Assessment process through the submission of a stakeholder letter, these included, but was not limited to:

- » The National Department of Rural Development and Land Reform: Eastern Cape Office
- » The National Department of Energy: Eastern Cape Office
- » South African National Parks (SANParks)
- » South African Heritage Resources Agency (SAHRA)
- » South African Civilian Aviation Authority
- » National Department of Agriculture, Forestry and Fisheries
- » Eskom
- » Eastern Cape Parks Board
- » Eastern Cape Department of Rural Development and Agrarian Reform
- » Eastern Cape Department of Economic Development and Environmental Affairs
- » Department of Water Affairs Eastern Cape
- » Department of Minerals and Energy Eastern Cape Regional Office
- » Camdeboo Local Municipality
- » Cacadu District Municipality

List of authorities from whom comments have been received:

To date no comment has been received from authorities.

7. CONSULTATION WITH OTHER STAKEHOLDERS

Note that, for linear activities, or 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.

Through the Basic Assessment Process other stakeholders will be registered on the I&AP database.

A stakeholder database of is attached in Appendix E.

Has any comment been received from stakeholders?

NO ✓

If "YES", briefly describe the feedback below (also attach copies of any correspondence to and from the stakeholders to this application):

All comments received, as well as responses provided will be captured and recorded within the Comments and Response Report attached with the final Basic Assessment Report.

SECTION D: IMPACT ASSESSMENT

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

1. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

List the main issues raised by interested and affected parties.

No comments have been received on the project to date. All comments received, as well as responses provided will be captured and recorded within the Comments and Response Report attached with the final Basic Assessment Report.

Response from the practitioner to the issues raised by the interested and affected parties (A full response must be given in the Comments and Response Report that must be attached to this report as Annexure E):

No comments have been received to date.

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

List the potential direct, indirect and cumulative property / activity / design / technology / operational alternative related impacts (as appropriate) 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.

2.1. IMPACTS THAT MAY RESULT FROM THE PLANNING AND DESIGN PHASE

Alternative (preferred alternative)

No impacts are anticipated that may result from the planning and design phase of the proposed development.

2.2. IMPACTS THAT MAY RESULT FROM THE CONSTRUCTION PHASE

Potential impacts associated with the construction of the proposed project are discussed below. The following methodology was used in assessing impacts related to the proposed development. All impacts are assessed according to the following criteria:

- » The **nature**, a description of what causes the effect, what will be affected, and how it will be affected.

- » The **extent**, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international. A score of between 1 and 5 is assigned as appropriate (with a score of 1 being low and a score of 5 being high).
- » The **duration**, wherein it is indicated whether:
 - * The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
 - * The lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
 - * Medium-term (5–15 years) – assigned a score of 3;
 - * Long term (> 15 years) - assigned a score of 4; or;
 - * Permanent - assigned a score of 5.
- » The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
 - * 0 is small and will have no effect on the environment;
 - * 2 is minor and will not result in an impact on processes;
 - * 4 is low and will cause a slight impact on processes;
 - * 6 is moderate and will result in processes continuing but in a modified way;
 - * 8 is high (processes are altered to the extent that they temporarily cease); and
 - * 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- » The **probability** of occurrence, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:
 - * Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
 - * Assigned a score of 2 is improbable (some possibility, but low likelihood);
 - * Assigned a score of 3 is probable (distinct possibility);
 - * Assigned a score of 4 is highly probable (most likely); and
 - * Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).
- » The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.
- » The **status**, which is described as either positive, negative or neutral.
- » The degree to which the impact can be reversed.
- » The degree to which the impact may cause irreplaceable loss of resources.
- » The degree to which the impact can be mitigated.

The **significance** is determined by combining the criteria in the following formula:

$S = (E+D+M) P$; where

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The **significance** weightings for each potential impact are as follows:

- » **< 30 points:** Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
- » **30-60 points:** Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- » **> 60 points:** High (i.e. where the impact must have an influence on the decision process to develop in the area).

The potential impacts associated with the construction of the proposed PV/CPV facility are discussed below. Specialist studies are included within Appendix D which detail the potential environmental impacts on heritage resources, the social environment, soil erosion and agricultural potential, ecological impacts (including flora and fauna), and visual impacts.

1. Potential impacts on Ecology

Six major risk factors associated with the development were identified. These are:

- » Disturbance and loss of vegetation and sensitive plant communities
- » Impacts on protected plant species
- » Increased risk of alien plant invasion
- » Increased soil erosion risk
- » Faunal habitat loss and disturbance
- » Negative impacts on avifauna

Impact tables summarising the significance of Ecological Impacts:

1.1. Potential impacts of disturbance or loss of indigenous natural vegetation

The site lies within the Eastern Lower Karoo vegetation type. The vegetation type is listed as Least Threatened and less than 2% has been transformed. It is however poorly conserved as less than 1% of a target of 16% falls within formally protected areas. Other vegetation types which occur in the vicinity of the site include Southern Karoo Riviere which characterises the drainage lines and rivers of the area and Camdebo Escarpment Thicket which occurs on mountain slopes and hillsides from Aberdeen to Graaff Reinet and Pearston. During the site visit 118 species were observed at the site. Three different plant communities were identified:

- » The vegetation of the rocky hill which forms the south-western extent of the site;

- » The vegetation of the flat open plains which characterize the northern extent of the site
- » A transitional vegetation type which occurs between the above two units.

The rocky slopes southeast of the substation and access road contained greater species richness than the plains to the north of the access road. Typical and dominant species of the rocky slopes include shrubs such as *Rhigozum obovatum*, *Felicia filifolia*, *Phymaspermum parvifolium* and *Euryops anthemoides* and grasses such as *Aristida congesta*, *Aristida diffusa* and *Digitaria eriantha*. The vegetation of the rocky hill contained a greater proportion of taller shrubs and small trees such as *Boscia albitrunca*, *Carissa bispinosa*, *Diospyros glabra* and *Rhus longispina*. This vegetation type also contained a number of geophytes such as *Haemanthus albiflos*, *Whiteheadia bifolia*, and *Tritonia laxifolia* as well as succulents such as *Pleiospilos bolusii* and *Astroloba congesta*. Overall, this is considered to be a sensitive vegetation type on account of the higher slope of the area as well as the higher plant diversity and presence of several listed plant species. The lower slopes of the hill contained coarse soils and gravel and represent a transitional area between the rocky slope and the plain which is characterised by silty clay soils. As this area also contained some protected plant species and was quite steep and vulnerable to erosion, it is also considered a somewhat sensitive habitat. Although there was some very minor drainage coming off the hill, these formed small channels cut into the gravel and specific vegetation had not developed around them.

The vegetation of the open plains is dominated by typical karoo shrubs and grasses such as *Pentzia incana*, *Rosenia glandulosa*, *Felicia muricata*, *Lycium cinereum*, *Eragrostis lehmanniana*, *Aristida adscensionis*. Scattered trees and large shrubs such as *Acacia karoo*, *Rhus longispina* and *Lycium oxycarpum* also occur. The only protected species observed on the plains was a single colony of *Aloe claviflora*, which was outside the proposed development footprint.

According to the SANBI SIBIS database, only one endangered species *Asparagus stipulaceus* is known from the area. No species which resemble *Asparagus stipulaceus* were observed at the site. A number of protected species were observed at the site, this includes *Aloe claviflora*, *Boscia albitrunca*, *Haemanthus albiflos* and *Pleiospilos bolusii*.

The site was relatively free of alien species and there were no serious problems with aliens, although a number of alien species were present such as *Nicotiana glauca*, *Argemone mexicana*, *Malva parviflora* and *Salsola kali*. The presence of these species at the site indicates that the disturbance associated with the development of the site would be likely to encourage the invasion of the cleared areas by some of these species.

The site lies within the planning domain of the Eastern Cape Biodiversity Conservation Plan (Berliner & Desment 2007). This biodiversity assessment identifies Critical Biodiversity Areas (CBAs) which represent biodiversity priority areas which should be maintained in a natural to near natural state. The site does not lie within a CBA and there are no CBAs within the site.

<i>Nature: Loss and disturbance of vegetation and sensitive plant communities due to road and PV array construction activities</i>		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Medium (6)	Low (2)
Probability	Highly Probable (4)	Probable (3)
Significance	Medium (44)	Low (21)
Status (positive or negative)	Negative	
Reversibility	Low	
Irreplaceable loss of resources?	Yes	
Can impact be mitigated?	Yes	
Mitigation measures:		
<ul style="list-style-type: none"> » Vegetation clearing to be kept to a minimum. If possible the ground grass layer should be left intact and only the larger woody plants cleared. » All areas to be cleared should be clearly demarcated. » Sensitive areas as demarcated on the sensitivity map should be avoided, and where such areas occur within or near the development area, they should be clearly demarcated as no-go areas. » Sensitive areas with appropriate buffers at the site such as the washes should be demarcated at the site by an ecologist as part of the preconstruction activities for the site. 		
Cumulative impact:		
<ul style="list-style-type: none"> » No other known developments nearby so the potential for cumulative impacts appears to be low 		
Residual impact:		
<ul style="list-style-type: none"> » Some loss of vegetation and habitat is inevitable 		

<i>Nature: Increased alien plant invasion risk, resulting from construction-phase disturbance as well as operational phase maintenance activities</i>		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Short-term (1)
Magnitude	Medium (3)	Low (2)
Probability	Highly Probable (4)	Improbable (2)
Significance	Medium (32)	Very Low (8)
Status (positive or negative)	Negative	
Reversibility	Moderate	

Irreplaceable loss of resources?	Yes
Can impact be mitigated?	Yes
Mitigation measures:	
<ul style="list-style-type: none"> » Soil disturbance and vegetation clearing should be kept to minimum. » Cleared areas that are not going to be used should be re-vegetated with locally-collected seed of indigenous species. » Regular monitoring to ensure that alien plants are not increasing as a result of the disturbance that has taken place. » All alien plants present at the site should be controlled annually using the best practice methods for the species present. » Bare soil should be kept to a minimum, and at least some grass or low shrub cover should be encouraged under the panels. 	
Cumulative impact:	
<ul style="list-style-type: none"> » A high density of alien species at the site would contribute to maintaining a high alien propagule pressure on the surrounding landscape 	
Residual impact:	
<ul style="list-style-type: none"> » If alien species are regularly controlled residual impacts would be minimized. 	

<i>Nature: Increased erosion risk as a result of soil disturbance and loss of vegetation cover</i>		
	Without mitigation	With mitigation
Extent	Local (2)	Local (1)
Duration	Long-term (4)	Short-term (1)
Magnitude	Medium (4)	Low (2)
Probability	Highly Probable (4)	Improbable (2)
Significance	Medium (40)	Very Low (8)
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	Yes	No
Can impact be mitigated?	Yes	
Mitigation measures:		
<ul style="list-style-type: none"> » Wherever possible, roads and tracks should be constructed so as to run along the contour. » All roads and tracks running down the slope must have water diversion structures present. » Any extensive cleared areas that are no longer or not required for construction activities should be re-seeded with locally-sourced seed of suitable species. Bare areas can also be packed with brush removed from other parts of the site to encourage natural vegetation regeneration and limit erosion potential. » All construction vehicles should remain on properly demarcated roads. No construction vehicles should be allowed to drive over the vegetation except where no cleared roads are available. In such cases a single track should be used and multiple paths should not be formed » Regular monitoring for erosion to ensure that no erosion problems are occurring at the site as a result of the roads and other infrastructure. All erosion problems observed should be rectified as soon as possible, using the appropriate erosion 		

control structures.
Cumulative impact:
» Higher sediment loads in rivers and streams will affect in-stream vegetation and biota
Residual impact:
» If erosion at the site is controlled, then there will be no residual impact

Implications for Project Implementation

- » There should be no development in areas of high sensitivity (See Figure 3: Habitat sensitivity map)

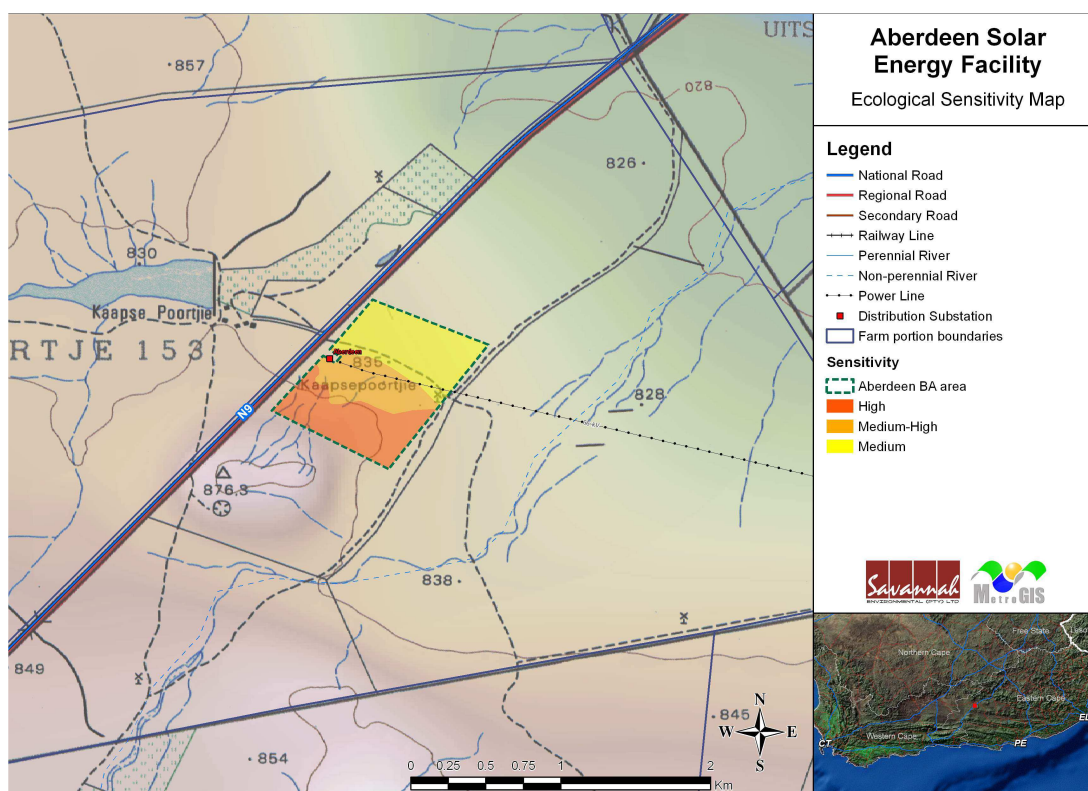


Figure 3: Habitat sensitivity map

1.2. Potential impacts of Loss of habitat for threatened and protected animals and birds

The site falls within the distribution range of 44 terrestrial mammals, indicating that the mammalian diversity at the site is likely to be of moderate to high diversity. Of the species which are known to occur in the area, only the Honey Badger (Endangered) and Leopard (Near Threatened) are listed. It is unlikely that the Leopard occurs within the site given the open nature of the habitat and agricultural activity that takes place in the area. The erection of fencing which prevents the movement of animals is a potential concern regarding the development of the site. However, the site occurs in close proximity to the N9 road, which is already fenced on either side by restrictive mesh fencing.

The site lies in or near the distribution range of at least 39 reptile species (refer to Appendix 3 of the ecological specialist report contained in Appendix D), indicating that the reptile diversity at the site is likely to be of moderate to low diversity.

Species observed at the site include Burchells' Sand Lizard and the Spotted Skaapstekker, both of which are likely to be widespread at the site. In terms of reptile habitats at the site, the rocky hill is likely to be of greater significance for reptiles as it contains a wider array of habitats and shelter for species which require rock crevices. No listed reptile species are known from the area and given the small extent of the development, the impact on reptiles is likely to be local in extent and of a generally low significance.

The site lies within the distribution range of six amphibian species. Potential breeding habitats observed in and near the site include a small dam on the slopes of the rocky hill as well as a shallow artificial pan along the N9. The pan is, however, outside the proposed development footprint and would not be directly impacted by the development. The only species of conservation concern which may occur at the site is the Giant Bullfrog which is listed as Near Threatened.

According to the bird data sets which are available on the SANBI SIBIS data portal which includes the SABAP 1 and SAFRING data sets, 159 bird species are known from the broad area surrounding the BioTherm Aberdeen site. The area has however been poorly sampled and the list probably does not include many species which are occasional visitors to the area. Although power lines pose a high risk to the listed species which occur in the area, the site is immediately adjacent to the substation and the length of any new power lines that would be required would be very short. Therefore the actual impact is likely to be low.

The site lies within the distribution range of as many as 25 bat species, indicating that the richness of bats at the site is potentially very high. The lack of wetlands and large drainage lines at the site, as well as the unlikelihood of any cave roosts in the vicinity suggests that the site is not likely to contain an abundance of species associated with these habitats.

The site lies within the distribution range of 27 amphibian species, which indicates that amphibian diversity at the site is potentially very high. The only listed species which may occur at the site is the Giant Bullfrog which is listed as Near Threatened. As there is no suitable breeding habitat for this species within or near the site, the site is not likely to be an important habitat for this species. Given that there are no pans, rivers or permanent water sources within the proposed development area, the impact on amphibians is likely to be local in

nature and of low magnitude.

The reptile fauna species of this region observed at the site include the Variable Skink, Striped Skink, Common Rough-scaled Lizard and Peter's Ground Agama. It is unlikely that any listed or highly localized reptile species occur at the site as it lacks specialised habitat for such species. Similarly, given the homogenous nature of the site, there were specific habitats present at the site which are likely to be of greater significance for reptiles.

Listed bird species observed at the site include the Southern Ground Hornbill and the Red-billed Oxpecker, but a large proportion of the other species (see Appendix D for Ecology Report and detailed Bird List: Table 1) are also likely to frequent the site or pass through the area occasionally. Overall the development is likely to result in some habitat loss for resident bird species, which is to some extent mitigated by the proximity of the site to the tar road and the mine.

Nature: Faunal habitat destruction, alteration and physical disturbance.		
	Without mitigation	With mitigation
Extent	Local (2)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Medium (4)	Medium-Low (3)
Probability	Highly Probable (4)	Probable (3)
Significance	Medium (40)	Low (24)
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	To some extent	
Mitigation measures:		
<ul style="list-style-type: none"> » 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 off of the construction site. » Fires should only be allowed within fire-safe demarcated areas. » No fuel wood collection should be allowed on-site. » No dogs should be allowed on site. » 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. » No unauthorized persons should be allowed onto the site. » Staff present during the operational phase should receive environmental education so as to ensure that that no hunting, killing or harvesting of plants and animals occurs. » Should the site need to be fenced, the fencing should be constructed in manner which allows for the passage of small and medium sized mammals. Steel palisade 		

<p>fencing (20 cm gaps min) is a good option in this regard as it allows most medium-sized mammals to pass between the bars, but remains an effective obstacle for humans. Alternatively the lowest strand or bottom of the fence should be elevated to 15 cm above the ground at least at strategic places to allow for fauna to pass under the fence.</p> <p>» If electrified strands are to be use, there should be no strands within 20 cm of the ground because tortoises retreat into their shells when electrocuted and eventually succumb from repeated shocks.</p>
<p>Cumulative impact: The development would contribute to cumulative faunal impacts in the area, but the extent is small and so the contribution to cumulative impacts would be low..</p>
<p>Residual impact: There will be some loss of habitat and landscape connectivity for fauna regardless of mitigation.</p>

<i>Nature: Negative impacts on avifauna, including listed species as a result of habitat loss, electrocution and collisions with transmission lines.</i>		
	<i>Without mitigation</i>	<i>With mitigation</i>
<i>Extent</i>	Local (2)	Local (1)
<i>Duration</i>	Long-term (4)	Short-term (4)
<i>Magnitude</i>	Medium (4)	Low (1)
<i>Probability</i>	Probable (3)	Improbable (1)
<i>Significance</i>	Low (30)	Very Low (6)
<i>Status (positive or negative)</i>	Negative	Negative
<i>Reversibility</i>	Low	Low
<i>Irreplaceable loss of resources?</i>	No	No
<i>Can impact be mitigated?</i>	Yes	
<i>Mitigation measures:</i>		
<p>» The length of any new power lines that need to be installed should be kept to a minimum.</p> <p>» Ensure that all new lines are marked with bird flight diverters along their entire length. If the new lines were to run parallel to existing unmarked lines this would potentially create a net benefit as this could reduce the collision risk posed by the older line.</p> <p>» 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.</p> <p>» 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..</p>		
<i>Cumulative impact:</i>		
<p>» The development would contribute to cumulative avifaunal impacts in the area resulting from electrocution and collisions. But given the proximity of the development to the substation, any contribution to impacts are likely to be very small</p>		

Residual impact:

- » There will be some loss of habitat and increased risk of collisions for avifauna

Implications for Project Implementation

- » There are places where internal access roads and underground cables are proposed to cross untransformed natural habitat. If possible, construction of these ancillary infrastructures should avoid untransformed natural habitat and follow existing disturbances on site.
- » Use should be made of various bird mitigation measures is paramount, included but not limited to bird flight devices for the power line being more visible.

2. Impacts on Geology, soils, and Agricultural Potential

The study area is underlain by gently folded rocks of the Teekloof Formation (Permian age) which forms the upper part of the Adelaide Subgroup of the Beaufort Group to the west of 24°E. The Teekloof Formation comprises mainly grey mudstones and subordinate fine grained feldspathic sandstone. The dominant soil types can be classified according to the Universal Soil Classification system as SM and GM types (poorly graded silty sands and poorly graded silty gravels with non-plastic fines, respectively). The distribution of alluvium can also be distinguished on the aerial photo by its light brown colour. On the plains between the main drainage lines, the bedrock is very shallow and outcrops are noted in many areas. Generally speaking, the soil cover over most of the farm is very thin (<300mm).

The dominant soil form is Hutton with effective depths of 80 – 350mm and underlain by bedrock. Topsoil texture is loamy fine sand with B-horizon texture varying from sandy loam to sand clay loam. Glenrosa soil form with depths of 100 – 300mm with similar textures as the Hutton soils, occur sub-dominantly. In the floodplains, Oakleaf soil forms are dominant, with depths of 500 – 1200mm and sandy loam topsoils and sandy loam to clay loam textures in the subsoil.

In addition to the soil characteristics, climatic factors are also important because the annual rainfall needs to be adequate to sustain a viable crop production. The combined low rainfall and high evaporation rates result in a serious limitation to agricultural potential of the site. In summary, the agricultural potential of the site is considered to be low and limited to extensive grazing by small stock and game. The carrying capacity is low (estimated at \pm 6 hectares per small stock unit (SSU)), rainfall is low and erratic and soils are shallow with low water holding capacities. Irrigation water is not available for use on the proposed site which is limited by the shallow soils and other inherent soil restraints. Irrigation is therefore not considered a viable option.

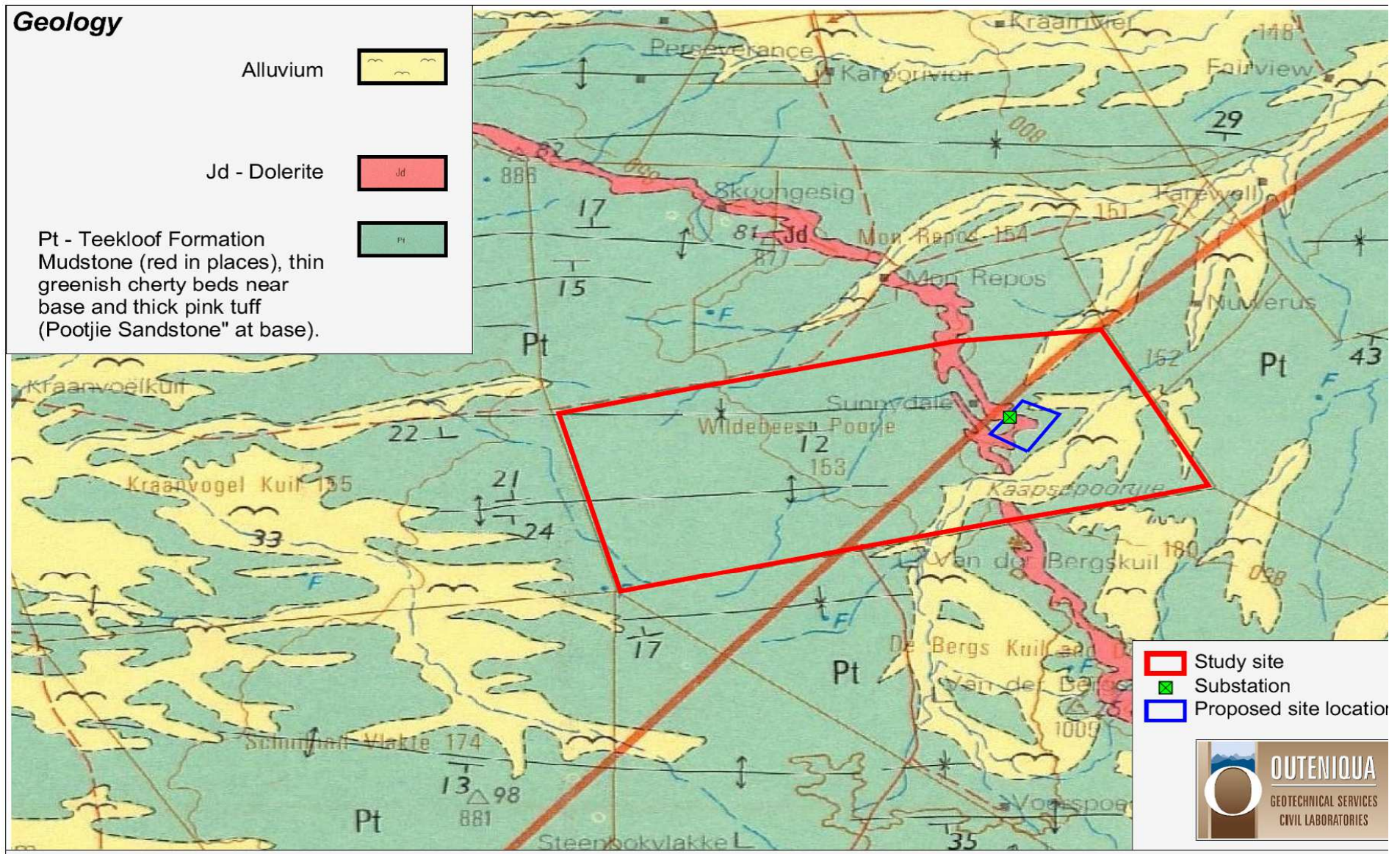


Figure 7: Geological map

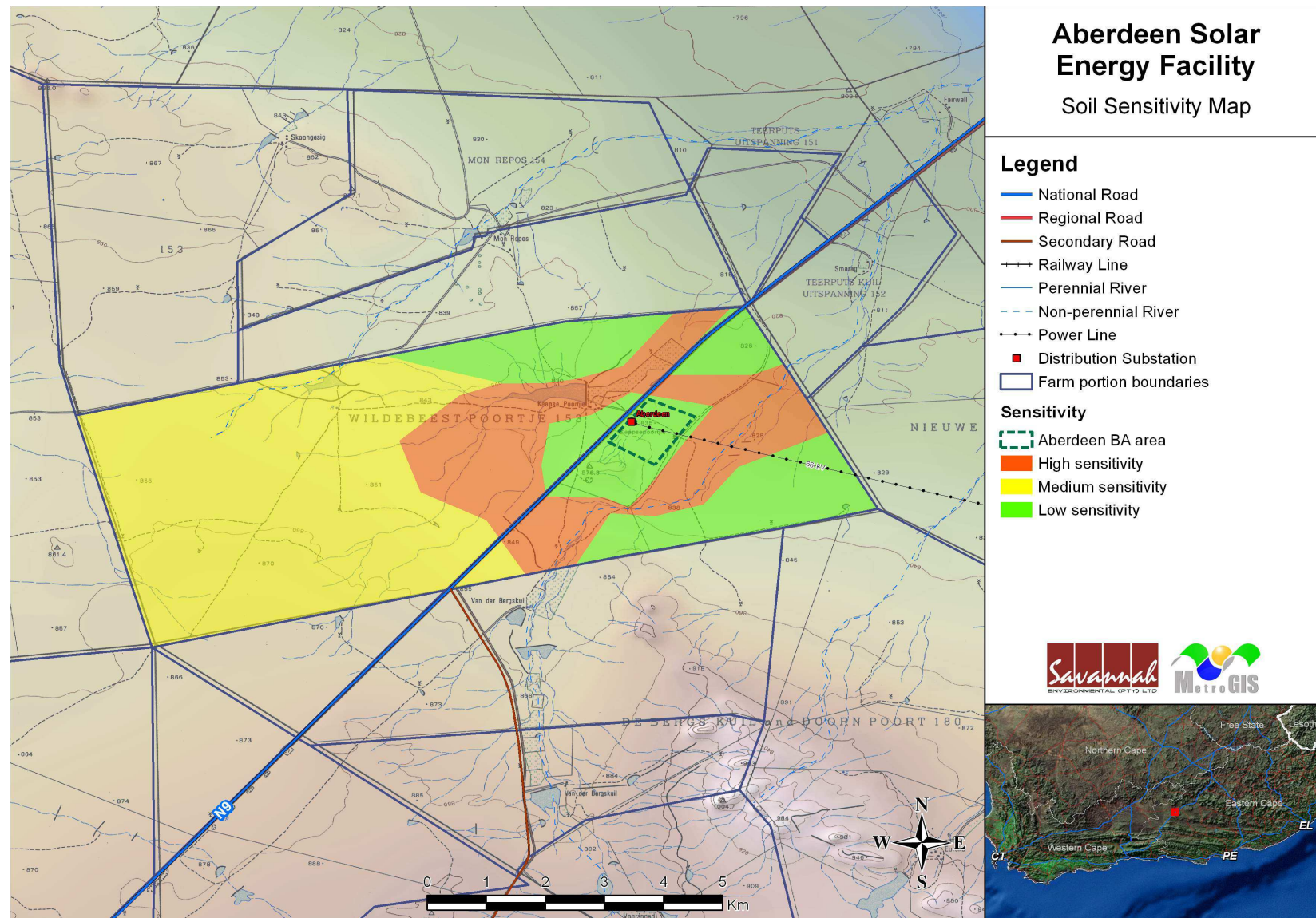


Figure 8: Soil sensitivity map of Portion 1 Farm Wildebeest Poorje which is located in the Camdeboo Local Municipality (CLM) area

Nature: Soil degradation (soil removal, mixing, compaction, etc.) due to the construction of foundations for structures (PV panels, buildings, substations, power lines).		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Short term (2)	Very Short term (1)
Magnitude	Minor (2)	Minor (2)
Probability	Definite (5)	Definite (5)
Significance	Low (25)	Low (20)
Status (positive or negative)	Negative	Negative
Reversibility	Partially reversible	Partially reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes.	
Mitigation measures:		
» Rehabilitate topsoil & vegetation around site after construction		
Cumulative impact:		
» The cumulative impact of earthworks in the area is considered low at this stage due to the low density of development in the area. Further development of the area may have increasing impact on the natural soil.		
Residual impact:		
» Minor loss of soil under structures.		

Nature: Soil degradation (soil removal, mixing, compaction, etc.) due to the construction of new access roads.		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Minor (2)
Probability	Definite (5)	Definite (5)
Significance	Moderate (45)	Moderate (35)
Status (positive or negative)	Negative	Negative
Reversibility	Irreversible	Reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes.	
Mitigation measures:		
» Use existing roads if possible/practical.		
» Minimise the length and width of new access roads (preferably just gravel tracks).		
» Maintain access roads in good condition, preventing detours due to bad road conditions		
Cumulative impact:		
» The cumulative impact of earthworks in the area is considered low at this stage due to the low density of development in the area. Further development of the area may have an increasing impact on the natural soil.		
Residual impact:		
» Minor loss of structures under roads.		

Nature: Soil degradation due to pollution of soil by contaminants used on site during construction (e.g. fuel, oil, chemicals, cement).		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Medium term (3)	Very short term (1)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Low (18)	Low (12)
Status (positive or negative)	Negative	Negative
Reversibility	Partially reversible	Partially reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation measures:		
<ul style="list-style-type: none"> » Control use and disposal of potential contaminants or hazardous materials. » Remove contaminants and contaminated topsoil and replace topsoil in affected areas.. 		
Cumulative impact:		
<ul style="list-style-type: none"> » The cumulative impact of soil pollution is considered low at present due to the undeveloped nature of the area but further development may have an increasing impact. 		
Residual impact:		
<ul style="list-style-type: none"> » Minor loss of soil potential 		

Nature: Soil degradation due to increased soil erosion by wind and/or water on construction areas.		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long term (4)	Short term (1)
Magnitude	Low (4)	Low (4)
Probability	Very probable (4)	Very probable (4)
Significance	Moderate (36)	Low (24)
Status (positive or negative)	Negative	Negative
Reversibility	Practically irreversible	Practically irreversible
Irreplaceable loss of resources?	Practically irreplaceable	Practically irreplaceable
Can impacts be mitigated?	Yes.	
Mitigation measures:		
<ul style="list-style-type: none"> » Minimise size of the construction footprint/camp. » Restrict activity outside of construction camp areas. » Implement effective erosion control measures around site. » Carry out earthworks in phases across site to reduce the area of exposed ground at any one time. » Protect and maintain denuded areas and material stockpiles to minimise erosion and instability 		

<p>Cumulative impact:</p> <p>» The cumulative impact of soil erosion is considered low at present due to the undeveloped nature of the area but further development may have an increasing impact on soil erosion.</p>
<p>Residual impact:</p> <p>» Minor localised erosion.</p>

Nature: Impact on existing land-use.	
	Without mitigation
Extent	Local (1)
Duration	Long term (4)
Magnitude	Minor (2)
Probability	Probable (4)
Significance	Low (28)
Status	Negative
Reversibility	Reversible
Irreplaceable loss of resources?	No
Can impacts be mitigated?	No
Mitigation:	
» None possible.	
Cumulative impacts:	
» The cumulative impact on land use is considered low at present due to the low intensity land-use practised on the site.	
Residual impacts:	
» Insignificant temporary loss of grazing land while facility is in use.	

Nature: Reduction in agricultural potential		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (4)	Probable (4)
Significance	Low (28)	Low (28)
Status	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	
Mitigation: None possible		
Cumulative impacts:		
» The cumulative impact of a reduction in the agricultural potential is considered low at present due to the low potential of the area		
Residual impacts:		
» Minor loss of grazing land while facility is in use		

An assessment of the potential indirect impacts associated with the proposed development is tabulated below;

<i>Nature: Degradation of waterways due to increased siltation downstream from site.</i>		
	Without mitigation	With mitigation
Extent	Regional (3)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Moderate (33)	Low (21)
Status	Negative	Negative
Reversibility	Irreversible	Irreversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none"> » Install anti-erosion measures such as silt fences, geosynthetic erosion protection, and/or flow attenuation along watercourses below construction sites. » Strictly control activity near water courses/natural drainage lines as sediment transport is higher in these areas. » Minimise increased run-off from hard surfaces (PV panels) by channelising and capturing rainwater for re-use (rainwater harvesting) 		
Cumulative impacts:		
<ul style="list-style-type: none"> » The cumulative impact of siltation in the area is considered low at present but further development may have an increasing impact on siltation of waterways. 		
Residual impacts:		
<ul style="list-style-type: none"> » Minor localised movement of soil across site 		

<i>Nature: Increased dust pollution from construction sites affecting surroundings.</i>		
	Without mitigation	With mitigation
Extent	Regional (2)	Local (1)
Duration	Very short term (1)	Very short term (1)
Magnitude	Low (4)	Minor (2)
Probability	Highly probable (4)	Highly probable (4)
Significance	Low (28)	Low (16)
Status	Negative	Negative
Reversibility	Irreversible	Irreversible
Irreplaceable loss of resources?	Yes, minor	Yes, insignificant
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none"> » Apply dust control measures such as straw bales or dampen dusty denuded areas. 		
Cumulative impacts:		
<ul style="list-style-type: none"> » The cumulative impact of dust in the area is considered low. 		
Residual impacts:		
<ul style="list-style-type: none"> » Minor localised dust pollution 		

Nature: Reduction in demand for non-renewable energy sources.		
	Without mitigation	With mitigation
Extent	National (3)	n/a
Duration	Long term (4)	n/a
Magnitude	Moderate (6)	n/a
Probability	Very probable (4)	n/a
Significance	Moderate (52)	n/a
Status	Positive	
Reversibility		
Irreplaceable loss of resources?		
Can impacts be mitigated?		
Mitigation: Not necessary		
Cumulative impacts: » The cumulative positive impact on a national scale is considered very high		
Residual impacts:		

Implications for Project Implementation

- » Erosion is considered to be a moderate risk on the site.
- » Impacts on soil and geology can be mitigated by effective implementation of the EMP to reduce the impact to a low, acceptable level.

3. Impacts on Heritage Resources

During the survey no sites of heritage significance were identified on the proposed development site. Isolated stone tools on fine grained material are however scattered over the site in extremely low frequencies and are therefore not considered as sites but rather as find spots. The artefacts found possibly belong to the MSA (figure 9) (possibly pre-Stilbaai) and LSA (figure 10). The MSA artefacts are not pristine and show signs of water weathering. The convergent flake in figure 9 show signs of edge modification/damage.



Figure 9. Possible Middle Stone Age artefacts



Figure 10: Possible Later Stone Age artefacts

Nature: During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.		
	Without mitigation	With mitigation
Extent	Local (2)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (2)	Low (1)
Probability	Probable (1)	Probable (1)
Significance	9 (low)	8 (low)
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impact be mitigated?	Yes	
Mitigation measures:		
» No sites were identified during the survey. However, if any archaeological material is uncovered during construction or operation a qualified archaeologist must be contacted to verify and record the find. Mitigation will then include documentation and sampling of the material. This will also be required if any paleontological material is uncovered..		
Cumulative impact:		
» Archaeological sites are non-renewable and impact on any archaeological context or material will be permanent and destructive.		
Residual impact:		
Depletion of archaeological record of the area.		

Implications for Project Implementation

- » It is recommended that the construction crew is educated about the potential palaeontological and heritage resources they could encounter during the construction phase of the project. This includes basic training for construction staff on possible finds, action steps for mitigation measures, surface collections, and communication routes to follow in the case of a discovery.
- » If any fossils are exposed (e.g. vertebrate teeth, bones, burrows, petrified wood) during construction, all operations must stop in the affected area until the finds are assessed by a palaeontologist
- » If, during construction, any archaeological finds are made (e.g. stone tools, skeletal material), the operations must be stopped, and the archaeologist must be contacted for an assessment of the finds.

4. Impacts on the visual aesthetics

Construction periods are often characterised by an increase in construction vehicles and personnel and their associated impacts such as dust clouds, noise, potential pollution, safety considerations, etc.

Nature: Potential visual impact of the construction period on visual receptors.		
	Without mitigation	With mitigation
Extent	Regional (3)	Local (2)
Duration	Very short term (1)	Very short term (1)
Magnitude	Medium (6)	Medium(6)
Probability	Probable (3)	Improbable (2)
Significance	Medium(30)	Low (18)
Status (positive or negative)	Negative	Negative
Reversibility	Recoverable	Recoverable
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Mitigation measures:		
<ul style="list-style-type: none"> » A Construction Phase and Operational Phase Environmental Management Programme must be prepared which would guide and control all aspects of the activity, including visual aspects. » An Environmental Control Officer (ECO) must be appointed to oversee the construction process and ensure compliance with conditions of approval. » Reduce and control dust through the use of approved dust suspension techniques as and when required. » Rehabilitate all disturbed areas (construction sites and roads) immediately after completion of construction works. 		
Cumulative impact:		
<ul style="list-style-type: none"> » None. 		
Residual impact:		
<ul style="list-style-type: none"> » None. 		

5. Impacts on the socio-economic environment

Potential positive impacts

- » Creation of employment and business opportunities and opportunity for skills development and on-site training

Potential negative impacts

- » Impacts associated with the presence of construction workers on site
- » Increased risk of stock theft, poaching and damage to farm infrastructure associated with presence of construction workers on the site
- » Increased risk of veld fires associated with construction-related activities
- » Threat to safety and security of farmers associated with the presence of construction workers on site
- » Impact of heavy vehicles, including damage to roads, safety, noise and dust
- » Potential loss of grazing land associated with construction-related activities.

The significance of the potential negative impacts with mitigation was assessed to be of Low significance. The majority of the potential negative impacts can

therefore be effectively mitigated if the recommended mitigation measures are implemented. However, the impact on individuals who are directly impacted on by construction workers and or job seekers (i.e. contract HIV/ AIDS) was assessed to be of Medium-High negative significance. In addition, due to the low population density of the area and the relatively small size of the labour force (80) the potential risk to local family structures and social networks is regarded as low.

Nature: Creation of employment and business opportunities during the construction phase

The construction phase is expected to extend over a period of 12-18 months and create approximately 80 employment opportunities. It is anticipated that approximately 60 % (48) of the employment opportunities will be available to low skilled (construction labourers, security staff etc.), 25% (20) to semi-skilled workers (drivers, equipment operators etc.) and 15% (12) to skilled personnel (engineers, land surveyors, project managers etc.). The majority of the low-skilled employment opportunities associated with construction phase are, therefore, likely to be available to members from the local community. In this regard the majority of the beneficiaries are likely to be historically disadvantaged (HD) members of the community. The low education and skills levels in the area may however hamper potential opportunities for local communities. The majority of the skilled and semi-skilled opportunities are likely to be associated with the contractors appointed to construct the facility and associated infrastructure. In terms of training, the contractors are likely to provide on-site training and skills development opportunities. However, the majority of benefits are likely to accrue to personnel employed by the relevant contractors. In the absence of specific commitments from the developer to employ local contractors the potential for meaningful skills development and training for members from the local communities are likely to be limited.

	Without enhancement	With enhancement
Extent	Local – Regional (2) (Rated as 2 due to potential opportunities for local communities and businesses)	Local – Regional (3) (Rated as 3 due to potential opportunities for local communities and businesses)
Duration	Short Term (2)	Short Term (2)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Highly probable (4)
Significance	Low (24)	Medium (36)
Status (positive or negative)	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	N/A	N/A
Can impact be enhanced?	Yes	
Mitigation measures:		
» Maximise the use of local labour for low – semi skilled jobs far as possible.		
Cumulative impact:		
» Opportunity to up-grade and improve skills levels in the area. However, due to		

relatively small number of local employment opportunities this benefit is likely to be limited.

Residual impact:

- » Improved pool of skills and experience in the local area. However, due to relatively small number of local employment opportunities this benefit is likely to be limited.

Nature: Potential impacts on family structures and social networks associated with the presence of construction workers

The presence of construction workers poses a potential risk to family structures and social networks in the area. In addition there are a number of potentially vulnerable farming activities, such as livestock farming.

While the presence of construction workers does not in itself constitute a social impact, the manner in which construction workers conduct themselves can impact on the local community. In this regard the most significant negative impact is associated with the disruption of existing family structures and social networks. This risk is linked to the potential behaviour of male construction workers, including:

- » An increase in alcohol and drug use
- » An increase in crime levels
- » The loss of girlfriends and or wives to construction workers
- » An increase in teenage and unwanted pregnancies
- » An increase in prostitution
- » An increase in sexually transmitted diseases (STDs)

Employing members from the local community to fill the low-skilled job categories can help to reduce the risk and mitigate the potential impacts on the local communities. These workers will be from the local community and form part of the local family and social network and, as such, the potential impact will be low. The use of local residents to fill the low skilled job categories will also reduce the need to house construction workers on the site. However, due to the potential mismatch of skills and low education levels, the potential employment opportunities for the members from these local communities may be low.

	Without Mitigation	With Mitigation
Extent	Local (3) (Rated as 3 due to potential severity of impact on local communities)	Local (2) (Rated as 1 due to potential severity of impact on local communities)
Duration	Short term for community as a whole (2) Long term-permanent for individuals who may be affected by STDs etc. (5)	Short term for community as a whole (2) Long term-permanent for individuals who may be affected by STDs etc. (5)
Magnitude	Low for the community as a whole (4) High-Very High for specific	Low for community as a whole (4) High-Very High for

	individuals who may be affected by STDs etc. (10)	specific individuals who may be affected by STDs etc. (10)
Probability	Probable (3)	Probable (3)
Significance	Low for the community as a whole (27) Moderate-High for specific individuals who may be affected by STDs etc. (57)	Low for the community as a whole (24) Moderate-High for specific individuals who may be affected by STDs etc. (51)
Status	Negative	Negative
Reversibility	No in case of HIV and AIDS	No in case of HIV and AIDS
Irreplaceable loss of resources?	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods	
Can impact be mitigated?	Yes, to some degree. However, the risk cannot be eliminated	
<p>• Mitigation:</p> <ul style="list-style-type: none"> • Where possible, BioTherm 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. • BioTherm should consider the establishment of a Monitoring Forum (MF) for the construction phase which should be established before the construction phase commences and should include key stakeholders, including representatives from the local community, local councillors, farmers, and the contractor. The role of the MF would be to monitor the construction phase and the implementation of the recommended mitigation measures. The MF should also be briefed on the potential risks to the local community associated with construction workers. • BioTherm and the contractor should, in consultation with representatives from the MF, develop a Code of conduct for the construction phase. The code should identify what types of behaviour and activities by construction workers are not permitted. Construction workers that breach the code of good conduct should be dismissed. All dismissals must comply with the South African labour legislation. • BioTherm and the contractor should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase. • The movement of construction workers on and off the site should be closely managed and monitored by the contractors. In this regard the contractors should be responsible for making the necessary arrangements for transporting workers to and from site on a daily basis. • The contractor should make the necessary arrangements for allowing workers from outside the area to return home over weekends and or on a regular basis during the 6-12 month construction phase. This would reduce the risk posed by construction 		

<p>workers to local family structures and social networks.</p> <ul style="list-style-type: none"> It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay overnight on the site. This will make it possible to manage the potential impacts effectively.
<p>Cumulative impacts:</p> <p>» Impacts on family and community relations that may, in some cases, persist for a long period of time. Also in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community</p>
<p>Residual impacts:</p> <p>See cumulative impacts.</p>

<p>Nature: <i>Potential loss of livestock, poaching and damage to farm infrastructure associated with the presence of construction workers on site</i></p> <p>The presence of construction workers on the site increases the potential risk of stock theft and poaching. The movement of construction workers on and off the site also poses a potential threat to farm infrastructure, such as fences and gates, which may be damaged. Stock and game losses may also result from gates being left open and/or fences being damaged</p>		
	Without Mitigation	With Mitigation
Extent	Local (4) (Rated as 4 due to potential severity of impact on local farmers)	Local (2)
Duration	Short Term (2)	Short Term (2)
Magnitude	Moderate (6) (Due to reliance on agriculture and livestock for maintaining livelihoods)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (36)	Low (24)
Status	Negative	Negative
Reversibility	Yes, compensation paid for stock losses etc.	Yes, compensation paid for stock losses etc.
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	Yes
<p>Mitigation:</p> <p>» BioTherm should enter into an agreement with the affected landowners whereby the company will compensate for damages to farm property and disruptions to farming activities. This includes losses associated with stock theft and damage to property etc.</p> <p>» BioTherm should investigate the option of establishing a MF (see above) that includes local farmers and develop a Code of Conduct for construction workers. Should such a MF be required it should be established prior to commencement of</p>		

<p>the construction phase. The Code of Conduct should be signed by BioTherm and the contractors before the contractors move onto site.</p> <ul style="list-style-type: none"> » BioTherm should hold contractors liable for compensating farmers and communities in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. This should be contained in the Code of Conduct to be signed between BioTherm, the contractors and neighbouring landowners. The agreement should also cover losses and costs associated with fires caused by construction workers or construction related activities (see below). » The EMP must outline procedures for managing and storing waste on site, specifically plastic waste that poses a threat to livestock if ingested. » Contractors appointed by BioTherm should ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms. » Contractors appointed by BioTherm should ensure that construction workers who are found guilty of stealing livestock, poaching and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation. » The housing of construction workers on the site should be limited to security personnel.
<p>Cumulative impacts:</p> <ul style="list-style-type: none"> » None, provided losses are compensated for
<p>Residual impacts:</p> <ul style="list-style-type: none"> » See cumulative impacts.

Nature: *Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of veld fires*

The presence of construction workers and construction-related activities on the site poses an increased risk of veld fires that in turn pose a threat to the livestock, wildlife, and farmsteads in the area. In the process, farm infrastructure may also be damaged or destroyed and human lives threatened. The farms in the area are dependent on grazing and any loss of grazing due to a fire would therefore impact negatively on the livelihoods of the affected farmers. The potential risk of veld fires is likely to be higher during the dry, winter months.

	Without Mitigation	With Mitigation
Extent	Local (2) (Rated as 2 due to potential severity of impact on local farmers)	Local (2) (Rated as 2 due to potential severity of impact on local farmers)
Duration	Short Term (2)	Short Term (2)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Low (24)	Low (24)
Status	Negative	Negative
Reversibility	No	

Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Local (2) (Rated as 2 due to potential severity of impact on local farmers)	Local (2) (Rated as 2 due to potential severity of impact on local farmers)
<p>Mitigation: BioTherm should enter into an agreement with the affected landowners whereby the company will compensate for damages. This includes losses associated veld fires. In addition, the potential increased risk of veld fires can be effectively mitigated. The detailed mitigation measures are outlined in the EMP for the construction and operation phases. The aspects that should be covered include:</p> <ol style="list-style-type: none"> 1. Contractor to ensure that open fires on the site for cooking or heating are not allowed except in designated areas; 2. Contractor to ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced. Measures to reduce the risk of fires include clearing working areas and avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high risk dry, windy winter months; 3. Contractor to provide adequate fire fighting equipment on-site; <ul style="list-style-type: none"> • Contractor to provide fire-fighting training to selected construction staff; • As per the conditions of the Code of Conduct, in the advent of a fire being caused by construction workers and or construction activities, the appointed contractors must compensate farmers for any damage caused to their farms. The contractor should also compensate the fire fighting costs borne by farmers and local authorities. <p>In addition the landowner should ensure that they join the local fire protection agency.</p>		
<p>Cumulative impacts: » No, provided losses are compensated for.</p>		
<p>Residual impacts: » See cumulative impacts.</p>		

Nature: Potential noise, dust and safety impacts associated with movement of construction related traffic to and from the site

The movement of heavy construction vehicles during the construction phase has the potential to damage roads and create noise, dust, and safety impacts for other road users and local communities in the area. However, the current road-use frequency along the main roads in the area, including the N9, is relatively low. The social impacts associated with the movement of construction related traffic are therefore likely to be low.

	Without Mitigation	With Mitigation
Extent	Local (2)	Local (1)
Duration	Short Term (2)	Short Term (2)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Probable (3)

Significance	Low (24)	Low (15)
Status	Negative	Negative
Reversibility	Yes	
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
<p>Mitigation: BioTherm should enter into an agreement with the affected landowners whereby the company will compensate for damages. This includes losses associated with damage to local internal farm roads that are affected by the site. In addition, the potential impacts associated with heavy vehicles and dust can be effectively mitigated. The aspects that should be covered include:</p> <ul style="list-style-type: none"> » The contractor must ensure that damage caused to roads by the construction related activities, including heavy vehicles, is repaired before the completion of the construction phase. The costs associated with the repair must be borne by the contractor; » Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers; » All vehicles must be road-worthy and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits. 		
<p>Cumulative impacts:</p> <ul style="list-style-type: none"> » If damage to roads is not repaired then this will affect the farming activities in the area and result in higher maintenance costs for vehicles of local farmers and other road users. The costs will be borne by road users who were no responsible for the damage. 		
<p>Residual impacts: See cumulative impacts</p>		

Nature: *The activities associated with the construction phase, such as establishment of access roads and the construction camp, movement of heavy vehicles and preparation of foundations for the PV/CPV SEF and power lines will damage farmlands and result in a loss of farmlands for future farming activities.*

The activities associated with the construction phase have the potential to damage farmlands and result in a loss of land available for grazing. The significance of the impacts is to some extent mitigated by the fact that the farming activities on the site are confined to sheep and cattle farming as opposed to crops. In addition, it is standard practice for the affected landowner/s to enter into a lease agreement that includes monthly rental. The loss of production farmland would therefore be offset by such an agreement. It may also be possible for livestock to graze between the PV panels. In addition, the final disturbance footprint can be reduced by careful site design and placement of components. The impact on farmland associated with the construction phase can therefore be mitigated by minimising the footprint of the construction related activities and ensuring that disturbed areas are fully rehabilitated

on completion of the construction phase. Recommended mitigation measures are outlined below.		
	<i>Without Mitigation</i>	<i>With Mitigation</i>
<i>Extent</i>	Local (3)	Local (1)
<i>Duration</i>	Long term-permanent if disturbed areas are not effectively rehabilitated (5)	Short term if damaged areas are rehabilitated (2)
<i>Magnitude</i>	Moderate, due to importance of farming in terms of local livelihoods (4)	Minor (2)
<i>Probability</i>	Definite (5)	Highly Probable (4)
<i>Significance</i>	High (60)	Low (20)
<i>Status</i>	Negative	Negative
<i>Reversibility</i>	No, in case of footprint associated with solar thermal plant	No, in case of footprint associated with solar thermal plant
<i>Irreplaceable loss of resources?</i>	Yes, loss of farmland. However, disturbed areas can be rehabilitated	Yes, loss of farmland. However, disturbed areas can be rehabilitated
<i>Can impact be mitigated?</i>	Yes, however, loss of farmland cannot be avoided	Yes, however, loss of farmland cannot be avoided
<p>Mitigation: The potential impacts associated with damage to and loss of farmland can be effectively mitigated. The aspects that should be covered include:</p> <ul style="list-style-type: none"> » The footprint associated with the construction related activities (access roads, construction platforms, workshop etc.) should be minimised. » An Environmental Control Officer (ECO) should be appointed to monitor the establishment phase of the construction phase. » All areas disturbed by construction related activities, such as access roads on the site, construction platforms, workshop area etc., should be rehabilitated at the end of the construction phase. » The implementation of a rehabilitation programme should be included in the terms of reference for the contractor/s appointed. The specifications for the rehabilitation programme should be drawn up the Environmental Consultants appointed to undertake the EIA. » The implementation of the Rehabilitation Programme should be monitored by the ECO. 		
<p>Cumulative impacts: » Overall loss of farmland could affect the livelihoods of the affected farmers, their families, and the workers on the farms and their families. However, disturbed areas can be rehabilitated.</p>		
<p>Residual impacts: See cumulative impacts.</p>		

Implications for Project Implementation

- » Locals should be provided an opportunity to be included in a list of possible local suppliers and service providers.
- » Social benefits in terms of training, skills development and the use of local labour should thus be aspired to. These skills can be transferable to other employment sectors and would result in further sustainable benefits.
- » The Aberdeen Local Municipality and community representatives and neighbouring property owners should be kept informed of the progress, decisions taken with regards to the development and construction schedules. The establishment of a community Management and Monitoring Committee consisting of key community representatives, and representatives of the Aberdeen Local Municipality could assist in this regard.
- » Attention should be given to the extension and improvement of the existing HIV/Aids awareness programmes.

No Go Alternative

Also referred to as the 'Do-nothing' option, this refers to BioTherm Energy (Pty) Ltd not constructing the proposed solar energy facility. In this scenario the potential environmental and social impacts will not occur and the status quo will be maintained. However, should the project not proceed, the distributed approach regarding the government target for renewable energy will not be realised. As a result the distributed range of socio-economic and environmental benefits for South Africa would not be realised.

2.3. IMPACTS THAT MAY RESULT FROM THE OPERATIONAL PHASE

1. Impacts on the visual aesthetics

The topography and the major ridgelines of the area were determined and mapped by using a Digital Elevation Model⁴. The project site is located below any ridge line. The DEM shows that there are no prominent topographical manifestations in close proximity to the project site from which the proposed activity is particularly visually exposed

Digital Viewshed Analysis

The photographic study summarised above was supplemented with a digital viewshed analysis based upon the Digital Elevation Model. The purpose of these two steps was to provide a basis for the identification and selection of appropriate observation points outside the project site for the VIA.

⁴A Digital Elevation Model (DEM) is a geographic information system-based outcome generated from contours for a specific area. In this instance, 20m contour intervals for reference sheet nos. 3223bc, 3223bd, 3223da, 3223db, 3224ac and 3224ca were used to calculate the DEM for the region.

The viewshed⁵ analysis was undertaken in accordance with the Guideline Document for involving Visual Specialists in EIA Processes. Geographic Information Systems (GIS) technology was used to analyse and map information in order to understand the relationships that exist between the observer and the observed view. Key aspects of the viewshed are as follows:

- » It is based on a single viewpoint from the highest point of the proposed 20ha PV/CPV site.
- » It is calculated from 20m above the natural ground level (i.e. the height of the CPV panels – i.e. worst case scenario).
- » It represents a 'broad-brush' designation, which implies that the zone of visual influence may include portions that are located in a view of shadow and it is therefore not visible from the project site and vice versa. This may be as a result of landscape features such as vegetation, buildings and infrastructure not taken into consideration by the DEM.

As illustrated by the viewshed (refer to Figure 11 below), the primary zone of visual influence⁶ is located in a north-easterly direction up to 35km from the project site. This is primarily due to the higher lying Camdeboo Mountains in the northeast. The GIS-generated viewshed illustrates a theoretical zone of visual influence. This does not mean that the proposed activity would be visible from all observation points in this area. The zone of visual influence is closely associated with the most prominent topographical features to the northeast.

Key Aspects of the Viewshed

A total of 10 Key Observation Points (KOPs) were provisionally identified and selected within the defined viewshed for the visual assessment in accordance with the selection criteria stipulated in the Visual Guidelines. As a result of the similarity in the assessment results of the KOPs, the description and assessment of only five KOPs are included in Annexure 1 of the visual impact assessment contained in Appendix D.

KOPs selected for the assessment are generally located at the intersection between the zone of visual influence and the defined view corridor (refer to Sections 4.1 and 5 in the specialist report attached in Appendix D). The view corridors are those areas that are accessible to the general observer

⁵A viewshed is defined as '*the outer boundary defining a view catchment area, usually along crests and ridgelines. Similar to a watershed*'. A Viewshed Analysis is therefore the study into the extent to which a defined area is visible to its surroundings.

⁶Zone of visual influence is defined as '*An area subject to the direct visual influence of a particular project*'.

The distance between the observer and the observed activity is an important determinant of the magnitude of the visual impact. This is due to the visual impact of an activity diminishing as the distance between the viewer and the activity increases. Viewsheds are categorised into three broad categories of significance, namely:

- » **Foreground:** The foreground is defined as the area within 1km from the observer within which details such as colour, texture, styles, forms and structure can be recognised. Objects in this zone are highly visible unless obscured by other landscape features, existing structures or vegetation.
- » **Middle ground:** The middle ground is the area between 1km and 3km from the observer where the type of detail which is clearly visible in the foreground becomes indistinguishable. Objects in the middle ground can be classified as visible to moderately visible, unless obscured by other elements within the landscape.
- » **Background:** the background stretches from approximately 3km onwards. Background views are only distinguishable by colour and lines, while structures, textures, styles and forms are often not visible (SRK Consulting, 2007).

As is illustrated by the figure below, the main town of Aberdeen, where most of the visual receptors would be located, is located outside the generated viewshed and is situated in the Background as per the definitions above. However, the main view corridor, namely the N9 falls within the foreground, middle ground and background, while the R61 only falls within the background.

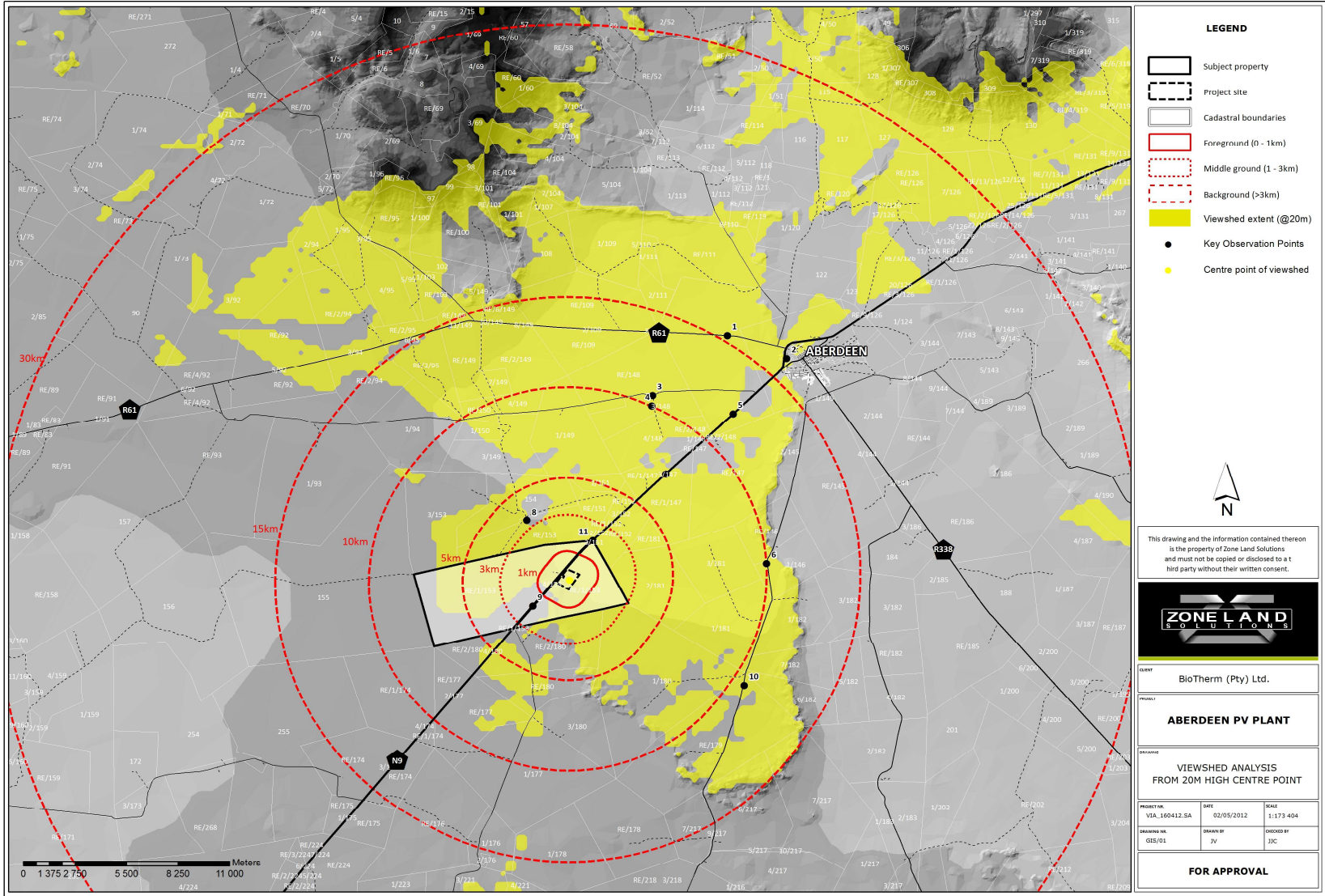


Figure 11: Potential visual exposure of the solar energy facility

Nature: Potential visual impact on the sensitive receptors in the foreground and the middle ground.

The sensitive receptors in the foreground and middle ground of the generated viewshed represent only one identified farmstead on the Remainder of Farm No. 153 as well as the N9 en route to Aberdeen. The N9 is considered to be the major and most sensitive receptor in the area as observers using this road will come into direct view of the proposed activity. However, impacts in this regard would be of very short duration.

The proposed activity will represent a change in land use and land form to what is currently the status quo. The introduction of foreign structures and forms in the agrarian landscape will have a significant impact on these sensitive receptors as described in the table below.

A photograph illustrating the site of the proposed activity in context of the N9 is appended under Annexure 1 of the visual impact assessment contained in Appendix D.

	Without Mitigation	With Mitigation
Extent	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	High (10)	High (8)
Probability	Highly probable (4)	Highly Probable (4)
Significance	High (64)	High (56)
Status	Negative	Negative
Reversibility	Recoverable (3)	Recoverable (3)
Irreplaceable Loss Of Resource?	No	No
Can Impacts Be Mitigated?	Yes	

Mitigation:

- » Keep disturbed areas to a minimum.
- » No large-scale clearing of land to take place outside the demarcated 20ha footprint.
- » Institute a rigorous planting regime along the western, northern and eastern boundaries. Only indigenous plant species to be introduced and planted in such a manner and location which would not cast shadows on the PV/CPV 'strings'.
- » Buildings and similar structures must be in keeping with regional planning policy documents, especially the principles of critical regionalism, namely sense of place, sense of history, sense of nature, sense of craft and sense of limits.

Cumulative Impacts:

- » The Aberdeen substation and associated industrial-type infrastructure such as electrical power lines and pylons already exists on site. Therefore, the cumulative impact will be increased with the establishment of the PV/CPV plant.

Residual Impacts:

- » It is very possible that the status quo could be regained after decommissioning of the plant. Providing that the site is rehabilitated to its current state, the visual impact will also be removed.

Nature: Potential visual impact on the sensitive receptors in the background.

Visual receptors in the background represent a mix of farmsteads, intensive agricultural areas and mobility routes. The western-most part of Aberdeen is also theoretically impacted by the proposed plant from a visual perspective.

The envisaged development components are constant and similar to the aspects described above, the likelihood of these structures being visible from a greater distance is however the only variable. Various photographs taken from key observation points in the background illustrate the extent to which the site is visible from a greater distance (refer to Annexure 1 in Appendix D).

	Without Mitigation	With Mitigation
Extent	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (4)	Low (2)
Probability	probable (3)	Improbable (2)
Significance	Medium(30)	Low (16)
Status	Neutral	Neutral
Reversibility	Recoverable (3)	Recoverable (3)
Irreplaceable Loss Of Resource?	No	No
Can Impacts Be Mitigated?	Yes	

Mitigation:

- » Keep disturbed areas to a minimum.
- » No large-scale clearing of land to take place outside the demarcated 20ha footprint.
- » Institute a rigorous planting regime along the western, northern and eastern boundaries. Only indigenous plant species to be introduced and planted in such a manner and location which would not cast shadows on the PV/CPV 'strings'.
- » Buildings and similar structures must be in keeping with regional planning policy documents, especially the principles of critical regionalism, namely sense of place, sense of history, sense of nature, sense of craft and sense of limits.

Cumulative Impacts:

- » It is near impossible to distinguish built forms and structures at distances greater than 5km. An example is that of the existing electrical substation on site which is unrecognisable from this distance. However, the introduction of a 20ha PV/CPV plant might have a cumulative effect on the observer.

Residual Impacts:

- » It is very possible that the status quo could be regained after decommissioning of the plant. Providing that the site is rehabilitated to its current state, the visual impact will also be removed.

Nature: Potential visual impact on the sense of place of the Aberdeen region.

Sense of place refers to a unique experience of an environment by a user, based on his or her cognitive experience of the place. Visual criteria and specifically visual character of an area (informed by a combination of aspects, such as topography, level of development, vegetation, noteworthy features, cultural/historical features, etc.) play a significant role. A visual impact on the sense of place is one that alters the visual landscape to such an

extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light.

The sense of place of Aberdeen is very much one of an agrarian landscape, dotted by agricultural farmsteads against a backdrop of mountains and hills. The project site has to a large degree lost many of its sense of place attributes with the introduction of the electrical substation and associated infrastructure. In addition, the substation, and planned PV/CPV plant, is in relative close proximity to the town of Aberdeen, which therefore does not district too much of the rural character of the area.

	Without Mitigation	With Mitigation
Extent	Local (2)	Site related (1)
Duration	Long term (4)	Long term (4)
Magnitude	Medium (6)	Low (2)
Probability	Highly Probable (4)	Probable (3)
Significance	Medium (48)	Low (21)
Status	Negative	Negative
Reversibility	Recoverable (3)	Recoverable (3)
Irreplaceable Loss Of Resource?	No	No
Can Impacts Be Mitigated?	Yes	

Mitigation:

- » Keep disturbed areas to a minimum.
- » No large-scale clearing of land to take place outside the demarcated 20ha footprint.
- » Institute a rigorous planting regime along the western, northern and eastern boundaries. Only indigenous plant species to be introduced.
- » Buildings and similar structures must be in keeping with regional planning policy documents, especially the principles of critical regionalism, namely sense of place, sense of history, sense of nature, sense of craft and sense of limits.
- » Consider raising the PV platforms so that sheep can roam underneath the PV 'string'.

Cumulative Impacts:

- » It is near impossible to distinguish built forms and structures at distances greater than 5km. However, the introduction of a 20ha PV/CPV plant might have a cumulative effect on the observer.

Residual Impacts:

- » It is very possible that the status quo could be regained after decommissioning of the plant. Providing that the site is rehabilitated to its current state, the visual impact will also be removed.

Nature: Potential visual impact of artificial lighting as a result of the activity during operational phase.

The area in the vicinity of the proposed PV Plant has a relatively low incidence of light sources. A slight sky glow⁷ effect is however visible at night in the vicinity of Aberdeen.

⁷Sky glow refers to the illumination of the night sky or parts thereof. The most common cause of sky glow is artificial light that emits light pollution, which accumulates into a fast glow that can be seen from miles away.

The proposed PV/CPV 'string' will not include lights of any kind. However, the associated ancillary buildings and infrastructure may include some degree of lighting. It is not expected that the proposed activity will contribute to the effects of sky glow or artificial lighting of the area. In order to ensure this, the proposed mitigation measures will have to be complied with.

	Without Mitigation	With Mitigation
Extent	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (4)	LOw (2)
Probability	Probable (3)	Probable (3)
Significance	Medium (30)	Medium (34)
Status	Negative	Negative
Reversibility	Recoverable (3)	Recoverable (3)
Irreplaceable Loss Of Resource?	No	No
Can Impacts Be Mitigated?	Yes	

Mitigation:

- » Outdoor lighting must be strictly controlled so as to prevent light pollution.
- » All lighting must be installed at downward angles.
- » Sources of light must as far as possible be shielded by physical barriers.
- » Consider the application of motion detectors to allow the application of lighting only where and when it is required.
- » Only minimum wattage light fixtures must be used.

Cumulative Impacts:

- » As mentioned above, the area within which the proposed activity is to be undertaken is relatively low lit. The occurrence of a farmstead on the western side of the N9 and the ancillary structures of the PV/CPV Plant will contribute to the cumulative lighting effect of the area but it is expected to be negligible in a local context.

Residual Impacts:

- » It is very possible that the status quo could be regained after decommissioning of the plant. Providing that the site is rehabilitated to its current state, the potential lighting impact will also be removed

Nature: Potential visual impact of reflection of the PV Panels on the sensitive receptors.

Photovoltaic solar panels are designed to absorb sunlight in order to convert it into electricity. The more sunlight that is absorbed, the more energy that can be produced. A monocrystalline silicon solar cell absorbs two-thirds of the sunlight reaching the panel's surface. This effectively means that only one-third of the sunlight reaching the surface of a solar panel has a chance to be reflected.

In addition, the PV panels have a reflectivity of around 30%, while surface materials such as dry sand has a reflectivity of around 45% and grass-type vegetation at 25%. Moreover, PV panels are installed at a fixed angle of around 30°.

With a height variation of approximately 80m over 15km, the majority of receptors in the region are located at more or less the similar height of the project site. The solar panels

will therefore not noticeably alter the site's current amount of reflected, indirect sunlight.		
	Without Mitigation	With Mitigation
Extent	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (6)	Low (2)
Probability	Improbable (2)	Improbable (2)
Significance	Low (16)	Low (16)
Status	Neutral	Neutral
Reversibility	Recoverable (3)	Recoverable (3)
Irreplaceable Loss Of Resource?	No	No
Can Impacts Be Mitigated?	Yes	
Mitigation:		
» Consider installing anti-reflective coating or glass to reduce the sunlight that is reflected and increase the amount of sunlight that is absorbed.		
Cumulative Impacts:		
» The introduction of the PV plant, coupled with the existing substation on site, contribute to a somewhat increased cumulative visual impact		
Residual Impacts:		
» It is very possible that the status quo could be regained after decommissioning of the plant. Providing that the site is rehabilitated to its current state, the potential impact of reflection will also be removed.		

Implications for Project Implementation

- » The proposed activity will have a low impact from the middle and background and a moderate impact from the foreground (<1km).
- » Motorists travelling along the N9 would only see the activity for a short period of time as they drive by the project site. The activity will therefore not have a lasting visual impact.
- » A lighting engineer should be consulted to assist in the planning and placement of light fixtures in order to reduce visual impacts associated with glare.
- » Based on the findings of the assessment it is recommended that the proposed activity be approved subject to the conditions described Environmental Management Programme.

2. Impacts on the socio-economic environment

Nature: Creation of employment and business opportunities associated with the operational phase		
	Without Mitigation	With Enhancement
Extent	Local and Regional (2)	Local and Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (30)	Medium (33)

Status	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
Enhancement:		
<p>The enhancement measures listed in terms of the enhancement of local employment and business opportunities during the construction phase, also apply to the operational phase. In addition BioTherm should implement a training and skills development programme for locals during the first 5 years of the operational phase. The aim of the programme should be to maximise the number of South African's and locals employed during the operational phase of the project.</p>		
Cumulative impacts:		
<p>Creation of permanent employment and skills and development opportunities for members from the local community and creation of additional business and economic opportunities in the area</p>		
Residual impacts:		
<p>See cumulative impacts</p>		

Nature: *Establishment of a community trust funded by revenue generated from the sale of energy. The revenue can be used to fund local community development*

In terms of the Request for Proposal document prepared by the Department of Energy all bidders for operating licences for renewable energy projects must demonstrate how the proposed development will benefit the local community. This can be achieved by establishing a Community Trust which is funded by revenue generated from the sale for energy. BioTherm has indicated that they are committed to establishment of a community trust. Community Trusts provide an opportunity to generate a steady revenue stream that is guaranteed for a 20 year period. This revenue can be used to fund development initiatives in the area and support the local community. The long term duration of the revenue stream also allows local municipalities and communities to undertake long term planning for the area. The revenue from the proposed PV/CPV plant can be used to support a number of social and economic initiatives in the area, including:

- » Education;
- » School feeding schemes;
- » Training and skills development;
- » Support for SMMEs.

In addition, the establishment of a solar plant is unlikely to have a significantly impact on the agricultural land uses that underpin the local economic activities in the area. The loss of this relatively small area is therefore unlikely to impact on the current and future farming activities. Experience has however also shown that Community Trusts can be mismanaged. This issue will need to be addressed in order to maximise the potential benefits associated with the establishment of a community trust.

	Without Mitigation	With Enhancement⁸
Extent	Local (2)	Local and Regional (4)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Definite (5)
Significance	Medium (30)	High (70)
Status	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
Enhancement: In order to maximise the benefits and minimise the potential for corruption and misappropriation of funds the following measures should be implemented: » Clear criteria for identifying and funding community projects and initiatives in the area should be identified. The criteria should be aimed at maximising the benefits for the community as a whole and not individuals within the community; » Strict financial management controls, including annual audits, should be instituted to manage the funds generated for the Community Trust from the solar plant.		
Cumulative impacts: Promotion of social and economic development and improvement in the overall well-being of the community		
Residual impacts: See cumulative impacts		

Nature: Promotion of clean, renewable energy

South Africa currently relies on coal-powered energy to meet more than 90% of its energy needs. As a result South Africa is one of the highest per capita producers of carbon emissions in the world and Eskom, as an energy utility, has been identified as the world's second largest producer carbon emissions. The establishment of a clean, renewable energy facility will therefore reduce, albeit minimally, South Africa's reliance on coal-generated energy and the generation of carbon emissions into the atmosphere.

However, the overall contribution of the proposed BioTherm Aberdeen Solar Facility to South Africa's total energy requirements will be small. In addition, the current application is not unique. In this regard, a significant number of solar developments are currently proposed in other parts of South Africa. The potential contribution of the proposed BioTherm Aberdeen Solar Facility should therefore be regarded as valuable, but should not be overestimated.

	Without Mitigation	With Mitigation <i>(The provision of renewable energy infrastructure is in itself a mitigation measure)</i>

⁸ Enhancement assumes effective management of the community trust

Extent	Local, Regional and National (4)	Local, Regional and National (4)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Low (4)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	Medium (40)	Medium (48)
Status	Positive	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	Yes, impact of climate change on ecosystems	
Can impact be mitigated?	Yes	
Enhancement: The establishment of the proposed facility is a mitigation measure in itself. In order to maximise the benefits of the proposed project BioTherm should implement a training and skills development programme for locals during the first 5 years of the operational phase. The aim of the programme should be to maximise the number of South African's employed during the operational phase of the project;		
Cumulative impacts: Reduce carbon emissions via the use of renewable energy and associated benefits in terms of global warming and climate change.		
Residual impacts: See cumulative impacts		

Nature: Potential impact of the solar plant on local tourism

The CDM IDP identifies tourism as an important economic sector. However, based on the findings of the VIA the proposed facility is not likely to impact on the tourism sector in the area or the Province. This is due to the relatively small scale of the project (20MW) and the sites location. The significance of this issue is therefore rated as low negative. In some instances the plant may also attract tourists to the area. However, the significance of this potential benefit is also rated as low positive.

	Without Mitigation	With Enhancement / Mitigation
Extent	Local (2)	Local (3)
Duration	Long term (4)	Long term (4)
Magnitude	Low (2)	Low (2)
Probability	Probable (3)	Probable (3)
Significance	Low (24) (Applies to both - and +)	Low (27) (Applies to both - and +)
Status	Negative (Potential to distract from the tourist experience of the area) Positive (Potential to attract people to the area)	Negative (Potential to distract from the tourist experience of the area) Positive (Potential to attract people to the area)
Reversibility	Yes	
Irreplaceable loss of	No	

resources?		
Can impact be enhanced?	Yes	
Enhancement:		
<p>In terms of mitigating the visual impacts, it is virtually impossible to hide the facility. The impact on the sense of place of the area cannot therefore be effectively mitigated. In terms of efforts to enhance the proposed benefits to tourism:</p> <ul style="list-style-type: none"> » BioTherm should liaise with representatives from the CLM and local tourism representatives to raise awareness of the proposed facility; » BioTherm should investigate the option of establishing a renewable energy interpretation centre at entrance to the site. The centre should include a viewing area where passing visitors can stop and view the site; 		
Cumulative impacts:		
Potential negative and or positive impact on tourism in the Kai! Garib Municipality Area.		
Residual impacts: See cumulative impacts		

No Go Alternative

Also referred to as the 'Do-nothing' option, this refers to BioTherm Energy (Pty) Ltd not operating the proposed PV facility. In this scenario the potential environmental and social impacts will not occur and the status quo will be maintained. However, should the project not proceed, the distributed approach regarding the government target for renewable energy will not be realised. As a result the distributed range of socio-economic and environmental benefits for South Africa would not be realised.

As indicated above, South Africa currently relies on coal-powered energy to meet more than 90% of its energy needs. As a result South Africa is one of the highest per capita producers of carbon emissions in the world and Eskom, as an energy utility, has been identified as the world's second largest producer carbon emissions.

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 negative social cost. However, as indicated above, the overall contribution of Phase 2 (20MW) of BioTherm Aberdeen PV/CPV facility to South Africa's total energy requirements will be small. In addition, the current application is not unique. The potential contribution of the proposed BioTherm Aberdeen PV/CPV facility should therefore be regarded as valuable, but should not be overestimated.

The No-Development option would also result in a loss in employment opportunities associated with both the construction and operational phase. In addition, the benefits associated with the establishment of a Community Trust funded by revenue generated from the sale of energy from the PV/CPV facility would be forfeited. The revenue from the proposed PV/CPV facility can be used to support a number of social and economic initiatives in the area. These benefits

would be forgone if the proposed PV/CPV facility is not developed. Given the limited economic opportunities in the area this would represent a negative social cost for the local community.

Nature: The no-development option would result in the lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy. The No-Development option would also result in the loss of the benefits to the local community and economy associated with the creation of employment opportunities and the establishment of a Community Trust.		
	Without Mitigation	With Enhancement⁹
Extent	Local-International (3)	Local-International (4)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Moderate (33)	Moderate (36)
Status	Negative	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	Yes, impact of climate change on ecosystems	
Can impact be mitigated?	Yes	
Enhancement: The proposed facility should be developed and the mitigation and enhancement measures identified in the SIA and other specialist studies should be implemented. However, the impact of large solar facilities on the sense of place and landscape are issues need to be addressed in the location, design and layout of the proposed plant.		
Cumulative impacts: Reduce carbon emissions via the use of renewable energy and associated benefits in terms of global warming and climate change.		
Residual impacts: See cumulative impacts		

2.4. IMPACTS THAT MAY RESULT FROM THE DECOMMISSIONING PHASE

Alternative (preferred alternative)

The impacts during the decommissioning and closure phases will be similar to impacts of the construction phase as discussed above.

No Go Alternative (Compulsory)

The 'Do nothing' alternative is the option of not decommissioning the proposed solar energy facility at the end of its life span.

At the end of its life span the efficiency of the facility could be reduced such that less electricity is produced. However, the additional electricity that could continue to be evacuated into the Eskom grid would be beneficial to the area. In addition,

⁹ Enhancement assumes development of the proposed PV/CPV facility

implementation of this alternative would mean that job opportunities are not lost.

3. 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.

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

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

- » The overall impact on ecology is likely to be of a low significance, provided the recommended mitigation measures are implemented. From an ecological perspective, the site is largely favourable for the development of a solar energy facility. With the appropriate avoidance of identified sensitive areas and mitigation measures in place, the risk of significant ecological impact at the site would be minimised. The plains of the site are homogenous and development within this area could proceed with little ecological risk. Disturbance during the construction phase should be kept to a minimum as the rehabilitation or revegetation of disturbed sites in the karoo can be difficult, and such areas would be prone to alien plant invasion for many years. The flat nature of the site is likely to be an enabling factor which would allow development to take place with minimal disturbance and it is recommended that the construction approach be one based on a philosophy of minimal impact. As with all semi-arid ecosystems, the site is likely to maintain a much higher degree of resilience if vegetation cover is allowed to persist as far as possible through the construction process.
- » The overall impact on soils is likely to be of **low negative significance** with the implementation of recommended mitigation measures. The most significant potential negative impacts are that of soil degradation and erosion. It is likely that the negative impacts will be out-weighed by the positive impact of a reduction in the rate of demand for non-renewable energy sources on a national scale.

- » The agricultural potential of the site is considered to be low and limited to extensive grazing by small stock and game. The carrying capacity is low (estimated at \pm 6 hectares per small stock unit (SSU)), rainfall is low and erratic and soils are shallow with low water holding capacities. Irrigation water is not available for use on the proposed site which is limited by the shallow soils and other inherent soil restraints. Irrigation is therefore not considered a viable option. Impacts on agricultural potential is therefore expected to be of **low significance**.
- » The overall heritage impact is likely to be of **low significance** with the implementation of mitigation measures. No sites of heritage significance were found during the survey. However, the larger area is known for its fossil record and the paleontological component of the project needs to be addressed as per the recommendations contained in this report.
- » The overall visual impact is likely to be of a **low to moderate significance** with the implementation of appropriate mitigation measures. The on-site verification from the selected Key Observation Points and the view sheds generated from the latter points indicated that the project site is indistinguishable from most observation points. The findings of the Visual Impact Assessment for the proposed Aberdeen PV Plant therefore found that the proposed activity will have a low impact from the middle and background and a moderate impact from the foreground (<1km). It should be noted that users of the N9 (the most sensitive visual receptor within the 1km zone) would only see the activity for a short period of time as they drive by the project site. The activity will therefore not have a lasting visual impact.
- » The overall social impact is likely to be of a predominantly **low significance** with the implementation of appropriate mitigation and enhancement measures. The findings of the SIA undertaken for the proposed BioTherm Aberdeen solar facility indicate that the development will create employment and business opportunities for locals during both the construction and operational phase of the project. The establishment of a Community Trust also creates an opportunity to support local economic development in the area. The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the challenges created by climate change, represents a positive social benefit for society as a whole.
- » The establishment of the facility will have positive benefits as the integration of an additional 20 MW may alleviate the pressure on the local grid to a small extent and would contribute (albeit small) to the national target for renewable energy.

Based on the findings of the studies undertaken, in terms of environmental constraints identified through the Environmental Basic Assessment process, no environmental fatal flaws were identified to be associated with the establishment of the proposed BioTherm Energy (Pty) Ltd and associated infrastructure.

The significance levels of the majority of identified negative impacts can generally be reduced 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. Environmental specifications for the management of these issues / impacts are detailed within the draft Environmental Management Programme (EMP) included within Appendix F.

No Go Alternative (Compulsory)

Also referred to as the 'Do nothing' option, this refers to BioTherm Energy (Pty) Ltd not constructing their 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 up to 20 MW from this project towards the Government target for renewable energy will not be realised. As a result the potential local and regional socio-economic and environmental benefits expected to be associated with the proposed project would not be realised. These include:

- » **Increased energy security:** The current electricity crisis in South Africa highlights the significant role that renewable energy can play in terms of power supplementation. In addition, given that renewables can often be deployed in a decentralised manner close to consumers, they offer the opportunity for improving grid strength and supply quality, while reducing expensive transmission and distribution losses.
- » **Exploitation of South Africa's significant renewable energy resource:** At present, valuable national resources including biomass by-products, solar radiation and wind power remain largely unexploited. The use of these energy flows will strengthen energy security through the development of a diverse energy portfolio.

- * Pollution reduction: The releases of by-products through the burning of fossil fuels for electricity generation have a particularly hazardous impact on human health and contribute to ecosystem degradation.
- * Support for international agreements: The effective deployment of renewable energy provides a tangible means for South Africa to demonstrate its commitment to its international agreements under the Kyoto Protocol, and for cementing its status as a leading player within the international community.
- * Employment creation: The sale, development, installation, maintenance, and management of renewable energy facilities have significant potential for job creation in South Africa.
- * Acceptability to society: Renewable energy offers a number of tangible benefits to society including reduced pollution concerns, improved human, and ecosystem health.
- * Support to a new industry sector: The development of renewable energy offers the opportunity to establish a new industry within the South African economy.
- * Support to local community: Since the local community will acquire some ownership in the facility, some of the revenue generated by the facility will be utilised for upliftment of the local community.

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

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

The no-development option also represents a lost opportunity in terms of the employment and business opportunities (construction and operational phase) associated with the proposed solar thermal plant and the benefits associated with the establishment of a Community Trust. This also represents a negative social cost.

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

SECTION E: RECOMMENDATION OF THE 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)?



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:

The construction of the proposed solar energy facility should be implemented according to the EMP 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 EMP, the Environmental Authorisation and all other relevant environmental legislation. Relevant conditions to be adhered to include:

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 (EMP) as contained within Appendix F 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 EMP 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.
- » Disturbed areas should be rehabilitated as soon as possible once construction is complete in an area.
- » An on-going monitoring programme should be established to detect and quantify any alien species.
- » Identify areas of high erosion risk (drainage lines/watercourses, existing problem areas). Only special works to be undertaken in these areas to be authorised by ECO and Engineer's representative (ER)
- » Access roads to be carefully planned and constructed to minimise the impacted area and prevent unnecessary degradation of soil. Special attention to be given to roads that cross drainage lines and roads on steep slopes (to

- prevent unnecessary cutting and filling operations).
- » Erosion control measures- run-off control and attenuation on slopes (sand bags, logs), silt fences, stormwater channels and catch-pits, shade nets, soil binding, geofabrics, hydroseeding or mulching over cleared areas.
 - » The construction crew is educated about the potential palaeontological and heritage resources they could encounter during the construction phase of the project. This includes basic training for construction staff on possible finds, action steps for mitigation measures, surface collections, and communication routes to follow in the case of a discovery.
 - » It is recommended that a qualified palaeontologist is approached to deal with the palaeontological component.
 - » If any fossils are exposed (e.g. vertebrate teeth, bones, burrows, petrified wood) during construction, all operations must stop in the affected area until the finds are assessed by a palaeontologist
 - » If, during construction, any archaeological finds are made (e.g. stone tools, skeletal material), the operations must be stopped, and the archaeologist must be contacted for an assessment of the finds.
 - » Contractors must be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites. A professional archaeologist must be appointed during construction to monitor various activities including vegetation clearing and excavation activities to monitor and identify possible archaeological material remains and features that may occur below the surface. If concentrations of archaeological heritage material and human remains are uncovered, all work must cease immediately and be reported to SAHRA so that systematic and professional investigation/ excavation can be undertaken.
 - » An application for all other permits (e.g. those with respect to protected tree species or protected plant species) must be obtained from the relevant authority prior to the commencement of construction activities.
 - » All declared aliens must be identified and managed in accordance with the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983), the implementation of a monitoring programme in this regard is recommended.
 - » Before development can continue the regions need to be checked for the presence of bird nesting sites, particularly those of ground nesting species.
 - » Areas of prime reptile habitat (e.g. extensive areas of flat rock, boulders fields) should be avoided. Reptiles present on the study site could potentially also be trapped and translocated.
 - » Limit construction, maintenance, and inspection activities to dry periods.
 - » Develop emergency maintenance operational plan to deal with any event of contamination, pollution, or spillages, particularly in riparian areas.
 - » If large areas are cleared for the storage of equipment, these could be rehabilitated using arid site rehabilitation techniques such as planting cover

crops reseeding with local grasses and shrubs.

- » Compile and implement a detailed waste management plan.
- » Compile and implement a storm water management plan.

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 (i.e. berms).
- » Development and implementation of a storm water management plan.
- » On-going maintenance of the facility to minimise the potential for visual impacts.
- » On-going monitoring of the site to detect and restrict the spread of alien plant species.

Is an EMPR attached?

YES ✓

The EMPR must be attached as **Appendix F**.