# SOCIAL IMPACT ASSESSMENT

# FOR

# BIOTHERM ENERGY

# OF THE

# ABERDEEN SOLAR FACILITY

# EASTERN CAPE PROVINCE

# (DRAFT REPORT)

**MAY 2012**

**Prepared for**

**SAVANNAH ENVIRONMENTAL (Pty) Ltd**

**By**

**Tony Barbour**

---

## Tony Barbour

**ENVIRONMENTAL CONSULTING AND RESEARCH**

P O Box 1753, Sun Valley, 7975, South Africa
(Tel) 27-21-789 1112 - (Fax) 27-21-789 1112 - (Cell) 082 600 8266
(E-Mail) tbarbour@telkomsa.net

---

# EXECUTIVE SUMMARY

## INTRODUCTION AND LOCATION

Savannah Environmental (Pty) Ltd were appointed by BioTherm Energy (Pty) Ltd (BioTherm) as the lead consultants to manage the Basic Assessment (BA) process for the establishment of proposed 20 MW photovoltaic solar energy facility (PVSEF) and associated infrastructure on a site located ~ 16 south-west of the town of Aberdeen in the Eastern Cape Province, South Africa.

Tony Barbour was appointed by Savannah to undertake a specialist Social Impact Assessment (SIA) as part of the BA process. This report contains the findings of the SIA undertaken as part of the BA process.

## DESCRIPTION OF THE PROPOSED PVSEF

The proposed BioTherm Aberdeen PVSEF has a generation capacity of 20 MW. The total area earmarked for the PVSEF is approximately 20 ha and the energy will be linked to the existing Aberdeen substation which is located adjacent to the site or an onsite substation to be constructed. The project is therefore an Independent Power Producer (IPP) project. According to information provided by Savannah BioTherm is investigating two solar technology options, namely Photovoltaic (PV) panels or concentrated photovoltaic (CPV) panels.

The basic infrastructure associated with proposed BioTherm Aberdeen PVSEF would include:

- 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.

Based on the information from other PVSEF projects the construction phase is expected to extend over a period of 12-18 months and create approximately 80 employment opportunities. The operational phase will employ approximately 20-25 people full time for a period of up to 20 years. The capital expenditure on completion is anticipated to be in the region of R 500 million for a 20 MW facility.

## APPROACH TO THE STUDY

The approach to the SIA study is based on the Western Cape Department of Environmental Affairs and Development Planning Guidelines for Social Impact Assessment (February 2007). These guidelines are based on international best practice. The key activities in the SIA process embodied in the guidelines include:

- Describing and obtaining an understanding of the proposed intervention (type, scale, location), the communities likely to be affected and determining the need and scope of the SIA;

- Collecting baseline data on the current social environment and historical social trends
- Identifying and collecting data on the Social Impact Assessment variables and social change processes related to the proposed intervention.
- Assessing and documenting the significance of social impacts associated with the proposed intervention; and
- Identifying alternatives and mitigation measures.

In this regard the study involved:

- Review of demographic data from the 2001 Census Survey;
- Review of relevant planning and policy frameworks for the area;
- Review of information from similar projects; and
- Identification of social issues associated with the proposed project.

Due to time constraints it was not possible to undertake a site visit as part of the draft SIA for the BA. No interviews with interested and affected parties have therefore been undertaken. The key social issues identified and assessed in the SIA are based on findings of SIAs undertaken for other PVSEF's. Based on these findings there are a number of generic social issues that are common to PVSEFs throughout the country. The author is therefore confident that issues assessed represent the key social issues likely to be associated with the proposed BioTherm Aberdeen PVSEF. A site visit and interviews will be undertaken as part of the SIA for the next phase of the project. The findings from the site visit will be used to verify the findings of the SIA undertaken for the proposed 20MW PVSEF, and any additional information will be included in the final BA Report to be submitted to DEA for decision-making.

**SUMMARY OF KEY FINDINGS**

The key findings of the study are summarised under the following sections:

- Fit with policy and planning;
- Construction phase impacts;
- Operational phase impacts;
- Cumulative Impacts;
- Decommissioning phase impacts; and
- No-development option.

**Fit with planning**

The key documents reviewed included:

- The National Energy Act (2008);
- The White Paper on the Energy Policy of the Republic of South Africa (December 1998);
- The White Paper on Renewable Energy (November 2003);
- Integrated Resource Plan (IRP) for South Africa (2010-2030);
- Eastern Cape Provincial Growth and Development Strategy (2004-2014);
- Cacadu District Municipality Integrated Development Plan (2007-2011);
- Cacadu District Municipality Land Use and Locational Policy for Renewable Energy Projects (2011);
- Camdeboo Local Municipality Integrated Development Plan (2007-2011);

The findings of the review indicated that renewable energy is strongly supported at a national, provincial, and local level. Based on this is it reasonable to assume that the establishment of the proposed Aberdeen PVSEF is supported.

**Construction phase**

The key social issues associated with the construction phase include:

**Potential positive impacts**

- Creation of employment and business opportunities, and the opportunity for skills development and on-site training.

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 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 limit the potential employment opportunities for the local community. The majority of the skilled and semi-skilled opportunities are likely to be associated with the contactors 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.

The total wage bill for the 12-18 month construction phase will be in the region of R 10 million. The injection of income into the area in the form of wages and rental for accommodation will create opportunities for local businesses in Aberdeen and Graaff Reinet. The sector of the local economy that is most likely to benefit from the proposed development is the local service industry. The potential opportunities for the local service sector would be linked to accommodation, catering, cleaning, transport and security, etc. associated with the construction phase. The benefits to the local economy will be confined to the construction period (12-18 months).

The capital expenditure on completion is anticipated to be in the region of R 500 million for a 20 MW facility. However, given the technical nature of the project and high import content associated with PVSEF the potential opportunities for the CLM economy will be limited. However, opportunities are likely to exist for local contractors and engineering companies in Port Elizabeth. Implementing the enhancement measures listed below can enhance these opportunities.

**Potential negative impacts**

- Influx of construction workers employed on the project;
- Increased risk of stock theft, poaching and damage to farm infrastructure associated with construction workers;
- Increased risk of veld fires associated with construction related activities;
- Impact of heavy vehicles, including damage to roads, safety, noise and dust;
- Loss of agricultural land associated with construction related activities.

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. At a community level the potential risk posed by construction workers and or job seekers was found to be low. This was due to the relatively small size of the construction force (80) and the likelihood that 50-60 could be sourced locally. The potential risk to local family structures and social networks is therefore likely to be low. Table 1 summarises the significance of the impacts associated with the construction phase.

**Table 1: Summary of social impacts during construction phase**

| **Impact** | **Significance No Mitigation** | **Significance With Mitigation** |
|---|---|---|
| **Creation of employment and business opportunities** | Low (Positive impact) | Medium (Positive impact) |
| **Presence of construction workers and potential impacts on family structures and social networks** | Low (Negative impact for community as a whole) Medium-High (Negative impact of individuals) | Low (Negative impact for community as a whole) Medium-High (Negative impact of individuals) |
| **Risk of stock theft, poaching and damage to farm infrastructure** | Medium (Negative impact) | Low (Negative impact) |
| **Risk of veld fires** | Medium (Negative impact) | Low (Negative impact) |
| **Impact of heavy vehicles and construction activities** | Low (Negative impact) | Low (Negative impact) |
| **Loss of farmland** | High (Negative impact) | Low (Negative impact) |

**Operational phase**

The key social issues affecting the operational phase include:

**Potential positive impacts**

- Creation of employment and business opportunities. The operational phase will also create opportunities for skills development and training;
- Benefits associated with the establishment of a community trust.
- The establishment of infrastructure to generate renewable energy.

The total number of permanent employment opportunities is estimated to be in the region of 20-25. Of this total approximately 80% will be low and medium-skilled and 20% high skilled positions. The majority of the beneficiaries are therefore likely to be historically disadvantaged (HD) members of the community from Aberdeen. Over time it will also be possible to increase the number of local employment opportunities through the implementation of a skills development and training programme linked to the operational phase. Such a programme would support the strategic goals of promoting local employment and skills development contained in the CLM IDP.

The establishment of a community trust funded by revenue generated from the sale of energy from the proposed PVSEF also creates an opportunity to support local economic development in the area. 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. The revenue from the proposed PVSEF 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 SMME's.

The long term duration of the revenue stream also allows local municipalities and communities to undertake long term planning for the area. Experience has however also shown that community trust 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.

The proposed development also represents an investment in infrastructure for the generation of clean, renewable energy, which, given the challenges created by climate change, represents a Positive social benefit for society as a whole.

**Potential negative impacts**

- The visual impacts and associated impact on sense of place and the landscape;
- Impact on tourism.

The visual impacts on landscape character associated with large renewable energy facilities, such as solar energy l plants, are highlighted in the research undertaken by Warren and Birnie (2009). In the South African context, the majority of South Africans have a strong connection with and affinity for the large, undisturbed open spaces that are characteristic of the South African landscape. The impact of solar energy plants on the landscape is therefore likely to be a key issue in South Africa, specifically given South African's strong attachment to the land and the growing number of solar energy applications. The visual impacts associated with the proposed BioTherm Aberdeen PVSEF are, however, likely to be low due to its relatively small size (20MW). The significance of the impacts associated with the operational phase are summarised in Table 2.

**Table 2: Summary of social impacts during operational phase**

| Impact | Significance No Mitigation | Significance With Mitigation |
|---|---|---|
| **Creation of employment and business opportunities** | Medium (Positive impact) | Medium (Positive impact) |
| **Benefits associated with the establishment of a community trust** | Medium (Positive impact) | High (Positive impact) |
| **Establishment of infrastructure for the generation of renewable energy** | Medium (Positive impact) | Medium (Positive impact) |
| **Visual impact and impact on sense of place** | Medium (Negative impact) | Medium (Negative impact) |
| **Impact on tourism** | Low (Positive and Negative) | Low (Positive and Negative) |

**Cumulative Impacts**

The cumulative impacts associated with solar energy facilities, such as the proposed BioTherm Aberdeen PVSEF, are largely linked to the impact on sense of place and visual impacts. In the case of the proposed BioTherm Aberdeen PVSEF the significance of the potential cumulative social impacts, specifically the impact on the landscape, was rated to be low.

However, it is recommended that the environmental authorities consider the overall cumulative impact on the rural character and the areas sense of place before a final decision is taken with regard to the optimal number of solar and wind energy facilities in the area. In addition, the siting and number of individual components of the plant should be informed by findings of the relevant VIAs, specifically with respect to the visual impact on farmsteads and important roads in the area.

**Transmission lines**

The findings of the SIA indicate that the impacts associated with the proposed overhead power line will be low.

**No-Development Option**

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

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 PVSEF would be forfeited. The revenue from the proposed PVSEF plant can be used to support a number of social and economic initiatives in the area. These benefits would be forgone if the proposed PVSEF plant is not developed. Given the limited economic opportunities in the area this would represent a significant negative social cost for the local community.

**Decommissioning phase**

Due to the relatively small number of people affected (~20-25) the social impacts associated with the decommissioning of the facility are likely to be low. In addition, the potential impacts can be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be Low (negative).

BioTherm should also investigate the option of establishing an Environmental Rehabilitation Trust Fund to cover the costs of decommissioning and rehabilitation of disturbed areas. The Trust Fund should be funded by a percentage of the revenue generated from the sale of energy to the national grid over the 20 year operational life of the facility. The rationale for the establishment of a Rehabilitation Trust Fund is linked to the experiences with the mining sector in South Africa and failure of many mining companies to allocate sufficient funds during the operational phase to cover the costs of rehabilitation and closure. BioTherm have indicated that the rehabilitation costs will be funded by the sale of scrap metal and other components on closure of the facility.

**RECOMMENDATIONS**

The findings of the SIA indicate that the development of the proposed BioTherm Aberdeen PVSEF will create employment and business opportunities for locals during both the construction and operational phase of the project. The establishment of a Community Trust funded by revenue generated from the sale of energy from the proposed PVSEF also creates an opportunity to support local economic development in the area. This represents a significant social benefit for an area where there are limited opportunities.

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 proposed BioTherm Aberdeen PVSEF is therefore supported by the findings of the SIA.

**IMPACT STATEMENT**

The findings of the SIA undertaken for the proposed BioTherm Aberdeen PVSEF 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.

It is therefore recommended that the facility as proposed be supported, subject to the implementation of the recommended mitigation measures and management actions contained in the report.

# TABLE OF CONTENTS

## ACRONYMS

| | |
|---|---|
| CDM | Cacadu District Municipality |
| CLM | Camdeboo Local Municipality |
| DM | District Municipality |
| DEA&DP | Department of Environmental Affairs and Development Planning |
| DoE | Department of Energy |
| ECPGDS | Eastern Cape Provincial Growth and Development Strategy |
| EIA | Environmental Impact Assessment |
| GDPR | Gross Domestic Product of the Region |
| HDI | Human Development Index |
| IDP | Integrated Development Plan |
| IPP | Independent Power Producer |
| IRP | Integrated Resource Plan |
| IDP | Integrated development Plan |
| IPP | Independent Power Producer |
| kV | Kilovolts |
| LED | Local Economic Development |
| LM | Local Municipality |
| MW | Megawatt |
| SIA | Social Impact Assessment |
| PV | Photovoltaic |
| PVSEF | Photovoltaic solar energy facility |
| SDF | Spatial Development Framework |
| SIA | Social Impact Assessment |
| UNFCCC | United Nations Framework Convention on Climate Change |
| WEF | Wind Energy Facility |

# SECTION 1: INTRODUCTION

## 1.1 INTRODUCTION

Savannah Environmental (Pty) Ltd were appointed by BioTherm Energy (Pty) Ltd (BioTherm) as the lead consultants to manage the Basic Assessment (BA) process for the establishment of proposed 20 MW photovoltaic solar energy facility (PVSEF) and associated infrastructure on a site located ~ 16 south-west of the town of Aberdeen in the Eastern Cape Province, South Africa (Figure 1.1).

Tony Barbour was appointed by Savannah to undertake a specialist Social Impact Assessment (SIA) as part of the BA process. This report contains the findings of the SIA undertaken as part of the BA process.

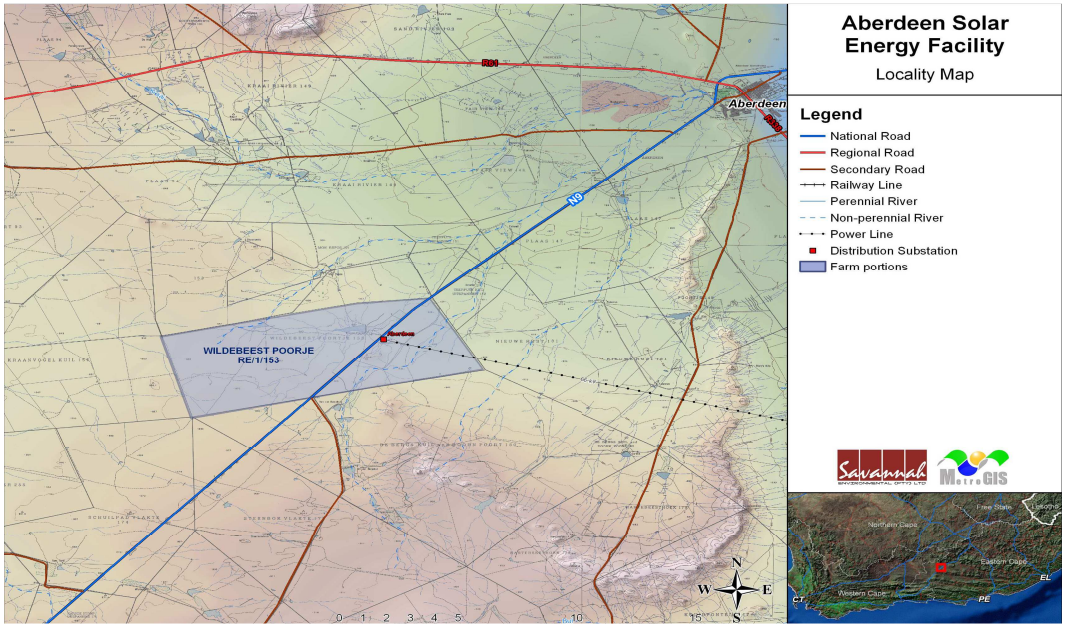



**Figure 1.1: Location of BioTherm Aberdeen PVSEF**

## 1.2 TERMS OF REFERENCE

The terms of reference for the SIA require:

- A description of the environment that may be affected by the activity and the manner in which the environment may be affected by the proposed facility
- A description and assessment of the potential social issues associated with the proposed facility
- Identification of enhancement and mitigation aimed at maximising opportunities and avoiding and or reducing negative impacts

## 1.3 PROJECT LOCATION AND SURROUNDING LAND USES

The proposed project site is located on the Portion 1 on Farm Wildebeest Poorje within the Camdeboo Local Municipality (EC101) (CLM), approximately ~ 16 km south-west of the town of Aberdeen in the Eastern Cape Province of South Africa. The CLM is one of 9 local municipalities that fall within the greater Cacadu District Municipality (DC10) (Figure 1.2).

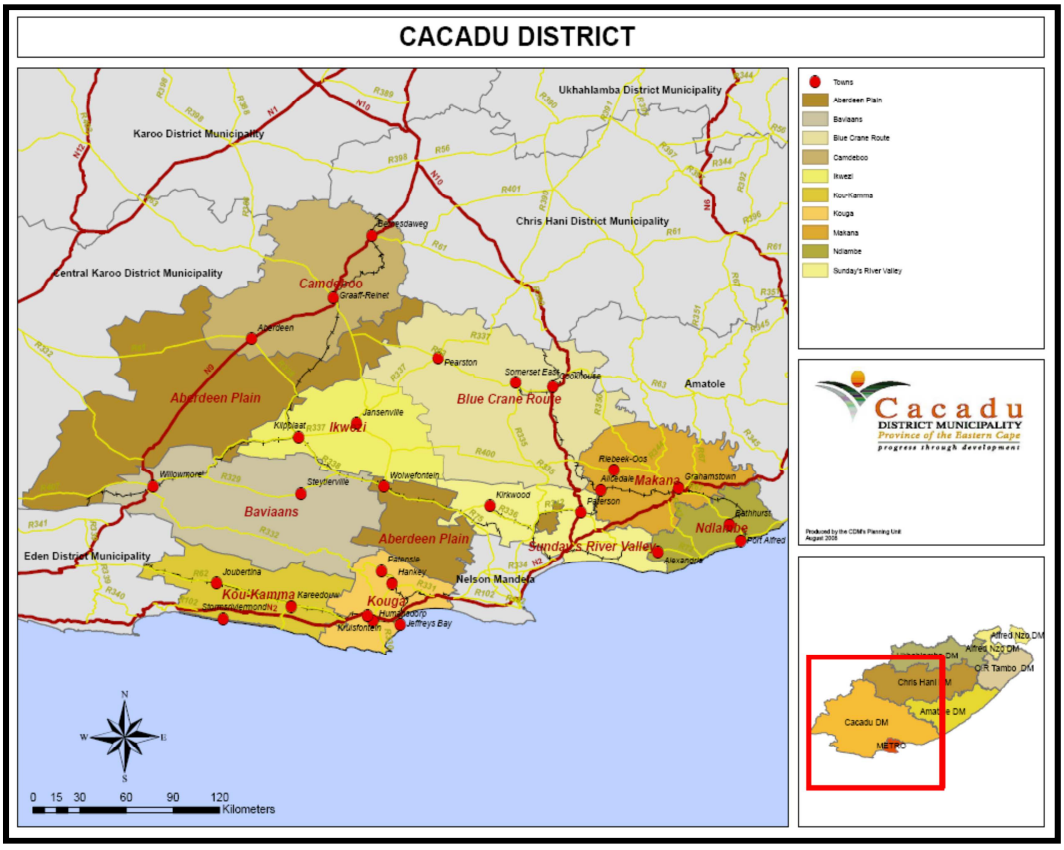



**Figure 1.2: Location of Cacadu District Municipality and Camdeboo Local Municipality**

The CLM is located approximately 270km from Port Elizabeth (CBD) and forms part of an area known as the "Karoo Heartland" which defines a scenic route through the Karoo. The northern area of the study area is characterised by a mountainous terrain or high lying hinterland. The rural areas have low densities and are characterised by farming activities. The urban nodes include:

- Graaff-Reinet, including Umasizakhe, Kroonvale, Adendorp and Kendrew;
- Aberdeen, including Lotusville and Thembalesizwe;
- Nieu-Bethesda, including Pienaarsig.

The CLM is renowned for its pristine natural environment, rich heritage, diverse peoples and cultures. Tourism is one of the key economic sectors and visitors are drawn to the area by its scenic landscapes and climate. The town of Graaff-Reinet, which is the 4$^{th}$ oldest town in South-Africa, is referred to as the "Gem of the Karoo" and functions as an important service centre for the CLM.

The Visual Impact Assessment (VIA) indicates that the subject property is bisected by the N9, which crosses the site in a south-west to north-east direction. The 20ha project site is located on the eastern side of the N9 (VIA, Zone Land Solutions, April 2012). Even though the project site has a generally flat terrain, this portion gently slopes downwards in a north-eastern direction (Photograph 1.1). The VIA also indicates that the site has a strong agrarian sense of place which is still intact.

Source: VIA, Zone Land Solutions, April 2012
**Photograph 1.1: View of the study area from the N9**

During 1994, a servitude area of 1.0114ha was registered over the property for the purposes of establishing an electrical substation to feed the town of Aberdeen. In addition, an electrical power line servitude of 22.0m in width has been registered over the property. The power line connects to the substation from a south-easterly direction (VIA, Zone Land Solutions, April 2012). The proposed PVSEF will connect to the grid via the latter substation and distribution network.

The VIA indicates that the landscape character of the region typifies a Karoo landscape of great open spaces surrounded by mountain chains of the escarpment. The main land uses in the area are dominated sheep farming. Other forms of agriculture, such as game farming, are also widely practiced. The occurrence of surface or underground water makes it possible to practice intensive agriculture, as has been done by the owners of the Farm Wildebeest Poortje No. 153/1 (VIA, Zone Land Solutions, April 2012). The VIA also indicates that there are a number of historic farmsteads and associated farm buildings are scattered throughout the landscape. The proposed PVSEF should take these structures into account.

## 1.4 PROJECT DESCRIPTION

The proposed BioTherm Aberdeen PVSEF has a generation capacity of 20 MW. The total area being considered for the project is ~ 20 hectares (including supporting infrastructure on site), and the project will have an expected minimum lifespan of 20 years. The energy will be linked via an on-site substation to the existing Aberdeen substation which is located adjacent to the site (Photograph 1.2). The project is therefore an Independent Power Producer (IPP) project.

Source: VIA, Zone Land Solutions, April 2012
**Photograph 1.2: Substation located on the site**

According to information provided by Savannah in the Background Information Document, BioTherm are investigating two solar technology options, namely Photovoltaic (PV) panels and Concentrated photovoltaic (CPV) panels. Solar energy

facilities, such as those using PV/CPV panels use the energy from the sun to generate electricity through a process known as the Photovoltaic Effect. This effect refers to photons of light colliding with electrons, and therefore placing the electrons into a higher state of energy to create electricity. The basic components of each the two technology options are briefly discussed below.

### 1.4.1 Photovoltaic (PV) technology

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

**Photovoltaic Cell**
A photovoltaic (PV) cell can consist of a thin film technology or polycrystalline silicone cell which acts as a semiconductor used to produce the photovoltaic effect. Individual PV cells are linked and placed behind a protective glass sheet to form a photovoltaic panel. Other technologies that can be used include thin film.

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

**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 1.3 illustrates a typical PV solar facility.

**Figure 1.3: Illustration of a photovoltaic solar facility**

### 1.4.2 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 (Figure 1.4). Unlike traditional, more conventional flat panel systems, CPV systems are often much less expensive to produce, because the concentration allows for the production of a much smaller area of solar cells.

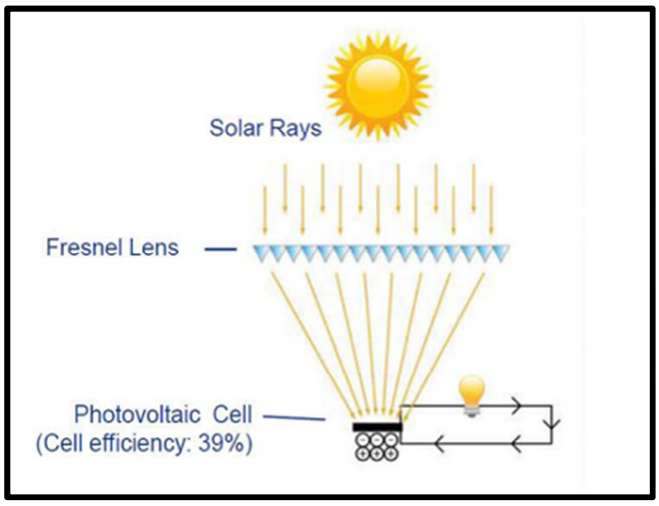



**Figure 1.4: Illustration of how the efficiency of the CPV panels is increased through the use of Fresnel Lenses which concentrates the amount of light entering the PV cells (Source: AmonixTM)**

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

**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. 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 (Figure 1.5).

**Figure 1.5: Example of a CPV plant** (*Source: Savannah, 2012*)

The proposed BioTherm Aberdeen PVSEF will consist of the following infrastructure:

- Photovoltaic (PV) panels and ConcentratedConcentrated 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.

Based on the information from other PVSEF projects the construction phase is expected to extend over a period of 12-18 months and create approximately 80 employment opportunities. The operational phase will employ approximately 20-25 people full time for a period of up to 20 years. The capital expenditure on completion is anticipated to be in the region of R 500 million for a 20 MW facility.

## 1.5 APPROACH TO STUDY

The approach to the SIA study is based on the Western Cape Department of Environmental Affairs and Development Planning Guidelines for Social Impact Assessment (February 2007). These guidelines are based on international best practice. The key activities in the SIA process embodied in the guidelines include:

- Describing and obtaining an understanding of the proposed intervention (type, scale, location), the settlements and communities likely to be affected by the proposed project
- Collecting baseline data on the current social and economic environment;

- Identifying the key potential social issues associated with the proposed project. This requires a site visit to the area and consultation with affected individuals and communities. As indicated in the limitations, due to time constraints it was not possible to undertake a site visit to interview key stakeholders. This will be undertaken at a later stage in the project and the SIA will be amended accordingly, where required. . The author is, however, confident that issues assessed represent the key social issues likely to be associated with the proposed BioTherm Aberdeen PVSEF. This is based on the author's experience in undertaking similar projects for other sites across the country.
- Assessing and documenting the significance of social impacts associated with the proposed intervention
- Identifying alternatives and mitigation measures

In this regard the study involved:

- Review of demographic data from the 2001 Census Survey;
- Review of relevant planning and policy frameworks for the area;
- Review of information from similar studies, including the EIAs undertaken for other renewable energy projects, including wind energy facilities;
- Identification and assessment of the social issues associated with the proposed project.

The identification of potential social issues associated with proposed facility is based on observations during the project site visit, review of relevant documentation, experience with similar projects and the area. Annex A contains a list of the secondary information reviewed. Annex B summarises the assessment methodology used to assign significance ratings to the assessment process.

### 1.5.1 Definition of social impacts

Social impacts can be defined as "The consequences to human populations of any public or private actions (these include policies, programmes, plans and/or projects) that alter the ways in which people live, work, play, relate to one another, organise to meet their needs and generally live and cope as members of society. These impacts are felt at various levels, including individual level, family or household level, community, organisation or society level. Some social impacts are felt by the body as a physical reality, while other social impacts are perceptual or emotional" (Vanclay, 2002).

When considering social impacts it is important to recognise that social change is a natural and on-going process (Burdge, 1995). However, it is also important to recognise and understand that policies, plans, programmes, and/or projects implemented by government departments and/or private institutions have the potential to influence and alter both the ***rate*** and ***direction*** of social change. Many social impacts are not in themselves "impacts" but change process that may lead to social impacts (Vanclay, 2002). For example the influx of temporary construction workers is in itself not a social impact. However, their presence can result in range of social impacts, such as increase in antisocial behaviour. The approach adopted by Vanclay stresses the importance of understanding the processes that can result in social impacts. It is therefore critical for social assessment specialists to think through the complex causal mechanisms that produce social impacts. By following impact pathways, or causal chains, and specifically, by thinking about interactions that are likely to be caused, the full range of impacts can be identified (Vanclay, 2002).

An SIA should therefore enable the authorities, project proponents, individuals, communities, and organisations to understand and be in a position to identify and anticipate the potential social consequences of the implementation of a proposed policy, programme, plan, or project. The SIA process should alert communities and individuals to the proposed project and possible social impacts, while at the same time allowing them to assess the implications and identify potential alternatives. The assessment process should also alert proponents and planners to the likelihood and nature of social impacts and enable them to anticipate and predict these impacts in advance so that the findings and recommendations of the assessment are incorporated into and inform the planning and decision-making process.

However, the issue of social impacts is complicated by the way in which different people from different cultural, ethic, religious, gender, and educational backgrounds etc view the world. This is referred to as the "social construct of reality". The social construct of reality informs people's worldview and the way in which they react to changes.

### 1.5.2 Timing of social impacts

Social impacts vary in both time and space. In terms of timing, all projects and policies go through a series of phases, usually starting with initial planning, followed by implementation (construction), operation, and finally closure (decommissioning). The activities, and hence the type and duration of the social impacts associated with each of these phases are likely to differ.

## 1.6 ASSUMPTIONS AND LIMITATIONS

### 1.6.1 Assumptions

**Strategic importance of the project and no-go option**
It is assumed that the strategic importance of promoting renewable energy, including solar energy, is supported by the national and provincial energy policies.

**Technical suitability**
It is assumed that the development site identified by BioTherm represents a technically suitable site for the establishment of a PVSEF plant.

**Fit with planning and policy requirements**
Legislation and policies reflect societal norms and values. The legislative and policy context therefore plays an important role in identifying and assessing the potential social impacts associated with a proposed development. In this regard a key component of the SIA process is to assess the proposed development in terms of its fit with key planning and policy documents. As such, if the findings of the study indicate that the proposed development in its current format does not conform to the spatial principles and guidelines contained in the relevant legislation and planning documents, and there are no significant or unique opportunities created by the development, the development cannot be supported.

However, the study recognises the strategic importance of solar energy and the technical, spatial and land use constraints required for such facilities.

**Generic issues relating to renewable energy**
A number of the key authorities in the other parts of South Africa, specifically the Northern Cape Province, have been interviewed as part of the SIAs for other solar

energy projects. For the purpose of the BioTherm Aberdeen SIA it is assumed that the generic issues relating to renewable energy, and specifically solar energy, also apply to the proposed BioTherm PVSEF plant.

### 1.6.2 Limitations

**Demographic data**
The demographic data used in the study is largely based on the 2001 Census[1]. While this data does provide useful information on the demographic profile of the affected area, the data are dated and should be treated with care. Where possible, reference is made to the latest demographic data contained in local Integrated Development Plans and other documents.

In addition, there is no longer any access to Census 2001 data at Ward level via the Municipal Demarcation Board. However, for the purposes of this study it was possible to source ward level information from a previous study undertaken in the area.

**Consultation with interested and affected parties**
Due to time constraints it was not possible to undertake a site visit as part of the SIA for the BA. No interviews with interested and affected parties have therefore been undertaken. The key social issues identified and assessed in the SIA are based on findings of SIAs undertaken for other PVSEF's and a review of local socio-economic data, such as Integrated Development Plans (IDPs). Based on these findings there are a number of generic social issues that are common to PVSEFs. The author is therefore confident that issues assessed represent the key social issues likely to be associated with the proposed BioTherm Aberdeen PVSEF. A site visit and interviews will be undertaken as part of the SIA for the next phase of the project. The findings from the site visit will be used to verify the findings of the SIA undertaken for the proposed 20MW PVSEF, and any additional information will be included in the final BA Report to be submitted to DEA for decision-making.

## 1.7 SPECIALIST DETAILS

The lead author of this report is an independent specialist with 23 years' experience in the field of environmental management. His qualifications include a BSc, BEcon (Hons) and an MSc in Environmental Science. In terms of SIA experience Tony Barbour has undertaken in the region of 120 SIAs and is the author of the Guidelines for Social Impact Assessments for EIAs adopted by the Department of Environmental Affairs and Development Planning (DEA&DP) in the Western Cape in 2007. These guidelines are based on international best practice and have been used widely in South Africa. Tony Barbour has also undertaken specialist SIA studies for over 20 PVSEFs in South Africa.

## 1.8 DECLARATION OF INDEPENDENCE

[1] The last comprehensive national census was conducted in 2001. Census 2001 provided demographic and socio-economic data from National to Municipal Ward level. An interim Community Survey (sample based) was undertaken in 2007, but provided information only on provincial and municipal levels. The next comprehensive national census is planned for 2011.

This confirms that Tony Barbour, the specialist consultants responsible for undertaking the study and preparing the Draft SIA Report, is independent and does not have vested or financial interests in the proposed PVSEF plant being either approved or rejected.

## 1.9 REPORT STRUCTURE

The report is divided into five sections, namely:

- Section 1: Introduction
- Section 2: Overview of the study area
- Section 3: Summary of key policy and planning documents relating to solar energy and the area in question
- Section 4: Identification and assessment of key social issues
- Section 5: Summary of key findings and recommendations

# SECTION 2: POLICY AND PLANNING ENVIRONMENT

## 2.1 INTRODUCTION

Section 2 provides an overview of the policy and planning environment affecting the proposed PVSEF. For the purposes of the meeting the objectives of the SIA the following policy and planning documents were reviewed, namely:

- The National Energy Act (2008);
- The White Paper on the Energy Policy of the Republic of South Africa (December 1998);
- The White Paper on Renewable Energy (November 2003);
- Integrated Resource Plan (IRP) for South Africa (2010-2030);
- Eastern Cape Provincial Growth and Development Strategy (2004-2014);
- Cacadu District Municipality Integrated Development Plan (2007-2011);
- Cacadu District Municipality Land Use and Locational Policy for Renewable Energy Projects (2011); and
- Camdeboo Local Municipality Integrated Development Plan (2007-2011).

## 2.2 NATIONAL LEVEL ENERGY POLICY

### 2.2.1 National Energy Act (Act No 34 of 2008)

The National Energy Act was promulgated in 2008 (Act No 34 of 2008). One of the objectives of the Act was to promote diversity of supply of energy and its sources. In this regard, the preamble makes direct reference to renewable resources, including solar:

"To ensure that diverse energy resources are available, in sustainable quantities, and at affordable prices, to the South African economy, in support of economic growth and poverty alleviation, taking into account environmental management requirements (…); to provide for (…) increased generation and consumption of renewable energies…" (Preamble).

### 2.2.2 White Paper on the Energy Policy of the Republic of South Africa

Investment in renewable energy initiatives, such as the proposed PVSEF, is supported by the White Paper on Energy Policy for South Africa (December1998). In this regard the document notes:

"Government policy is based on an understanding that renewables are energy sources in their own right, are not limited to small-scale and remote applications, and have significant medium and long-term commercial potential".

"Renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future".

The support for renewable energy policy is guided by a rationale that South Africa has a very attractive range of renewable resources, particularly ***solar*** and wind and that renewable applications are in fact the least cost energy service in many cases; more so when social and environmental costs are taken into account.

Government policy on renewable energy is thus concerned with meeting the following challenges:

- Ensuring that economically feasible technologies and applications are implemented;
- Ensuring that an equitable level of national resources is invested in renewable technologies, given their potential and compared to investments in other energy supply options; and,
- Addressing constraints on the development of the renewable industry.

The White Paper also acknowledges that South Africa has neglected the development and implementation of renewable energy applications, despite the fact that the country's renewable energy resource base is extensive and many appropriate applications exist.

The White Paper also notes that renewable energy applications have specific characteristics that need to be considered. Advantages include:

- Minimal environmental impacts in operation in comparison with traditional supply technologies; and
- Generally lower running costs, and high labour intensities.

Disadvantages include:

- Higher capital costs in some cases;
- Lower energy densities; and
- Lower levels of availability, depending on specific conditions, especially with sun and wind based systems.

The IRP 2010 also allocates 43% of new energy generation facilities in South Africa to renewables.

### 2.2.3 White Paper on Renewable Energy

This White Paper on Renewable Energy (November, 2003) (further referred to as the White Paper) supplements the *White Paper on Energy Policy*, which recognizes that the medium and long-term potential of renewable energy is significant. This Paper sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa. The White Paper notes that while South Africa is well-endowed with renewable energy resources that have the potential to become sustainable alternatives to fossil fuels, these have thus far remained largely untapped. As signatory to the Kyoto Protocol[2],, Government is determined to make good

[2] The **Kyoto Protocol** is a protocol to the United Nations Framework Convention on Climate Change (UNFCCC), aimed at fighting global warming. The UNFCCC is an international environmental treaty with the goal of achieving "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."[The Protocol was initially adopted on 11 December 1997 in Kyoto, Japan and entered into force on 16 February 2005. As of November 2009, 187 states have signed and ratified the protocol (Wikipedia)

the country's commitment to reducing greenhouse gas emissions. To this purpose, Government has committed itself to the development of a framework in which a national renewable energy framework can be established and operate.

South Africa is also a signatory of the Copenhagen Accord, a document that delegates at the 15th session of the Conference of Parties (COP 15) to the United Nations Framework Convention on Climate Change agreed to "take note of" at the final plenary on 18 December 2009. The accord endorses the continuation of the Kyoto Protocol and confirms that climate change is one of the greatest challenges facing the world. In terms of the accord South Africa committed itself to a reduction target of 34% compared to business as usual.

Apart from the reduction of greenhouse gas emissions, the promotion of renewable energy sources is aimed at ensuring energy security through the diversification of supply (in this regard, also refer to the objectives of the National Energy Act).

Government's long-term goal is the establishment of a renewable energy industry producing modern energy carriers that will offer in future years a sustainable, fully non-subsidised alternative to fossil fuels. The medium-term (10-year) target set in the White Paper is:

*10 000 GWh (0.8 Mtoe) renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro. The renewable energy is to be utilised for power generation and non-electric technologies such as solar water heating and bio-fuels. This is approximately 4% (1667 MW) of the projected electricity demand for 2013 (41539 MW)* (Executive Summary, ix).

### 2.2.4 National Integrated Resource Plan for Electricity (2010-2030)

The current iteration of the Integrated Resource Plan (IRP) for South Africa, initiated by the Department of Energy (DoE) after a first round of public participation in June 2010, led to the Revised Balanced Scenario (RBS) that was published in October 2010. The document outlines the proposed generation new build fleet for South Africa for the period 2010 to 2030. This scenario was derived based on the cost-optimal solution for new build options (considering the direct costs of new build power plants), which was then "balanced" in accordance with qualitative measures such as local job creation. In addition to all existing and committed power plants, the RBS included a nuclear fleet of 9,6 GW; 6,3 GW of coal; 11,4 GW of renewables; and 11,0 GW of other generation sources.

A second round of public participation was conducted in November/December 2010, which led to several changes to the IRP model assumptions. The main changes were the disaggregation of renewable energy technologies to explicitly display solar photovoltaic (PV), concentrated solar power (CSP) and wind options; the inclusion of learning rates, which mainly affected renewables; and the adjustment of investment costs for nuclear units, which until then represented the costs of a traditional technology reactor and were too low for a newer technology reactor (a possible increase of 40%).

Additional cost-optimal scenarios were generated based on the changes. The outcomes of these scenarios, in conjunction with the following policy considerations, led to the Policy-Adjusted IRP:

- The installation of renewables (solar PV, CSP and wind) were brought forward in order to accelerate a local industry;

- To account for the uncertainties associated with the costs of renewables and fuels, a nuclear fleet of 9,6 GW was included in the IRP;
- The emission constraint of the RBS (275 million tons of carbon dioxide per year after 2024) was maintained; and
- Energy efficiency demand-side management (EEDSM) measures were maintained at the level of the RBS.

**Table 2.1 National Energy Development Commitments before the next IRP**

| | New build options | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Coal (PF, FBC, imports, own build) | Nuclear | Import hydro | Gas – CCGT | Peak – OCGT | Wind | CSP | Solar PV |
| | MW | MW | MW | MW | MW | MW | MW | MW |
| 2010 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2011 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2012 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 300 |
| 2013 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 300 |
| 2014 | 500[1] | 0 | 0 | 0 | 0 | 400 | 0 | 300 |
| 2015 | 500[1] | 0 | 0 | 0 | 0 | 400 | 0 | 300 |
| 2016 | 0 | 0 | 0 | 0 | 0 | 400 | 100 | 300 |
| 2017 | 0 | 0 | 0 | 0 | 0 | 400 | 100 | 300 |
| 2018 | 0 | 0 | 0 | 0 | 0 | 400[4] | 100[4] | 300[4] |
| 2019 | 250 | 0 | 0 | 237[3] | 0 | 400[4] | 100[4] | 300[4] |
| 2020 | 250 | 0 | 0 | 237[3] | 0 | 400 | 100 | 300 |
| 2021 | 250 | 0 | 0 | 237[3] | 0 | 400 | 100 | 300 |
| 2022 | 250 | 0 | 1 143[2] | 0 | 805 | 400 | 100 | 300 |
| 2023 | 250 | 1 600 | 1 183[2] | 0 | 805 | 400 | 100 | 300 |
| 2024 | 250 | 1 600 | 283[2] | 0 | 0 | 800 | 100 | 300 |
| 2025 | 250 | 1 600 | 0 | 0 | 805 | 1 600 | 100 | 1 000 |
| 2026 | 1 000 | 1 600 | 0 | 0 | 0 | 400 | 0 | 500 |
| 2027 | 250 | 0 | 0 | 0 | 0 | 1 600 | 0 | 500 |
| 2028 | 1 000 | 1 600 | 0 | 474 | 690 | 0 | 0 | 500 |
| 2029 | 250 | 1 600 | 0 | 237 | 805 | 0 | 0 | 1 000 |
| 2030 | 1 000 | 0 | 0 | 948 | 0 | 0 | 0 | 1 000 |
| Total | 6 250 | 9 600 | 2 609 | 2 370 | 3 910 | 8 400 | 1 000 | 8 400 |

Firm commitment necessary now

Final commitment in IRP 2012

1. Built, owned & operated by IPPs 2. Commitment necessary due to required high-voltage infrastructure, which has long lead time 3. Commitment necessary due to required gas infrastructure, which has long lead time 4. Possibly required grid upgrade has long lead time and thus makes commitment to power capacity necessary

**Source: Integrated Resource Plan (IRP) for South Africa (2010)**

Table 2.1 above indicates the new capacities of the Policy commitment. The dates shown in Table 2.1 indicate the latest that the capacity is required in order to avoid security of supply concerns. The document notes that projects could be concluded earlier than indicated.

The Policy-Adjusted IRP includes the same amount of coal and nuclear new builds as the RBS, while reflecting recent developments with respect to prices for renewables. In addition to all existing and committed power plants (including 10 GW committed coal), the plan includes 9,6 GW of nuclear; 6,3 GW of coal; 17,8 GW of renewables; and 8,9 GW of other generation sources. The Policy-Adjusted IRP has therefore resulted in an increase in the contribution from renewables from 11,4 GW to 17,8 GW.

The key recommendations contained in the Policy-Adjusted IRP Final Report (March 2011) that have a bearing on the renewable energy sector include:

**General**

- The dark shaded projects in Table 2.1 need to be decided before the next IRP iteration, with the identified capacities thereafter assumed as "committed" projects;
- The light shaded options should be confirmed in the next IRP iteration; and
- All non-shaded options could be replaced during the next, and subsequent, IRP iterations if IRP assumptions change and thus impact on the quantitative model results.

**PV Solar energy**

- Solar PV programme 2012-2015: In order to facilitate the connection of the first solar PV units to the grid in 2012 a firm commitment to this capacity is necessary. Furthermore, to provide the security of investment to ramp up a sustainable local industry cluster, the first four years from 2012 to 2015 require firm commitment; and
- Solar PV 2016 to 2019: Grid upgrades might become necessary for the second round of solar PV installations from 2016 to 2019, depending on their location. To trigger the associated tasks in a timely manner, a firm commitment to these capacities is necessary in the next round of the IRP at the latest. By then, the assumed cost decreases for solar PV will be confirmed.

**Conclusions**

The key conclusions that are relevant to the renewable energy sector include:

- An accelerated roll-out of renewable energy options should be allowed in order to derive the benefits of localisation in these technologies; and
- A solar PV programme as envisaged in the Policy-Adjusted IRP should be pursued (including decentralised generation).

## 2.3 PROVINCIAL AND LOCAL LEVEL POLICY AND PLANNING

### 2.3.1 Eastern Cape Provincial Growth and Development Programme

The Eastern Cape Provincial Growth and Development Programme (PGDP) 2004-2014 sets out the vision and plan for development for the Eastern Cape until 2014. It highlights, in particular, strategies to fight poverty, promote economic and social development, and create jobs.

The strategy document does not highlight any specific measures to promote the development of renewable energy sources. However, an analysis of energy sources within the province reveals that 23% of the population of the province still rely on paraffin for their energy needs while 25% rely on candles for lighting.

Energy demands and electricity infrastructure rollout forms part of the Strategic Infrastructure Programme of the PGDP. The PGDP states that the, "…economic and logistics infrastructure – energy, roads, rail, ports, and air transport among others – is a necessary condition for economic growth and development."

Section 5 of the PGDP (2004-2014) identifies six strategic objective areas of the PGDP. Of these the infrastructure programme is of relevance to the study. The report notes that development of infrastructure, especially in the former homelands, is a necessary condition to eradicate poverty through:

- The elimination of social backlogs in access roads, schools and clinics and water and sanitation;
- To leverage economic growth through access roads and improving the road, rail and air networks of the Province.

Infrastructure development, in turn, will have strong growth promotion effects on the agriculture, manufacturing and tourism sectors by improving market access and by "crowding in" private investment. Poverty alleviation should also be promoted through labour-intensive and community based construction methods.

The PGDP indicates that the programmes have been selected for their potential in leveraging significant resources, creating a large multiplier effect, and providing a foundation for accelerated economic growth. Of specific relevance is the Strategic Infrastructure Programme. This programme indicates that enabling economic and logistics infrastructure – energy, roads, rail, ports, and air transport among others – is a necessary condition for economic growth and development. Specific reference is therefore made to energy infrastructure.

The Strategic Infrastructure Programme also seeks to consolidate and build on this coastal advantage through the provision of world-class infrastructure and logistics capability at the Coega and East London IDZs, and improving connectivity and linkages with major industrial centres, such as Johannesburg.

The high-level objectives of the Strategic Infrastructure Programme include consolidating and building upon the strengths of the Province's globally-competitive industrial sector through the development of world-class infrastructure and logistics capability in the East London and Coega IDZs. A reliable energy supply will be critical to achieving these objectives. The proposed PVSEF will contribute to the future energy requirements of the Eastern Cape, and it proximity (270 km) to the Coega IDZs will also benefit these key initiatives.

## 2.4 DISTRICT LEVEL PLANNING AND SPATIAL POLICY CONTEXT

### 2.4.1 Cacadu District Municipality Integrated Development Plan

The Cacadu District Municipality (CDM) Integrated Development Plan (IDP) (2007-2012) refers to the Medium Term Strategic Framework (MTSF) developed in July 2009 by the Minister of Planning. The aim of the MTSF is to guide planning and resource allocation across all the spheres of government through the identification of ten (10) National Strategic Medium Term Priorities. National, Provincial and Local spheres of government are expected to adapt their planning in line with the Strategic Priorities. The Strategic Priorities that are relevant to the proposed Aberdeen PVSEF include:

- Speeding up growth and transforming the economy to create decent work and sustainable livelihoods:
- Strengthen the skills and human resource base:
- Sustainable Resource Management and Use:

The sustainable resource management and use is a specifically relevant priority as is makes reference to impact of climate change and South Africa's ratification of the United Nations Framework on Climate Change in August 1997 and the Kyoto Protocol in March 2002. The main objective of government in terms of this priority is to encourage

sustainable resource management and use by focusing on various interventions including the pursuance of renewable energy alternatives and promotion of energy efficiency.

With regard to the CDM not all of the 10 Strategic Priorities are relevant to the role and mandate of the CDM. However, the IDP indicates that seven components of the MTSF have been extracted in the interest of influencing project formulation and resource allocation. Of these the following are relevant to the proposed Aberdeen PVSEF:

- Identification of Economic Opportunities, specifically efforts to identify and enhance existing economic opportunities, and create employment opportunities;
- Enhancement of Skills and Education Systems, specifically implementation of skills development programmes and initiatives:
- Sustainable Resource Management and Use, specifically the investigation of renewable energy alternatives. This priority also highlights the importance of enhance biodiversity and the preservation of natural habitats.

The CDM IDP therefore specifically makes reference to the need to investigate renewable energy options, such as wind energy. However, the IDP also highlights the importance of tourism to the local economy. The potential impact of the proposed Aberdeen PVSEF on tourism will be assessed during the assessment phase of the EIA.

### 2.4.2 Cacadu District Municipality Land Use and Locational Policy for Renewable Energy Projects

Urban Dynamics have been appointed by the Cacadu DM to develop a policy to guide decisions relating to land use and location of renewable energy projects in the Cacadu DM. In this regard a presentation was made to a working group on April 2011. The need for such a policy is driven by the fact that 33 WEF projects have been initiated in the Cacadu DM. Of these 8 are in the Blue Crane Lm, 9 in the Kouga LM, 2 in the Kou Kamma LM, 2 in the Makana Lm, 4 in the Ndlambe Lm, 4 in the Nelson Mandela Bay LM and 4 in the Sundays River Valley LM. The current status of the initiative is not known. The objective of the study is to:

- Formulate a detailed locational and land use strategy for the establishment of wind farms and large scale renewable energy projects;
- Implement District wide land use and locational guidelines with respect to renewable energy technologies;
- Assess the impact and possible spin-offs of renewable energy, especially wind farms, on the municipal rates base;
- Develop District level guidelines and policy for possible roll-out to individual LM's and province.

Given the uncoordinated land use management approach for implementation of renewable energy projects on a National level, this policy should be seen as a point of departure for land use applications in the Cacadu district, with possible future refinement and rollout on a Provincial level.

The initiative appears to be largely focused on wind farms, and as such makes reference to the Strategic initiative to introduce commercial land base wind energy developments to the Western Cape. In this regard the approach makes reference to:

- Method 1 : Criteria Based Assessment;
- Method 2 : Landscape Based Assessment

The documentation prepared to date makes reference to a number of impacts that are specifically linked to wind farms, such as noise and shadow flicker. However, the document also lists criteria and buffers that may also be applicable to PVSEFs, specifically in relation to transportation routes, infrastructure and transmission lines, nature reserves, protected areas, scenic routes, coast and rivers, wetlands, species and vegetation protection, topography, and heritage sites.

The approach also makes reference to criteria, buffers and setbacks. These are listed in Table 2.2.

**Table 2.2: List of criteria and buffers**

| Criteria | Buffer | Notes |
|---|---|---|
| **Urban Areas** | 800m | Adequately covers noise and flicker criteria. |
| **Residential Areas (rural dwellings)** | 400m | Adequately covers noise and flicker criteria. |
| **National Roads** | TBD | To be determined by SANRAL and based on Visual Impact Assessment. |
| **Local Roads** | TBD | To be determined by DRE and based on Visual Impact Assessment. |
| **Tourist Route** | TBD | Status of routes to be identified and based on Visual Impact Assessment |
| **Major Power Lines** | 250m | Subject to comment from Controlling Authority. |
| **Cell Phone Towers, Communication Towers, Radio + Navigation Beacons** | 250m | Subject to comment from Controlling Authority. |
| **Airport with Primary Radar and Local Airfield** | TBD | Subject to comment from Controlling Authority. |
| **National Security Sites** | TBD | Subject to comment from Controlling Authority. |
| **National Parks + Provincial Nature Reserves** | 2km | Subject to comment from Controlling Authority. |
| **Mountain Catchments and Protected Natural Environment** | TBD | Subject to EIA Process. |

### 2.4.3 Camdeboo Local Municipality Integrated Development Plan

The Vision Statement for the Camdeboo Integrated Development Plan 2007 –2012 states that:

*"Camdeboo Municipality strives to ensure the socio-economic development and effective participation of all its inhabitants within an economically viable and sustainable environment, where equal opportunities are promoted. Poverty is eradicated and services provided at an affordable cost within a crime free, healthy environment and well managed administration".*

This long-term Vision is linked to development Priorities, Objectives, Strategies and Projects which are listed in the IDP. The key Development Priorities identified during the participation process are, in order of importance:

- Housing (RDP backlog as well as fallen);
- Infrastructure (including services, maintenance and bulk supply);
- Local Economic Development (including, job creation, Black Economic Empowerment (BEE), skills development, tourism, industrial development, heritage, etc.);
- Institution building (including Staff);
- Community building (including community facilities, recreation, HIV/AIDS)

The key development priority of relevance to the proposed BioTherm Aberdeen PVSEF is Local Economic Development (LED). In this regard the IDP notes that the CLM must promote LED by creating an enabling environment through investing in good infrastructure (new as well as maintaining and upgrading the old), ensuring that a high standard of services (water, electricity, health care, etc.) is rendered to all areas and that sufficient land is allocated for enterprise and industrial development. One of the key constraints affecting the economic development of the area that is relevant to the project is the shortage of skills and low education levels.

The IDP also lists the findings of a Community Needs Analysis. In terms of priorities, the key priorities that a relevant to the proposed PVSEF include job creation, BEE, small enterprise, industrial and sector development (e.g. Tourism and & Agriculture) and skills development. The proposed BioTherm Aberdeen PVSEF has the potential to contribute towards the creation of jobs, skills development and the promotion of small businesses and BBE. However, due the potential visual impacts associated with large PVSEFs, the proposed development also has the potential to impact negatively on the tourism potential of the area.

# SECTION 3: OVERVIEW OF STUDY AREA

## 3.1 INTRODUCTION

Section 3 provides an overview of the study area with regard to:

- The relevant administrative context;
- The provincial socio-economic context; and
- The municipal-level socio-economic context.

## 3.2 ADMINISTRATIVE CONTEXT

The study area is located within the Camdeboo Local Municipality (CLM) in the Eastern Cape Province of South Africa. The CLM is one of nine local municipalities that make up the Cacadu District Municipality (CDM), which covers an area of 58 243 $km^2$, making it the largest DM in the Eastern Cape Province.

The CLM consists of 6 Wards and covers an area of 7 230 km² and is renowned for its pristine natural environment, rich heritage, diverse peoples and cultures. Important tourist attractions include the beautiful landscapes and a healthy climate. The town of Graaff-Reinet, which is the $4^{th}$ oldest town in South-Africa and is referred to as the "Gem of the Karoo", is a hub of agri-tourism activity. The town is also the seat of the Municipal Council and serves as an important service centre.

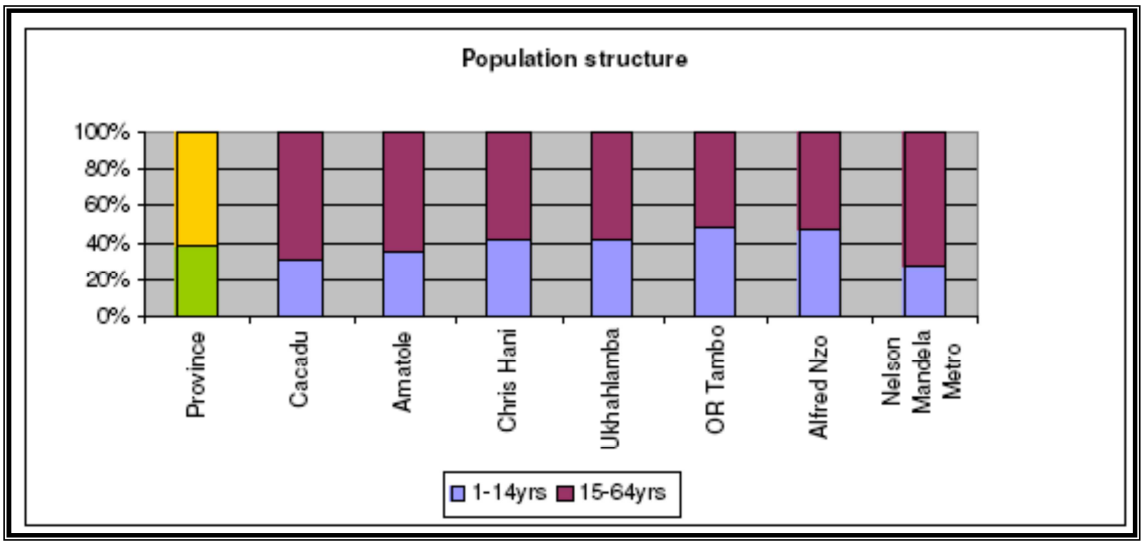
## 3.3 PROVINCIAL SOCIO-ECONOMIC CONTEXT

The proposed Aberdeen PVSEF is located within the CDM of the Eastern Cape Province of South Africa. The Eastern Cape Province is the second largest province in terms of land area in South Africa (169 580 $km^2$) and makes up 13.9% of South Africa's total land area. The province contributes 7.5 % to the countries total GDP and with 14.1 % of South Africa's population it is the countries third most populous province. Of this total almost 40% are under the age of 14 years. In the case of the Alfred Nzo and OR Tambo (Oliver Tambo) districts, this proportion exceeds 45% (Figure 3.1).

The high proportion of children is reflective of Eastern Cape's historic role as a major source of migrant labour (Austrian Development Agency, 2005). Migration from the Eastern Cape to other provinces, specifically the Western Cape, still continues today. Life expectancy in the province has dropped over the past decade from 60 years in 1995 to 50 years in 2003 (Austrian Development Agency, 2005). There are two major urban centers within the Province, the Nelson Mandela Metropolitan Area and Buffalo City Municipality (BCM). With the exception of the Nelson Mandela Metro and Buffalo City, the province is predominantly rural in character.

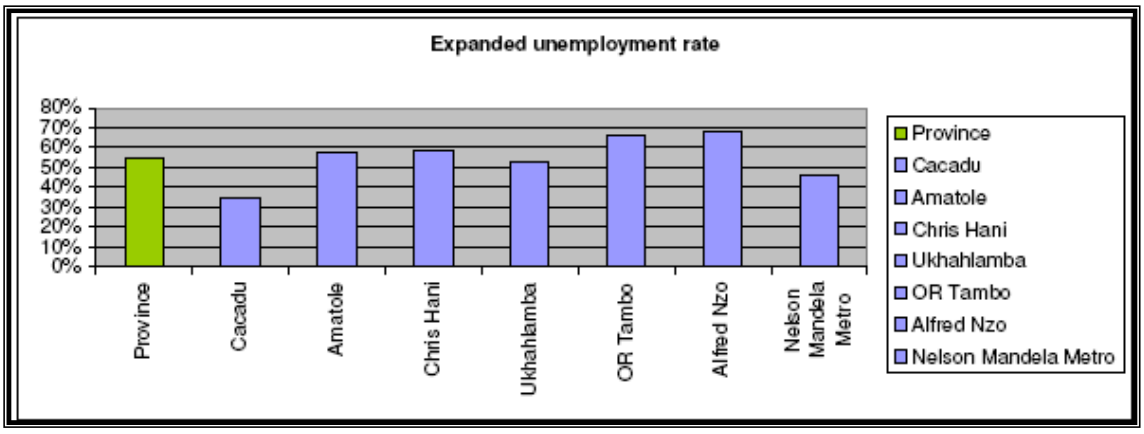
The Eastern Cape is also the poorest province in South Africa, with seven of the poorest Local Municipalities in the country located in province, namely Umzimvubu (Alfred Nzo DM), Ntabankulu (OR Tambo DM), Mbizana (OR Tambo DM), Mbhashe (Amatole DM),

Ngqushwa (Amatole DM), Elundini (Ukhahlamba DM) and Intsika Yethu (Chris Hani DM). The high levels of poverty in the province are linked to the inclusion of the two former apartheid era Bantustan areas, namely the Transkei and Ciskei, into the Eastern Cape (Austrian Development Agency, 2005).



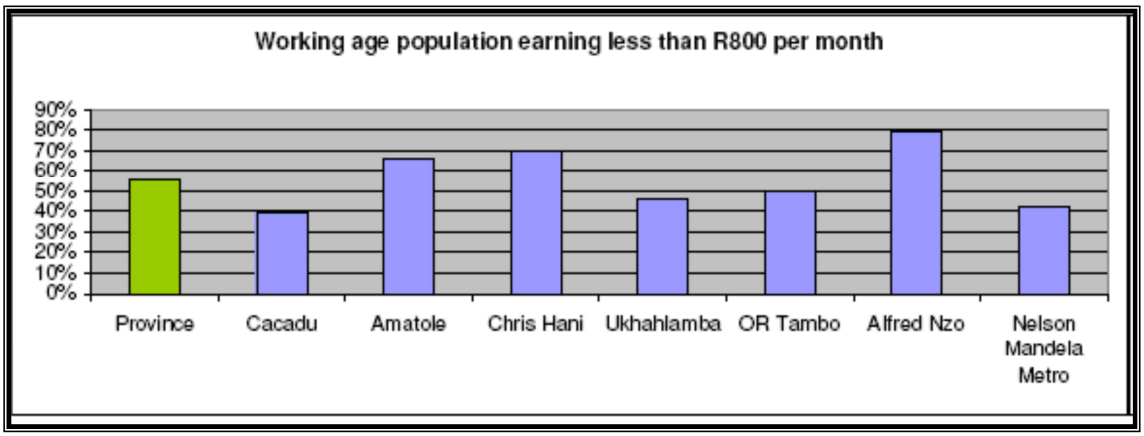

Source: Austrian Development Agency (2005)
**Figure 3.1: Age distribution with the Eastern Cape Province**

Although the Eastern Cape is the poorest province in the country, there is a distinct variation in both the distribution and severity of poverty within the province. In this regard a distinction can be made between those areas that were formerly part of the Ciskei and the Transkei (in particular OR Tambo, Alfred Nzo, but also large parts of Ukhahlamba, Amatole and Chris Hani), and those areas that were administered by the former white South Africa (in particular Cacadu) (Austrian Development Agency, 2005). In terms of unemployment rates, the OR Tambo and Alfred Nzo Districts have the highest rates, followed by Chris Hani and Amatole. All of these districts have unemployment rates higher than the provincial average (Figure 3.2). The Cacadu District Municipality has the lowest unemployment rate in the province.




Source: Austrian Development Agency (2005)
**Figure 3.2: Expanded unemployment rate for the Eastern Cape Province**

In addition to the high unemployment levels, income levels are also low. A large proportion of those that are employed therefore earn less than R800 per month. In the case of Alfred Nzo, Chris Hani and Amatole districts, over 60% of those employed earn less than R800 per month (Figure 3.3). The figure for the Cacadu district is 40%.




Source: Austrian Development Agency (2005)

**Figure 3.3: Percentage of working age population earning less than R800 per month**

In addition to the high unemployment rates and low-income levels, there has also been an increase in inequality as measured by the Gini coefficient[3] since 1995. In 1995 the figure stood at 0.61. By 2001 the coefficient had increased to 0.66. Similarly, in relation to human development indices, the situation has also deteriorated (Austrian Development Agency, 2005).

In response to these challenges, the Eastern Cape Province has been earmarked by the ANC as a priority for growth and economic development. To facilitate development, two spatial development initiatives (SDIs), the Fish River SDI and the Wild Coast SDI, two Industrial Development Zones (IDZs), the Coega IDZ near the Nelson Mandela Metropole (Port Elizabeth) and the West Bank IDZ near East London, and numerous substructure and structure plans have been initiated. The IDZ initiatives are linked to two of the province's three harbours (i.e. Coega and East London). In addition the province has three airports offering direct flights to the main centres, and a well-developed road infrastructure. In terms of context the proposed Aberdeen PVSEF is located approximately 270 km north-west of the Nelson Mandela Metropole and the Coega IDZ. The facility is therefore well placed to supplement the future energy needs of these two large consumers. The location of the site will also significantly reduce the transmission losses experienced by Eskom in the transmission of electricity from Gauteng and Mpumalanga to the Eastern Cape.

[3] The Gini coefficient is a measure of statistical dispersion most prominently used as a measure of inequality of income distribution or inequality of wealth distribution. It is defined as a ratio with values between 0 and 1: A low Gini coefficient indicates more equal income or wealth distribution, while a high Gini coefficient indicates more unequal distribution (Source, Wikipedia.org)

## 3.4 OVERVIEW OF THE PROPOSED PROJECT AREA

### 3.4.1 Cacadu District Municipality

The Cacadu District Municipality (CDM), DC10, is the largest (58 243 $km^2$) of the six (6) District Municipalities in the Eastern Cape Province. The District is situated in the western portion of the Province, bordering the Western Cape, Northern Cape and two other District Municipalities in the Eastern Cape, namely Chris Hani District Municipality and Amathole District Municipality (Figure 1.3).

The District consists of nine (9) local municipalities (Category B Municipalities) and four other portions collectively known as the District Management Area (DMA). Two of the four areas are National Parks, namely the Addo Elephant National Park and the Tsitsikamma National Park. These parks are managed by the South African National Parks Board. The District wholly borders the Nelson Mandela Metropolitan Municipality (NMMM), and consequently, land access to the NMMM is via the CDM. The nine local municipalities in CDM and their respective towns are illustrated in Table 3.4.

The Cacadu District covers approximately one third of the Eastern Cape's land area, however it only houses 5.4% of the provinces' population. The main population concentrations are in Makana, Kouga and Ndlambe, with more than 50% of residents in the District residing in these Municipalities. The remaining Municipalities all have less than 50 000 inhabitants per Municipality. Figure 3.1 illustrates the population figures for each of the nine local municipal areas.

Due the relatively small population size and large geographical area, the population density was 5.6 persons per $km^2$ in 2001 in the Cacadu District Municipality. This is significantly lower than that of the Eastern Cape and South Africa (both 32 in 2001). There is a 72.6% Urbanisation level for the Cacadu District.

**Table 3.1: List of Local Municipalities within the Cacadu District Municipality**

| | MUNICIPALITY | MAJOR SETTLEMENTS / TOWNS |
|---|---|---|
| EC101 | Camdeboo | Graaff-Reinet, Aberdeen, Nieu-Bethesda |
| EC102 | Blue Crane Route | Somerset-East, Cookhouse, Pearston |
| EC103 | Ikwezi | Jansenville, Klipplaat, Waterford |
| EC104 | Makana | Grahamstown, Alicedale, Riebeeck-East |
| EC105 | Ndlambe | Port Alfred, Kenton-on-Sea, Bushmans River, Alexandria |
| EC106 | Sundays River Valley | Kirkwood, Addo, Paterson |
| EC107 | Baviaans | Willowmore, Steytlerville |
| EC108 | Kouga | Jeffreys Bay, Humansdorp, Hankey, Patensie |
| EC109 | Kou-Kamma | Joubertina, Kareedouw, Louterwater |
| DC10 | Cacadu DMA | Rietbron, Wolwefontein, Vondeling, Glenconner |

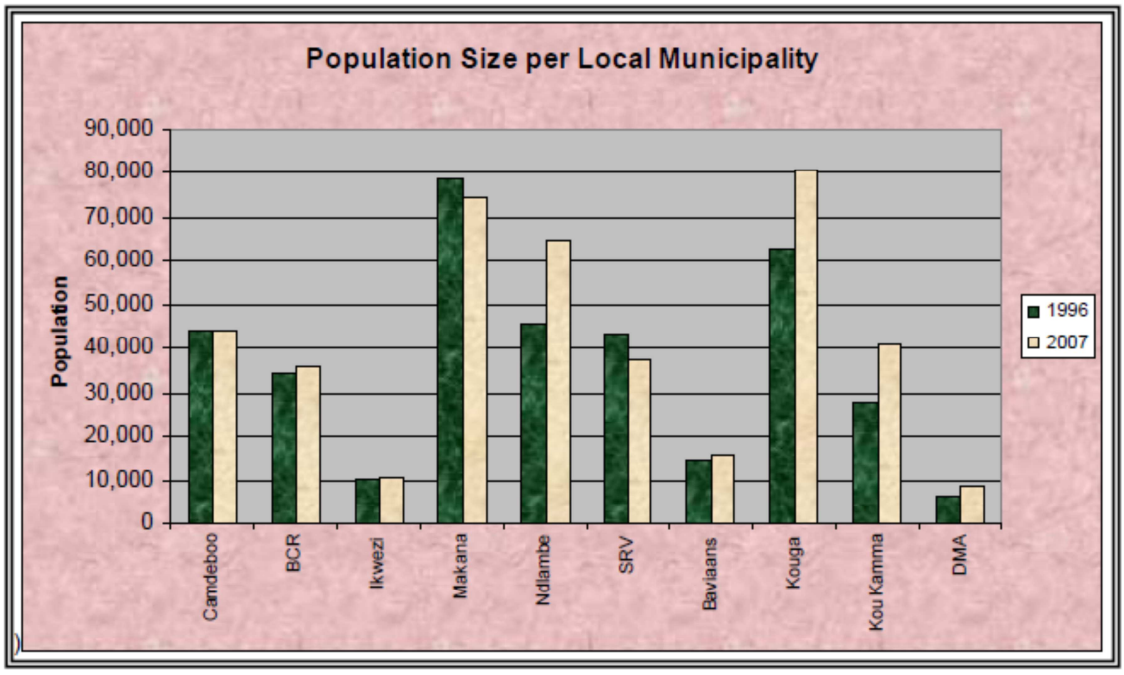



**Figure 3.4: Population size per local Municipality in the Cacadu District Municipality**

### 3.4.2 Camdeboo Local Municipality

The CLM (EC101) is approximately 270km from Port Elizabeth (CBD) with the N9 national road being the major access route bisecting the study area. The Camdeboo is part of an area known as the "Karoo Heartland" which defines a scenic route through the Karoo. The northern area of the study area is characterised by a mountainous terrain or high lying hinterland. The rural areas have low densities and is characterised by farming activities. The urban nodes include:

- Graaff-Reinet, including Umasizakhe, Kroonvale, Adendorp and Kendrew;
- Aberdeen, including Lotusville and Thembalesizwe;
- Nieu-Bethesda, including Pienaarsig.

The CLM consists of 6 Wards and covers an area of 7 230 km² and is renowned for its pristine natural environment, rich heritage, diverse peoples and cultures. Important tourist attractions include the beautiful landscapes and a healthy climate. The key features of the region include:

- Agriculture : wool, mohair, ostrich, poultry, redmeat production (beef, sheep, goat), crops;
- Tourism : museums (e.g. Reinet House, Owl House), natural and cultural heritage, the Valley of Desolation, Camdeboo National Park;
- Commerce & Industry : established business (large and small), formal & informal sectors;
- Infrastructure & Services : good infrastructure, free basic services (water and electricity) available to all with subsidized support to the Indigent;
- Schools, colleges and other educational centres;
- Primary health care clinics, hospitals and other medical facilities;
- Public amenities: libraries, sport & recreational facilities, banks and post offices.

**Population**
Based on the 2001 Census Statistics the Camdeboo Local Municipality (CLM) had a population of 44 370 in 2001 made up of approximately 10 320 households, giving an average of 4.3 people per house. During 2007 StatsSA conducted a national Community Survey based on random samples taken throughout the country. The findings of the survey released in 2008 indicated that the population of the CLM was 41 764 compared to the 44 370 in 2001. The CLM IDP states that the data from the Community Survey is deemed to be unreliable. Based on current estimates the population of the CLM is estimated to be in the region of 50 000 (CLM IDP 2007-2012).

Of the 2001 total, ~ 67 % were Coloureds, 22 % Black African and 11 % Whites. The dominant language in the area is Afrikaans. In terms of settlements, the largest concentration of people live in Graff-Reinet (24 224), followed by Umasizake (8 237), Aberdeen (4 976), Thembalesizwe (1 345), Nieu-Bethesda (1 009). Approximately 4 579 live in the rural, farming areas of the LM (Census 2001).

**Education**
Based on the 2001 Census data ~ 50% of population older than 20 years are semi- or completely illiterate, whilst the majority of the remaining 50% do not have secondary, matric or a higher qualification. In this regard ~ 6% of persons older than 20 years have a tertiary education. Due to the low education levels a large number of persons are employed as general labourers, and have to perform menial tasks with limited

responsibility (CLM IDP 2007-2012). Youth development and education have therefore been identified a key priorities by the CLM.

**Household incomes**
Census 2001 data indicated that of the ~ 10 320 households in the Camdeboo, 39% earned below R800 per month and 43 % earned between R 801 and R 3 200 per month. At the time of the Census, the Poverty Line Income was defined as R800 per month per household. The Department of Social Welfare classifies a household as indigent and living below the poverty line if it has an income of up to R9 600 per year, which is R800 per month. The low income levels in the area are closely linked to the low education levels.

As a result of the low income levels a large portion of the population derives its income from Social Support (Welfare). Based on latest statistics (2010) 42% of the total population (50 000) receive some form of social support from the Government. In terms of totals, a total of ~ R 194 million is paid out per annum in social grants. Of this total, Child Support Grants make up 50% of Grants & Pensions paid out in the CLM. This total is expected to increase as the age threshold is moved up (CLM IDP 2007-2012).

**Employment**
According to the 2001 National Census, 20% of the employable sector was unemployed and 43% were not economically active. Of the Employable Sector (age group 15-65 years), 37% was employed; of those 71% worked in the Formal Sector, 12% in the Informal Sector and 18% in the Farming (Agricultural) Sector. Recent figures for the area indicate that in 2008 the level of unemployment had risen to 25% compared to the 2001 level of 20%. This is the same as the National Unemployment rate for 1st Quarter of 2011 (25%).

**Basic services**
The 2001 Census data indicated that an average of 98.7% of households in the CLM had access to piped water within 200m from their dwelling. In terms of sanitation, ~ 89.7% of households had access to a minimum of a VIP pit latrine, while ~ an average of 92.5% of households had access to weekly refuse collection. With regard to electricity, ~ 93.4% of all households had access to electricity. In 2004 Eskom reported that there were no electrification infrastructure backlogs within CDM. The level of basic services in the CLM is therefore regarded as good.

**Road infrastructure**
The IDP notes that tourism is one of the main economic drivers in the Camdeboo and it is therefore crucial that roads, signage and markings be of acceptable standard and are maintained properly. The IDP indicates that many rural gravel roads throughout the District are in a very poor state of repair.

# SECTION 4: ASSESSMENT OF KEY SOCIAL ISSUES

## 4.1 INTRODUCTION

Section 4 identifies the key social issues identified during the SIA study. The identification of social issues was based on:

- Review of project related information, including other specialist studies;
- Interviews with key interested and affected parties;
- Experience with renewable energy projects, including solar energy projects

In identifying the key issues the following assumption is made:

- The area identified for the proposed solar energy plant meets the technical criteria required for such facilities.

## 4.2 IDENTIFICATION OF KEY SOCIAL ISSUES

The key social issues identified during the SIA can be divided into:

- The policy and planning related issues
- Local, site-specific issues

The local site-specific issues can in turn be divided into construction and operational related issues. These issues are discussed and assessed below. The potential impacts associated with the associated infrastructure (access road, pipeline and power line routes_ are also assessed.

## 4.3 POLICY AND PLANNING ISSUES

As indicated in Section 1.4, legislative and policy context plays an important role in identifying and assessing the potential social impacts associated with a proposed development. In this regard a key component of the SIA process is to assess the proposed development in terms of its fit with key planning and policy documents.

The review of the relevant planning and policy documents has been undertaken as a part of the Scoping Study assessment. The key documents reviewed included:

- The National Energy Act (No. 34 of 2008);
- The White Paper on the Energy Policy of the Republic of South Africa (December 1998);
- The White Paper on Renewable Energy (November 2003);
- Integrated Resource Plan (IRP) for South Africa (2010-2030);
- Eastern Cape Provincial Growth and Development Strategy (2004-2014);
- Cacadu District Municipality Integrated Development Plan (2007-2011);

- Cacadu District Municipality Land Use and Locational Policy for Renewable Energy Projects (2011);
- Camdeboo Local Municipality Integrated Development Plan (2007-2011);

The findings of the review indicated that wind energy development is strongly supported at a national level.

At a national level the While Paper on Energy Policy (1998) notes:

- Renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future;
- The support for renewable energy policy is guided by a rationale that South Africa has a very attractive range of renewable resources, particularly **solar** and wind and that renewable applications are in fact the least cost energy service in many cases; more so when social and environmental costs are taken into account.

At a provincial level the Eastern Cape PGDP does not make specific reference to renewable energy, however, investment in energy infrastructure is identified as one of the key requirements. Based on this is it reasonable to assume that the establishment of PVSEF is supported. At a local level the Cacadu District Municipality IDP identifies 7 key strategic priorities. The key priority that is relevant to the proposed PVSEF is:

- Sustainable Resource Management and Use, specifically to investigate the option of renewable energy alternatives.

The findings of the review of the relevant policies and documents pertaining to the energy sector therefore indicate that renewable energy and the establishment of PVSEFs are supported at a national, provincial and local level. It is therefore the opinion of the authors that the establishment of a PVSEF on the proposed area is supported by national, provincial and local policies and planning guidelines.

## 4.4 SOCIAL IMPACTS ASSOCIATED WITH THE CONSTRUCTION PHASE

The key social issues associated with the construction phase include:

**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.

### 4.4.1 Creation of employment and business opportunities

Based on the information from other PVSEFs the construction phase for a 20MW PVSEF is expected to extend over a period of 12-18 months and create approximately 80 employment opportunities, depending on the final design. The work associated with the construction phase will be undertaken by contractors and will include the establishment of the PVSEF and the associated components, including, access roads, services and power line.

Based on other renewable energy projects it is anticipated that approximately 60% (48) of the employment opportunities will be available to low (construction labourers, security staff etc.), ~ 25% (20) for 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 the project are likely to benefit 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 contactors appointed to construct the proposed PVSEF and the associated infrastructure. In this regard the majority of contractors tend to use their own staff and this will limit the potential for direct employment opportunities for locals during the construction phase. 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.

The capital expenditure on completion is anticipated to be in the region of R 500 million for a 20 MW facility. In terms of business opportunities for local companies, the expenditure of these sums during the construction phase will create business opportunities for the regional and local economy. However, given the technical nature of the project and high import content associated with solar plants the opportunities for the CLM economy are likely to be limited. However, opportunities may exist for local contractors and engineering companies in Port Elizabeth. Implementing the enhancement measures listed below can enhance these opportunities.

The implementation of the proposed enhancement measures listed below would enable the establishment of the proposed PVSEF to support co-operation between the public and private sectors in order for the economic development potential of the Eastern Cape to be realised. In this regard the ECPGDS highlights the importance of enterprise development, and notes that the current levels of private sector development and investment in the province are low. The proposed PVSEF therefore has the potential to create opportunities to promote private sector investment and the development of SMMEs in the Eastern Cape Province.

The sector of the local economy that is most likely to benefit from the proposed development is the local service industry. The potential opportunities for the local service sector would be linked to accommodation, catering, cleaning, transport and security, etc. associated with the construction workers on the site. The majority of construction workers are likely to be accommodated in Aberdeen and possible Graaff Reinet. This will create opportunities for local hotels, B&Bs, guest farms and people who want to rent out their houses. In addition, a proportion of the total wage bill earned by construction workers over the 12 month construction phase is also likely to be spent in

the regional and local economy. The total wage bill for the construction phase is estimated to be in the region of R 10 million. This is based on the assumption that the average monthly salary for low skilled, semi-skilled and skilled workers is R 4 000, R 8 000 and R 25 000 respectively for a period of 15 months. A percentage of the wage bill will be spent in the local economy and will create opportunities for local businesses in Aberdeen and Graaff Reinet. The sector of the local economy that is most likely to benefit from the proposed development is the local service industry. The potential opportunities for the local service sector would be linked to accommodation, catering, cleaning, transport and security, etc. associated with the construction workers on the site. The benefits to the local economy will however be confined to the construction period (12-15 months).

The hospitality industry in Aberdeen and Graaff Reinet is also likely to benefit from the provision of accommodation and meals for professionals (engineers, quantity surveyors, project managers, product representatives etc.) and other (non-construction) personnel involved on the project. Experience from other large construction projects indicates that the potential opportunities are not limited to on-site construction workers but also to consultants and product representatives associated with the project.

**Table 4.1: Impact assessment of employment and business creation opportunities during the construction phase**

| **Nature:** Creation of employment and business opportunities during the construction phase | | |
|---|---|---|
| | **Without Mitigation** | **With Enhancement** |
| **Extent** | Local – Regional (2)<br>(Rated as 2 due to potential opportunities for local communities and businesses) | Local – Regional (3)<br>(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 | Positive |
| **Reversibility** | N/A | N/A |
| **Irreplaceable loss of resources?** | N/A | N/A |
| **Can impact be enhanced?** | Yes | |
| **Enhancement :** See below | | |
| **Cumulative impacts:** 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 impacts:** 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. | | |

**Assessment of No-Go option**

There is no impact as it maintains the current status quo. The potential employment and economic benefits associated with the proposed PVSEF would therefore be forgone. The

potential opportunity costs in terms of the capital expenditure, employment, skills development, and opportunities for local business are therefore regarded as a negative.

**Recommended enhancement measures**
In order to enhance local employment and business opportunities associated with the construction phase the following measures should be implemented:

**Employment**
- Where reasonable and practical, BioTherm should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. However, due to the low skills levels in the area, the majority of skilled posts are likely to be filled by people from outside the area.
- Where feasible, efforts should be made to employ local contactors that are compliant with Black Economic Empowerment (BEE) criteria;
- Before the construction phase commences BioTherm should meet with representatives from the CLM to establish the existence of a skills database for the area. If such as database exists it should be made available to the contractors appointed for the construction phase.
- The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that BioTherm intends following for the construction phase of the project.
- Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the construction phase.
- The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.

**Business**
- BioTherm should seek to develop a database of local companies, specifically BEE companies, which qualify as potential service providers (e.g. construction companies, catering companies, waste collection companies, security companies etc.) prior to the commencement of the tender process for construction contractors. These companies should be notified of the tender process and invited to bid for project-related work;
- Where possible, BioTherm should assist local BEE companies to complete and submit the required tender forms and associated information.
- The CLM, in conjunction with the local Chamber of Commerce and representatives from the local hospitality industry, should identify strategies aimed at maximising the potential benefits associated with the project.

Note that while preference to local employees and companies is recommended, it is recognised that a competitive tender process may not guarantee the employment of local labour for the construction phase.

### 4.4.2 Presence of construction workers in the area

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. The potential threat to farming activities is discussed below.

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)

Given the relatively small labour force (80) during the construction phase, of which approximately 60 can be sourced from the local area, the potential risk to local family structures and social networks is regarded as low.

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.

**Table 4.2: Assessment of impact of construction workers on local communities**

| **Nature:** Potential impacts on family structures and social networks associated with the presence of construction workers | | |
|---|---|---|
| | **Without Mitigation** | **With Mitigation** |
| **Extent** | Local (3)<br>(Rated as 3 due to potential severity of impact on local communities) | Local (2)<br>(Rated as 1 due to potential severity of impact on local communities) |
| **Duration** | Short term for community as a whole (2)<br>Long term-permanent for individuals who may be affected by STD's etc. (5) | Short term for community as a whole (2)<br>Long term-permanent for individuals who may be affected by STD's etc. (5) |
| **Magnitude** | Low for the community as a whole (4)<br>High-Very High for specific individuals who may be affected by STD's etc. (10) | Low for community as a whole (4)<br>High-Very High for specific individuals who may be affected by STD's etc. (10) |
| **Probability** | Probable (3) | Probable (3) |
| **Significance** | Low for the community as a whole (27)<br>Moderate-High for specific individuals who may be affected by STD's etc. (57) | Low for the community as a whole (24)<br>Moderate-High for specific individuals who may be affected by STD's etc. (51) |
| **Status** | Negative | Negative |
| **Reversibility** | No in case of HIV and AIDS | No in case of HIV and AIDS |
| **Irreplaceable loss of** | Yes, if people contract HIV/AIDS. Human capital plays a critical role in | |

| | | |
|---|---|---|
| **resources?** | communities that rely on farming for their livelihoods | |
| **Can impact be mitigated?** | Yes, to some degree. However, the risk cannot be eliminated | |
| **Mitigation:** See below | | |
| **Cumulative impacts:** 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. | | |
| **Residual impacts:** See cumulative impacts. | | |

**Assessment of No-Go option**
There is no impact as it maintains the current status quo. The potential positive impacts on the local economy associated with the additional spending by construction workers in the local economy will also be lost.

**Recommended mitigation measures**
The potential risks associated with construction workers can be mitigated. The aspects that should be covered include:

- 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 workers to local family structures and social networks;
- 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.

### 4.4.3 Increased risk of stock theft, poaching and damage to farm infrastructure

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.

**Table 4.3: Assessment of impact of stock theft and damage to farm infrastructure**

| **Nature:** Potential loss of livestock, poaching and damage to farm infrastructure associated with the presence of construction workers on site | | |
|---|---|---|
| | **Without Mitigation** | **With Mitigation** |
| **Extent** | Local (4)<br>(Rated as 4 due to potential severity of impact on local farmers) | Local (2) |
| **Duration** | Short Term (2) | Short Term (2) |
| **Magnitude** | Moderate (6)<br>(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 |
| **Mitigation:** See below | | |
| **Cumulative impacts:** No**,** provided losses are compensated for | | |
| **Residual impacts:** See cumulative impacts. | | |

**Assessment of No-Go option**
There is no impact as it maintains the current status quo.
**Recommended mitigation measures**
The mitigation measures that can be considered to address the potential impact on livestock, game, and farm infrastructure include:

- 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.;
- 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 the

construction phase. The Code of Conduct should be signed by BioTherm and the contractors before the contractors move onto site;
- 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 loses 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.

### 4.4.4 Increased risk 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.

**Table 4.4: Assessment of impact of increased risk of veld fires**

| **Nature:** Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of veld fires | | |
|---|---|---|
| | **Without Mitigation** | **With Mitigation** |
| Local (4)<br>(Rated as 4 due to potential severity of impact on local farmers) | Local (2)<br>(Rated as 2 due to potential severity of impact on local farmers) | Local (2)<br>(Rated as 2 due to potential severity of impact on local farmers) |
| Short Term (2) | Short Term (2) | Short Term (2) |
| Moderate-High due to reliance on livestock for maintaining livelihoods (8) | Low (4) | Low (4) |
| Probable (3) | Probable (3) | Probable (3) |
| Medium (42) | Low (24) | Low (24) |
| Negative | Negative | Negative |
| Yes, compensation paid for stock and crop losses etc. | | |

| | | |
|---|---|---|
| No | No | No |
| Yes | | |
| **Mitigation:** See below | | |
| **Cumulative impacts:** No, provided losses are compensated for. | | |
| **Residual impacts:** See cumulative impacts. | | |

**Assessment of No-Go option**
There is no impact as it maintains the current status quo.

**Recommended mitigation measures**
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:

- Contractor to ensure that open fires on the site for cooking or heating are not allowed except in designated areas;
- 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;
- Contractor to provide adequate fire fighting equipment on-site;
- 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.

In addition the landowner should ensure that they join the local fire protection agency.

### 4.4.5 Impact of construction vehicles

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.

**Table 4.5**: **Assessment of the impacts associated with construction vehicles**

| **Nature:** Potential noise, dust and safety impacts associated with movement of construction related traffic to and from the site | | |
|---|---|---|
| | **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 | |
| **Mitigation:** See below | | |
| **Cumulative impacts:** 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. | | |
| **Residual impacts:** See cumulative impacts | | |

**Assessment of No-Go option**
There is no impact as it maintains the current status quo.

**Recommended mitigation measures**
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:

- 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.

### 4.4.6 Damage to and loss of farmland

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.

**Table 4.6: Assessment of impact on farmland due to construction related activities**

| | | |
|---|---|---|
| **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 PVSEF and power lines will damage farmlands and result in a loss of farmlands for future farming activities. | | |
| | **Without Mitigation** | **With Mitigation** |
| **Extent** | Local (3) | Local (1) |
| **Duration** | Long term-permanent if disturbed areas are not effectively rehabilitated (5) | Short term if damaged areas are rehabilitated (2) |
| **Magnitude** | Moderate, due to importance of farming in terms of local livelihoods (4) | Minor (2) |
| **Probability** | Definite (5) | Highly Probable (4) |
| **Significance** | High (60) | Low (20) |
| **Status** | Negative | Negative |
| **Reversibility** | No, in case of footprint associated with solar thermal plant | No, in case of footprint associated with solar thermal plant |
| **Irreplaceable loss of resources?** | Yes, loss of farmland. However, disturbed areas can be rehabilitated | Yes, loss of farmland. However, disturbed areas can be rehabilitated |
| **Can impact be mitigated?** | Yes, however, loss of farmland cannot be avoided | Yes, however, loss of farmland cannot be avoided |
| **Mitigation:** See below | | |
| **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. | | |
| **Residual impacts:** See cumulative impacts. | | |

**Assessment of No-Go option**
There is no impact as it maintains the current status quo.

**Recommended mitigation measures**
The potential impacts associated with damage to and loss of farmland can be effectively mitigated. The aspects that should be covered include:

- 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.

## 4.5 SOCIAL IMPACTS ASSOCIATED WITH THE OPERATIONAL PHASE

The key social issues affecting the operational phase include:

**Potential positive impacts**
- Creation of employment and business opportunities. The operational phase will also create opportunities for skills development and training;
- Benefits associated with the establishment of a community trust;
- The establishment of renewable energy infrastructure.

**Potential negative impacts**
- The visual impacts and associated impact on sense of place;
- Potential impact on tourism.

### 4.5.1 Creation of employment and business opportunities

Based on information from other PVSEF projects the proposed solar thermal plant is likely to employ approximately 20-25 full time employees over a 20 year period. Based on information from other renewable projects approximately 10% of the posts will skilled positions and the remaining 90% semi and low skilled positions. Due to the low education and skills levels in the area the potential employment opportunities for members from the local Aberdeen and Graaff Reinet community are likely to be low. These opportunities will be largely confined to the low skills positions. However, it will be possible to increase the number of local employment opportunities through the implementation of a skills development and training programme linked to the operational phase. Such a programme would support the strategic goals of promoting local employment and skills development contained in the CLM IDP.

Given the location of the proposed facility the majority of permanent staff is likely to reside in Aberdeen and Graaff Reinet. In terms of accommodation options, a percentage of the permanent employees may purchase houses in the town, while others may decide to rent. Both options would represent a positive economic benefit for the region. In addition, a percentage of the monthly wage bill earned by permanent staff would be spent in the regional and local economy, which will benefit local businesses in these towns. The benefits to the local economy will extend over the 20-year operational lifespan of the project.

The local hospitality industry in Aberdeen and Graaff Reinet is also likely to benefit from the operational phase. These benefits are associated with site visits by company staff members and other professionals (engineers, technicians etc.) who are involved in the company and the project but who are not linked to the day-to-day operations.

**Table 4.7: Impact assessment of employment and business creation opportunities**

| **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:** See below | | |
| **Cumulative impacts:** 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 | | |
| **Residual impacts:** See cumulative impacts | | |

**Assessment of No-Go option**
There is no impact as it maintains the current status quo. However, the potential opportunity costs in terms of the loss of employment and skills and development training would be lost which would also represent a negative impact.

**Recommended enhancement measures**
The enhancement measures listed in Section 4.4.1, i.e. to enhance 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.

### 4.5.2 Benefits associated with the establishment of a community trust

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 PVSEF 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 SMME's.

In addition, the establishment of a PVSEF 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.

**Table 4.8: Assessment of benefits associated with establishment of a community trust**

| **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 | | |
|---|---|---|
| | **Without Mitigation** | **With Enhancement[4]** |
| **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:** See below | | |
| **Cumulative impacts:** Promotion of social and economic development and improvement in the overall well-being of the community | | |
| **Residual impacts:** See cumulative impacts | | |

**Assessment of No-Go option**
There is no impact as it maintains the current status quo. However, the potential opportunity costs in terms of the supporting the social and economic development in the area would be lost. This would also represent a negative impact.

[4] Enhancement assumes effective management of the community trust

**Recommended enhancement measures**
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 PVSEF plant.

### 4.5.3 Development of clean, renewable energy infrastructure

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 PVSEF 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 PVSEF developments are currently proposed in other parts of South Africa. The potential contribution of the proposed BioTherm Aberdeen PVSEF should therefore be regarded as valuable, but should not be overestimated.

**Table 4.9: Development of clean, renewable energy infrastructure**

| **Nature:** Promotion of clean, renewable energy | | |
|---|---|---|
| | **Without Mitigation** | **With Mitigation** (The provision of renewable energy infrastructure is in itself a mitigation measure) |
| **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:** See below | | |
| **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 | | |

**Assessment of No-Go option**
The No-Development option would represent a lost opportunity for South Africa to supplement is current energy needs with clean, renewable energy. This would represent a negative opportunity cost.

**Recommended mitigation measures**
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;

### 4.5.4 Visual impact and impact on sense of place

The components associated with the proposed facility will have a visual impact and, in so doing, impact on the landscape and rural sense of the place of the area. Care therefore needs to be taken to ensure that the development of large renewable energy projects not impact on visual character and sense of place of the landscape.

The findings of the Visual Impact Assessment (VIA) for the proposed Aberdeen PVSEF found that the proposed activity will have a **low** impact from the *middle* and *background* and a **moderate** impact from the *foreground* (<1km) (VIA, Zone Land Solutions, April, 2012). In addition, the VIA indicates that 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. Based on the findings of the assessment the VIA recommends that the proposed activity be approved subject to the conditions described Environmental Management Programme.

**Table 4.10: Visual impact and impact on sense of place**

| **Nature:** Visual impact associated with the proposed solar facility and the potential impact on the areas rural sense of place. | | |
|---|---|---|
| | **Without Mitigation** | **With Mitigation** |
| **Extent** | Local (3) | Local (2) |
| **Duration** | Long term (4) | Long term (4) |
| **Magnitude** | Low (4) | Low (4) |
| **Probability** | Probable (3) | Probable (3) |
| **Significance** | Moderate (32) | Moderate (30) |
| **Status** | Negative | Negative |
| **Reversibility** | Yes, solar facility can be removed. | |
| **Irreplaceable loss of resources?** | No | |
| **Can impact be mitigated?** | Yes | |
| **Enhancement:** See below | | |
| **Cumulative impacts:** Potential impact on current rural sense of place | | |

| |
|---|
| **Residual impacts:** See cumulative impacts |

**Assessment of No-Go option**
There is no impact as it maintains the current status quo.

**Recommended mitigation measures**
The recommendations contained in the VIA should be implemented.

### 4.5.5 Impact on 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.

**Table 4.11: Impact on tourism**

| **Nature:** Potential impact of the solar thermal plant on local tourism | | |
|---|---|---|
| | **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<br>(Potential to distract from the tourist experience of the area)<br>Positive<br>(Potential to attract people to the area) | Negative<br>(Potential to distract from the tourist experience of the area)<br>Positive<br>(Potential to attract people to the area) |
| **Reversibility** | Yes | |
| **Irreplaceable loss of resources?** | No | |
| **Can impact be enhanced?** | Yes | |
| **Enhancement:** See below | | |
| **Cumulative impacts:** Potential negative and or positive impact on tourism in the Kai! Garib Municipality Area. | | |
| **Residual impacts:** See cumulative impacts | | |

**Assessment of No-Go option**
The No-Development option would represent a lost opportunity to create a facility that has the potential to attract visitors to the area. This would represent a negative opportunity cost.

**Recommended enhancement measures**
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:

- 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;

## 4.6 ASSESSMENT POWER LINE OPTIONS

The social impacts associated with an overhead power line are linked to the visual impact and associated impact on the sense of place and landscape character of the area. The Aberdeen substation is located adjacent to the site. The significance of the impact is therefore rated as low negative. This is due to the short length of the line and presence of an existing substation and power lines that traverse the site.

**Table 4.12: Assessment of transmission line options**

| **Nature:** Potential visual impact and impact on sense of place associated with power lines | | |
|---|---|---|
| | **Without Mitigation** | **With Mitigation** |
| **Extent**<br>**Duration** | Local (2)<br>Long term (4) | Local (1)<br>Long term (4) |
| **Magnitude** | Minor (2) | Minor (2) |
| **Probability** | Probable (3) | Probable (3) |
| **Significance** | Low (24) | Low (21) |
| **Status** | Negative | Negative |
| **Reversibility** | Yes | |
| **Irreplaceable loss of resources?** | No | |
| **Can impact be mitigated?** | Yes | |
| **Enhancement:** See below | | |
| **Cumulative impacts:** Limited visual and impact on sense of place | | |
| **Residual impacts:** See cumulative impacts | | |

**Assessment of No-Go option**
There is no impact as it maintains the current status quo.

**Recommended mitigation measures**
The recommendations contained in the VIA should be implemented. The measures listed above to address the potential impacts associated with the construction phase also apply to the construction of the power line.

## 4.7 ASSESSMENT OF NO-DEVELOPMENT OPTION

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 is current energy needs with clean, renewable energy. Given South Africa's position as one of the highest per capita producer of carbon emissions in the world, this would represent a negative social cost. However, as indicated above, the overall contribution of the proposed BioTherm Aberdeen PVSEF 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 PVSEF 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 PVSEF would be forfeited. The revenue from the proposed PVSEF plant can be used to support a number of social and economic initiatives in the area. These benefits would be forgone if the proposed PVSEF plant is not developed. Given the limited economic opportunities in the area this would represent a negative social cost for the local community.

**Table 4.13: Assessment of no-development option**

| **Nature:** The no-development option would result in the lost opportunity for South Africa to supplement is 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 Mitigation** |
| **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:** See below | | |
| **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 | | |

**Recommended enhancement measures**
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.

## 4.8 ASSESSMENT OF CUMULATIVE IMPACTS

Although there appear to be no guidelines for solar facilities, the Australian Wind Farm Development Guidelines (Draft, July 2010) indicate that the cumulative impact of multiple wind farm facilities is likely to become an increasingly important issue for wind farm developments in Australia. This finding is also likely to apply to solar energy plants and is also likely to be the case in South Africa. The key concerns in terms of cumulative impacts are, as in the case of wind farms, also likely to be linked to visual impacts and the impact on rural, undeveloped landscapes.

The Scottish Natural Heritage (2005) describes a range of potential cumulative landscape impacts associated with wind farms on landscapes. These issues raised in these guidelines as to what defines a cumulative impact are also regarded as pertinent to solar facilities, specifically given that the key issue of concern is likely to relate to the impact on rural, undeveloped landscapes. The relevant issues raised in the by Scottish Natural Heritage include:

- Combined visibility (whether two or more wind farms (solar facilities) will be visible from one location).
- Sequential visibility (e.g. the effect of seeing two or more wind farms (solar facilities) along a single journey, e.g. road or walking trail).
- The visual compatibility of different wind farms (solar facilities) in the same vicinity.
- Perceived or actual change in land use across a character type or region.
- Loss of a characteristic element (e.g. viewing type or feature) across a character type caused by developments across that character type.

The guidelines also note that cumulative impacts need to be considered in relation to dynamic as well as static viewpoints. The experience of driving along a tourist road, for example, needs to be considered as a dynamic sequence of views and visual impacts, not just as the cumulative impact of several developments on one location. The viewer may only see one wind farm (solar facility) at a time, but if each successive stretch of the road is dominated by views of a wind farm (solar facility), then that can be argued to be a cumulative visual impact (National Wind Farm Development Guidelines, DRAFT - July 2010). It is reasonable to assume that these issues will also apply to solar thermal plants.

Research on wind farms undertaken by Warren and Birnie (2009) also highlights the visual and cumulative impacts on landscape character. The paper notes that given that aesthetic perceptions are a key determinant of people's attitudes, and that these perceptions are subjective, deeply felt and diametrically contrasting, it is not hard to understand why the arguments become so heated. Because landscapes are often an important part of people's sense of place, identity and heritage, perceived threats to familiar vistas have been fiercely resisted for centuries. The paper also identifies two factors that important in shaping people's perceptions of wind farms' landscape impacts. The first of these is the cumulative impact of increasing numbers of wind farms

(Campbell, 2008). The research found that if people regard a region as having 'enough' wind farms already, then they may oppose new proposals. The second factor is the cultural context. This relates to people's perception and relationship with the landscape. In the South African context, the majority of South Africans have a strong connection with and affinity for the large, undisturbed open spaces that are characteristic of the South African landscape. The concerns raised with regard to wind farms and the impact on landscapes are also likely to apply to solar facilities. However, it should be noted that the potential visual impacts associated with solar energy facilities are likely to be significantly less than those associated with wind turbines.

The impact of solar facilities on the landscape is therefore likely to be a key issue in South Africa, specifically given South African's strong attachment to the land and the growing number of solar plant applications. With regard to the area, there do not appear to any other PVSEF projects proposed in the immediate vicinity of the site. The potential for significant cumulative impacts is therefore likely to be low. However, a number of proposed wind energy facilities have been proposed for the area. The Eastern Cape Environmental Authorities should be aware of the potential cumulative impacts associated with the establishment of renewable energy facilities in the area when evaluating applications.

**Table 4.14: Cumulative impacts on sense of place and the landscape**

| **Nature:** Visual impacts associated with the establishment of more than one solar thermal plant and the potential impact on the areas rural sense of place and character of the landscape. | | |
|---|---|---|
| | **Without Mitigation** | **With Mitigation** |
| **Extent** | Local and regional (2) | Local and regional (2) |
| **Duration** | Long term (4) | Long term (4) |
| **Magnitude** | Minor (2) | Minor (2) |
| **Probability** | Probable (3) | Probable (3) |
| **Significance** | Low (24) | Low (24) |
| **Status** | Negative | Negative |
| **Reversibility** | Yes. Solar energy plant components and other infrastructure can be removed. | |
| **Irreplaceable loss of resources?** | No | |
| **Can impact be mitigated?** | Yes | |
| **Enhancement:** See below | | |
| **Cumulative impacts:** Impact on other activities whose existence is linked to linked to rural sense of place and character of the area, such as tourism, bird watching, and hunting. | | |
| **Residual impacts:** See cumulative impacts | | |

### Assessment of No-Go option

There is no impact as it maintains the current status quo.

### Recommended mitigation measures

The establishment of a number of large solar and wind energy facilities in the area does have the potential to have a negative cumulative impact on the areas sense of place and

the landscape. The environmental authorities should consider the overall cumulative impact on the rural character and the areas sense of place before a final decision is taken with regard to the optimal number of such plants in an area.

## 4.9 ASSESSMENT OF DECOMMISSIONING PHASE

Typically, the major social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income. This has implications for the households who are directly affected, the communities within which they live, and the relevant local authorities. However, in the case of the proposed facility the decommissioning phase is likely to involve the disassembly and replacement of the existing components with more modern technology. This is likely to take place in the 20 years post commissioning. The decommissioning phase is therefore likely to create additional, construction type jobs, as opposed to the jobs losses typically associated with decommissioning.

In addition, the social impacts associated with final decommissioned are likely to be limited due to the relatively small number of permanent employees (20-25) affected. The potential impacts associated with the decommissioning phase can also be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be Low (negative).

**Recommended mitigation measures**

The following mitigation measures are recommended:

- BioTherm should ensure that retrenchment packages are provided for all staff who stand to lose their jobs when the plant is decommissioned;
- All structures and infrastructure associated with the proposed facility should be dismantled and transported off-site on decommissioning;
- BioTherm should investigate the option of establishing an Environmental Rehabilitation Trust Fund to cover the costs of decommissioning and rehabilitation of disturbed areas. The Trust Fund should be funded by a percentage of the revenue generated from the sale of energy to the national grid over the 30 year operational life of the facility. The rationale for the establishment of a Rehabilitation Trust Fund is linked to the experiences with the mining sector in South Africa and failure of many mining companies to allocate sufficient funds during the operational phase to cover the costs of rehabilitation and closure.

# SECTION 5: KEY FINDINGS AND RECOMMENDATIONS

## 5.1 INTRODUCTION

Section 5 lists the key findings of the study and recommendations. These findings are based on:

- A review of key planning and policy documents pertaining to the area;
- A review of social and economic issues associated with similar developments;
- A review of relevant literature on social and economic impacts;
- The experience of the authors with other renewable energy projects in South Africa.

## 5.2 SUMMARY OF KEY FINDINGS

The key findings of the study are summarised under the following sections:

- Fit with policy and planning
- Construction phase impacts
- Operational phase impacts
- Cumulative Impacts
- Decommissioning phase impacts
- No-development option

The section also comments on the potential health impacts associated with solar facilities.

### 5.2.1 Policy and planning issues

The key documents reviewed included:

- The National Energy Act (2008);
- The White Paper on the Energy Policy of the Republic of South Africa (December 1998);
- The White Paper on Renewable Energy (November 2003);
- Integrated Resource Plan (IRP) for South Africa (2010-2030);
- Eastern Cape Provincial Growth and Development Strategy (2004-2014);
- Cacadu District Municipality Integrated Development Plan (2007-2011);
- Cacadu District Municipality Land Use and Locational Policy for Renewable Energy Projects (2011);
- Camdeboo Local Municipality Integrated Development Plan (2007-2011);

The findings of the review indicated that renewable energy is strongly supported at a national, provincial, and local level. Based on this is it reasonable to assume that the establishment of the proposed Aberdeen PVSEF is supported.

### 5.2.2 Construction phase

The key social issues associated with the construction phase include:

**Potential positive impacts**

- Creation of employment and business opportunities, and the opportunity for skills development and on-site training.

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 contactors 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.

The total wage bill for the 12-18 month construction phase will be in the region of R 10 million. The injection of income into the area in the form of wages and rental for accommodation will create opportunities for local businesses in Aberdeen and Graaff Reinet. The sector of the local economy that is most likely to benefit from the proposed development is the local service industry. The potential opportunities for the local service sector would be linked to accommodation, catering, cleaning, transport and security, etc. associated with the construction phase. The benefits to the local economy will be confined to the construction period (12-18 months).

The capital expenditure on completion is anticipated to be in the region of R 500 million for a 20 MW facility. However, given the technical nature of the project and high import content associated with PVSEF the potential opportunities for the CLM economy will be limited. However, opportunities are likely to exist for local contractors and engineering companies in Port Elizabeth. Implementing the enhancement measures listed below can enhance these opportunities.

**Potential negative impacts**

- Influx of construction workers employed on the project;
- Increased risk of stock theft, poaching and damage to farm infrastructure associated with construction workers;
- Increased risk of veld fires associated with construction related activities;
- Impact of heavy vehicles, including damage to roads, safety, noise and dust;
- Loss of agricultural land associated with construction related activities.

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 relatively small size of the labour force (80) the potential risk to local family structures and social networks is regarded as low.

Table 5.1 summarises the significance of the impacts associated with the construction phase.

**Table 5.1: Summary of social impacts during construction phase**

| Impact | Significance No Mitigation | Significance With Mitigation |
|---|---|---|
| **Creation of employment and business opportunities** | Low (Positive impact) | Medium (Positive impact) |
| **Presence of construction workers and potential impacts on family structures and social networks** | Low (Negative impact for community as a whole) Medium-High (Negative impact of individuals) | Low (Negative impact for community as a whole) Medium-High (Negative impact of individuals) |
| **Risk of stock theft, poaching and damage to farm infrastructure** | Medium (Negative impact) | Low (Negative impact) |
| **Risk of veld fires** | Medium (Negative impact) | Low (Negative impact) |
| **Impact of heavy vehicles and construction activities** | Low (Negative impact) | Low (Negative impact) |
| **Loss of farmland** | High (Negative impact) | Low (Negative impact) |

### 5.2.3 Operational phase

The key social issues affecting the operational phase include:

**Potential positive impacts**
- Creation of employment and business opportunities. The operational phase will also create opportunities for skills development and training;
- Benefits associated with the establishment of a community trust.
- The establishment of infrastructure to generate renewable energy.

The total number of permanent employment opportunities is estimated to be in the region of 20-25. Of this total approximately 80% will be low and medium-skilled and 20% high skilled positions. The majority of the beneficiaries are therefore likely to be historically disadvantaged (HD) members of the community from Aberdeen. Over time it will also be possible to increase the number of local employment opportunities through the implementation of a skills development and training programme linked to the operational phase. Such a programme would support the strategic goals of promoting local employment and skills development contained in the CLM IDP.

The establishment of a Community Trust funded by revenue generated from the sale of energy from the proposed PVSEF also creates an opportunity to support local economic development in the area. 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. The revenue from the proposed PVSEF 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 SMME's.

The long term duration of the revenue stream also allows local municipalities and communities to undertake long term planning for the area. Experience has however also shown that community trust 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.

The proposed development also represents an investment in infrastructure for the generation of clean, renewable energy, which, given the challenges created by climate change, represents a Positive social benefit for society as a whole.

**Potential negative impacts**
- The visual impacts and associated impact on sense of place and the landscape;
- Impact on tourism.

The visual impacts on landscape character associated with large renewable energy facilities, such as solar thermal plants, are highlighted in the research undertaken by Warren and Birnie (2009). In the South African context, the majority of South Africans have a strong connection with and affinity for the large, undisturbed open spaces that are characteristic of the South African landscape. The impact of solar energy plants on the landscape is therefore likely to be a key issue in South Africa, specifically given South African's strong attachment to the land and the growing number of solar energy applications. The visual impacts associated with the proposed BioTherm Aberdeen PVSEF are, however, likely to be low due to its relatively small size (20MW). The significance of the impacts associated with the operational phase are summarised in Table 5.2.

**Table 5.2: Summary of social impacts during operational phase**

| Impact | Significance No Mitigation | Significance With Mitigation |
|---|---|---|
| **Creation of employment and business opportunities** | Medium (Positive impact) | Medium (Positive impact) |
| **Benefits associated with the establishment of a community trust** | Medium (Positive impact) | High (Positive impact) |
| **Establishment of infrastructure for the generation of renewable energy** | Medium (Positive impact) | Medium (Positive impact) |
| **Visual impact and impact on sense of place** | Medium (Negative impact) | Medium (Negative impact) |
| **Impact on tourism** | Low (Positive and Negative) | Low (Positive and Negative) |

### 5.2.4 Assessment of cumulative impacts

The cumulative impacts associated with solar energy facilities, such as the proposed BioTherm Aberdeen PVSEF, are largely linked to the impact on sense of place and visual impacts. In the case of the proposed BioTherm Aberdeen PVSEF the significance of the potential cumulative social impacts, specifically the impact on the landscape, was rated to be low.

However, it is recommended that the environmental authorities consider the overall cumulative impact on the rural character and the areas sense of place before a final decision is taken with regard to the optimal number of solar and wind energy facilities in the area. In addition, the siting and number of individual components of the plant should be informed by findings of the relevant VIAs, specifically with respect to the visual impact on farmsteads and important roads in the area.

### 5.2.5 Transmission line options

The findings of the SIA indicate that the impacts associated with the proposed overhead power line will be low.

### 5.2.6 Assessment of no-development option

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

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. This also represents a negative social cost.

### 5.2.7 Decommissioning phase

Due to the relatively small number of people affected (~20-25) the social impacts associated with the decommissioning of the facility are likely to be low. In addition, the potential impacts can be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be Low (negative).

BioTherm should also investigate the option of establishing an Environmental Rehabilitation Trust Fund to cover the costs of decommissioning and rehabilitation of disturbed areas. The Trust Fund should be funded by a percentage of the revenue generated from the sale of energy to the national grid over the 20 year operational life of the facility. The rationale for the establishment of a Rehabilitation Trust Fund is linked to the experiences with the mining sector in South Africa and failure of many mining companies to allocate sufficient funds during the operational phase to cover the costs of rehabilitation and closure. BioTherm have indicated that the sale of scrap metal etc. will be used to cover the costs of rehabilitation.

## 5.3 CONCLUSIONS AND RECOMMENDATIONS

The findings of the SIA indicate that the development of the proposed BioTherm Aberdeen PVSEF plant will create employment and business opportunities for locals during both the construction and operational phase of the project. The establishment of

a Community Trust funded by revenue generated from the sale of energy from the proposed PVSEF also creates an opportunity to support local economic development in the area. This represents a significant social benefit for an area where there are limited opportunities.

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 proposed BioTherm Aberdeen PVSEF is therefore supported by the findings of the SIA.

## 5.4 IMPACT STATEMENT

The findings of the SIA undertaken for the proposed BioTherm Aberdeen PVSEF 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.

It is therefore recommended that the facility as proposed be supported, subject to the implementation of the recommended mitigation measures and management actions contained in the report.

# ANNEXURE A

## References


- Integrated Resource Plan (IRP) for South Africa (2010-2030);
- StatsSA Community Survey, 2007;
- The National Energy Act, 2008;
- The White Paper on Renewable Energy, November 2003;
- The White Paper on the Energy Policy of the Republic of South Africa, December 1998;
- Eastern Cape Provincial Growth and Development Strategy (2004-2014);
- Cacadu District Municipality Integrated Development Plan (2007-2011);
- Cacadu District Municipality Land Use and Locational Policy for Renewable Energy Projects (2011);
- Camdeboo Local Municipality Integrated Development Plan (2007-2011);
- Visual Impact Assessment Aberdeen PVSEF, Zone Land Solutions, (April, 2012).


## Internet sources


- www.demarcation.org.za (Census 2001 data);

# ANNEXURE B

## METHODOLOGY FOR THE ASSESSMENT OF POTENTIAL IMPACTS

Direct, indirect and cumulative impacts of the above issues, as well as all other issues identified will be assessed in terms of the following criteria:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, where it will be indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international. A score between 1 and 5 will be assigned as appropriate (with a score of 1 being low and a score of 5 being high).
- The **duration**, where it will be 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 shall describe the likelihood of the impact actually occurring. Probability will be 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 shall be determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.
- The **status**, which will be 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 reso*urces.
- 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).

# ANNEXURE C

# ENVIRONMENTAL MANAGEMENT PROGRAMME: SIA

## CONSTRUCTION PHASE

### Creation of employment and business opportunities

**OBJECTIVE: Maximise local employment and business opportunities associated with the construction phase.**

| | |
|---|---|
| Project component/s | Construction and establishment activities associated with the establishment of the PV facility, including infrastructure etc. |
| Potential Impact | The opportunities and benefits associated with the creation of local employment and business should be maximised. |
| Activity/risk source | The employment of outside contractors to undertake the work and who make use of their own labour will reduce the employment and business opportunities for locals. Employment of local labour will maximise local employment opportunities. |
| Mitigation: Target/Objective | BioTherm, in discussions with the CLM, should aim to employ a minimum of 80% of the low-skilled workers from the local area. This should also be made a requirement for all contractors. BioTherm should also develop a database of local BEE service providers |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|---|---|
| • Attempt to employ a minimum of 80% of the low-skilled workers are sourced from the local area;<br>• Where required, implement appropriate training and skills development programmes prior to the initiation of the construction phase to ensure that 80% target is met.<br>• Skills audit to be undertaken to determine training and skills development requirements;<br>• Develop a database of local BEE service providers and ensure that they are informed of tenders and job opportunities;<br>• Identify potential opportunities for local businesses | • BioTherm & contractors<br>• BioTherm<br>• BioTherm<br>• BioTherm<br>• BioTherm | • Employment and business policy document that sets out local employment targets to be in place before construction phase commences.<br>• Where required, training and skills development programmes to be initiated prior to the initiation of the construction phase.<br>• Skills audit to determine need for training and skills development programme undertaken within 1 month of commencement of construction phase commences.<br>• Database of potential local BEE services providers to be completed before construction phase commences. |

| | |
|---|---|
| Performance Indicator | • Employment and business policy document that sets out local employment and targets completed before construction phase commences;<br>• 80% of semi and unskilled labour locally sourced.<br>• Database of potential local BEE services providers in place before construction phase commences.<br>• Skills audit to determine need for training and skills development programme undertaken within 1 month of commencement of construction phase. |
| Monitoring | • BioTherm and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase. |

## Impact associated with presence of construction workers

**OBJECTIVE: Avoid the potential impacts on family structures and social networks associated with presence of construction workers from outside the area**

| | |
|---|---|
| Project component/s | Construction and establishment activities associated with the establishment of the PV facility, including infrastructure etc. |
| Potential Impact | The presence of construction workers who live outside the area and who are housed in local towns can affect family structures and social networks. |
| Activity/risk source | The presence of construction workers can affect negatively on family structures and social networks, especially in small, rural communities. |
| Mitigation: Target/Objective | To avoid and or minimise the potential impact of construction workers on the local community. This can be achieved by maximising the number of locals employed during the construction phase and minimising the number of workers housed on the site. |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|---|---|
| • Attempt to ensure that a minimum of 80% of the low-skilled workers are sourced from the local area. This should be included in the tender documents. Construction workers should be recruited from the local area in and around the towns of De Aar, Britstown, and Hanover. | • BioTherm and contractors | • Identify suitable local contractors prior to the tender process for the construction phase.<br>• Tender documents for contractors include conditions set out in SIA, including transport of workers home over weekends, transportation of workers home on completion of construction phase, establishment of MF etc., |
| • Local construction workers should be able to provide proof of having lived in the area for five years or longer. | • BioTherm | |
| • Identify local contractors | • BioTherm | |

| | | |
|---|---|---|
| who are qualified to undertaken the required work.<br>• Develop a Code of Conduct to cover the activities of the construction workers housed on the site.<br>• Ensure that construction workers housed attend a brief session before they commence activities. The aim of the briefing session is to inform them of the rules and regulations governing activities on the site as set out in the Code of Conduct.<br>• Ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct.<br>• Ensure that construction workers who are found guilty of breaching the Code of Conduct are dismissed. All dismissals must be in accordance with South African labour legislation.<br>• Provide opportunities for workers to go home over weekends. The cost of transporting workers home over weekends and back to the site should be borne by the contractors.<br>• On completion of the construction phase all construction workers must be transported back to their place of origin within two days of their contract ending. The costs of transportation must be borne by the contractor. | • BioTherm<br>• BioTherm and contractors<br>• BioTherm and contractors<br>• Contactors<br>• Contractors<br>• Contractors<br>• Contractors | • MF established before construction phase commences.<br>• Code of Conduct drafted before construction phase commences.<br>• Briefing session for construction workers held before they commence work on site. |
| Performance Indicator | • Employment policy and tender documents that sets out local employment and targets completed before construction | |

| | |
|---|---|
| | phase commences;<br>• 80% of semi and unskilled labour locally sourced;<br>• Local construction workers employed have proof that they have lived in the area for five years or longer;<br>• Tender documents for contractors include recommendations for construction camp;<br>• MF set up prior to implementation of construction phase;<br>• Code of Conduct drafted before commencement of construction phase;<br>• Briefing session with construction workers held at outset of construction phase; |
| Monitoring | • ACED and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase. |

**Safety, poaching, stock theft and damage to farm infrastructure**

**OBJECTIVE: To avoid and or minimise the potential impact of the activities during the construction on the safety of local communities and the potential loss of stock and damage to farm infrastructure.**

| | |
|---|---|
| Project component/s | Construction and establishment activities associated with the establishment of the PV facility, including infrastructure etc. |
| Potential Impact | Impact on safety of farmers and communities (increased crime etc.) and potential loss of livestock due to stock theft by construction workers and also damage to farm infrastructure, such as gates and fences. |
| Activity/risk source | The presence of construction workers on the site can pose a potential safety risk to local farmers and communities and may result in stock thefts. The activities of construction workers may also result in damage to farm infrastructure. |
| Mitigation: Target/Objective | To avoid and or minimise the potential impact on local communities and their livelihoods. |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|---|---|
| • The housing of construction workers on the site should be limited to security personnel.<br>• Consider establishing a MF with the adjacent farmers and develop a Code of Conduct for construction workers.<br>• Inform all workers of the conditions contained in the Code of Conduct.<br>• Dismiss all workers that do not adhere to the code of conduct for workers. All dismissals must be in accordance with South | • BioTherm and contractors<br>• BioTherm<br>• BioTherm and contractor<br>• Contractors | • Establish MF before construction phase commences.<br>• Develop Code of Conduct prior to commencement of construction phase. The Code of Conduct should be signed by BioTherm and the contractors before the contractors move onto site;<br>• Inform all construction workers of Code of Conduct requirements before construction phase commences.<br>• Compensate farmers / community members within 1 |

| | | |
|---|---|---|
| African labour legislation.<br>• Compensate farmers / community members at full market related replacement cost for any losses, such as livestock, damage to infrastructure etc. | • Contractors | month of claim being verified by BioTherm and or Contractor/s. |

| | |
|---|---|
| Performance Indicator | • Community MF in place before construction phase commences.<br>• Code of Conduct developed and approved prior to commencement of construction phase.<br>• All construction workers made aware of Code of Conduct within first week of being employed.<br>• Compensation claims settled within 1 month of claim being verified by Community MF. |
| Monitoring | • BioTherm and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase. |

**Increase risk of veld fires**

**OBJECTIVE: To avoid and or minimise the potential risk of increased veld fires during the construction phase.**

| | |
|---|---|
| Project component/s | Construction and establishment activities associated with the establishment of PV facility, including infrastructure etc. |
| Potential Impact | Veld fires can pose a personal safety risk to local farmers and communities, and their homes, crops, livestock and farm infrastructure, such as gates and fences. |
| Activity/risk source | The presence of construction workers and their activities on the site can increase the risk of veld fires. |
| Mitigation: Target/Objective | To avoid and or minimise the potential risk of veld fires on local communities and their livelihoods. |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|---|---|
| • Ensure that open fires on the site for cooking or heating are not allowed except in designated areas.<br>• Provide adequate fire fighting equipment onsite.<br>• Provide fire-fighting training to selected construction staff.<br>• Compensate farmers / community members at full market related replacement cost for any losses, such as livestock, damage to infrastructure etc.<br>• Join Fire Protection Agency | • BioTherm and contractors<br>• BioTherm and contractors<br>• Contractors<br>• Contractors | • Ensure that these conditions are included in the Construction Phase EMP.<br>• Ensure that designated areas for fires are identified on site at the outset of the construction phase.<br>• Ensure that fire fighting equipment and training is provided before the construction phase commences.<br>• Compensate Farmers within 1 month of claim being verified by MF. |

| | |
|---|---|
| Performance Indicator | • Conditions contained in the Construction EMP.<br>• Designated areas for fires identified on site at the outset of the construction phase.<br>• Fire fighting equipment and training provided before the construction phase commences.<br>• Compensation claims settled within 1 month of claim being verified by Community MF. |
| Monitoring | • BioTherm and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase. |

**Impact of dust and noise due to heavy vehicles and damage to roads**

**OBJECTIVE: To avoid and or minimise the potential impacts of safety, noise and dust and damage to roads caused by construction vehicles during the construction phase.**

| | |
|---|---|
| Project component/s | Construction and establishment activities associated with the establishment of the PV facility, including infrastructure etc. |
| Potential Impact | Heavy vehicles can generate noise and dust impacts. Movement of heavy vehicles can also damage roads. |
| Activity/risk source | The movement of heavy vehicles and their activities on the site can result in noise and dust impacts and damage roads. |
| Mitigation: Target/Objective | To avoid and or minimise the potential noise and dust impacts associated with heavy vehicles, and minimise damage to roads. |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|---|---|
| • Implement dust suppression measures for heavy vehicles such as wetting roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. | • Contractors | • Ensure that these conditions are included in the Construction Phase EMP.<br>• Ensure that dust suppression measures are implemented for all heavy vehicles that require such measures during the construction phase commences. |
| • Ensure that all vehicles are road-worthy; drivers are qualified and are made aware of the potential noise, dust and safety issues. | • Contractors | • Ensure that drivers are made aware of the potential safety issues and enforcement of strict speed limits when they are employed. |
| • Ensure that drivers adhere to speed limits. Vehicles should be fitted with recorders to record when vehicles exceed the speed limit. | • Contractors | • Fit all heavy vehicles with speed monitors before they are used in the construction phase.<br>• Assess road worthy status of heavy vehicles at the outset of the construction phase and on a monthly basis thereafter; |
| • Ensure that damage to roads is repaired before completion of construction phase; | • Contractors | • Ensure that damage to roads is repaired before completion |

| | | |
|---|---|---|
| | | of construction phase. |

| | |
|---|---|
| Performance Indicator | • Conditions included in the Construction Phase EMP.<br>• Dust suppression measures implemented for all heavy vehicles that require such measures during the construction phase commences.<br>• Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed.<br>• All heavy vehicles equipped with speed monitors before they are used in the construction phase.<br>• Road worthy certificates in place for all heavy vehicles at outset of construction phase and up-dated on a monthly basis. |
| Monitoring | • BioTherm and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase. |

**Impact on farming activities**

**OBJECTIVE: To avoid and or minimise the potential impact on current and future farming activities during the construction phase.**

| | |
|---|---|
| Project component/s | Construction phase activities associated with the establishment of the PV facility and associated infrastructure. |
| Potential Impact | The footprint of the solar energy plant and associated infrastructure will result in a loss of land that will impact on farming activities on the site. |
| Activity/risk source | The footprint taken up by the solar energy plant and associated infrastructure. |
| Mitigation: Target/Objective | To minimise the loss of land taken up by the PV facility and associated infrastructure and to enable farming activities to continue where possible, specifically grazing. |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|---|---|
| • Minimise the footprint of the PV facility and the associated infrastructure.<br>• Rehabilitate disturbed areas on completion of the construction phase. Details of the rehabilitation programme should be contained in the EMP. | • Contractor and BioTherm<br>• ECO and Contractors | • Footprint for PV facility should be defined in the Construction EMP before construction phase commences.<br>• Rehabilitation should be on-going and completed within 3 months of the completion of the construction phase.<br>• Meeting/s with local farmers to discuss lease options should take place during the construction phase. |

| | |
|---|---|
| Performance Indicator | • Footprint of PV facility included in the Construction Phase EMP.<br>• Meeting/s held with farmers during construction phase. |
| Monitoring | • ECO must monitor indicators listed above to ensure that they |

have been met for the construction phase.

# OPERATIONAL PHASE

## Creation of employment and business opportunities

**OBJECTIVE: Maximise local employment and business opportunities associated with the operational phase.**

| | |
|---|---|
| Project component/s | Day to day operational activities associated with the PV facility, including maintenance etc. |
| Potential Impact | The opportunities and benefits associated with the creation of local employment and business should be maximised |
| Activity/risk source | The operational phase of the PV facility will create approximately 20-25 full time employment opportunities. |
| Mitigation: Target/Objective | In the medium to long term employ as many locals as possible to fill the full time employment opportunities. |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|---|---|
| • The entire workforce of 20-25 permanent staff will be based in local towns of Aberdeen and Graaff Reinet. BioTherm should commit to implementing a 5-year training and skills development and training programme. The initial local content target is 30%; however, after 5 years the objective is to have all the employment opportunities taken up by locals. | • BioTherm | • Develop 5 year training and skills development programme during the construction phase<br>• Identify local members of the community who are suitably qualified or who have the potential to be employed full time during the construction phase. |
| • Identify local members of the community who are suitably qualified or who have the potential to be employed full time. | • BioTherm | |

| | |
|---|---|
| Performance Indicator | • 5 year training and skills development programme developed and designed before construction phase completed.<br>• Potential locals identified before construction phase completed. |
| Monitoring | • BioTherm must monitor indicators listed above to ensure that they have been met for the operational phase. |

## DECOMMISSIONING PHASE

### Impact of decommissioning

**OBJECTIVE: To avoid and or minimise the potential impacts associated with the decommissioning phase.**

| | | | |
|---|---|---|---|
| Project component/s | Decommissioning phase of the PV facility | | |
| Potential Impact | Decommissioning will result in job losses, which in turn can result in a number of social impacts, such as reduced quality of life, stress, depression etc. However, the number of people affected (20-25) is relatively small. Decommissioning is also similar to the construction phase in that it will also create temporary employment opportunities. | | |
| Activity/risk source | Decommissioning of the PV facility | | |
| Mitigation: Target/Objective | To avoid and or minimise the potential social impacts associated with decommissioning phase of the PV facility. | | |
| Mitigation: Action/control | | Responsibility | Timeframe |
| • Retrenchments should comply with South African Labour legislation of the day | | • BioTherm | • When PV facility is decommissioned |
| Performance Indicator | • South African Labour legislation relevant at the time | | |
| Monitoring | • BioTherm and Department of Labour | | |