

**SOCIAL IMPACT ASSESSMENT
FOR
MERAPI SOLAR PARK
FREE STATE PROVINCE**

OCTOBER 2012

Prepared for

SAVANNAH ENVIRONMENTAL (PTY) LTD

By

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EXECUTIVE SUMMARY

INTRODUCTION AND LOCATION

Savannah Environmental (Pty) Ltd was appointed by SolaireDirect Southern Africa (Pty) Ltd (Hereafter referred to as SolaireDirect) as the lead consultant to manage the Environmental Impact Assessment (EIA) process for the establishment of the proposed Merapi solar plant and associated infrastructure. The proposed solar power plant will include photovoltaic (PV) solar panels and associated infrastructure with a total generating capacity of ~ 300MW (to be developed in four phases of 75MW each), and will be known as the Merapi Solar Park.

The proposed site is located ~ 5 km south-east of the town of Excelsior, which is located within the Mantsopa Local Municipality (MLM), which falls with the Thabo Mofustanyana District Municipality (TMDM) in the Free State Province. A broader area of approximately 1505 ha is being considered within which the facilities are to be constructed. The proposed PVSEF is located on the following properties:

- Portion 0 of Farm 311 Ceylon;
- Portion 0 of Farm 566 Moedersgift;
- Portion 0 of Farm 1623 Welgegund;
- Portion 0 of Farm 374 Concordia; and
- Portion 1 of Farm 1547 De Hoop.

DESCRIPTION OF THE PROPOSED PVSEF

The proposed Merapi Solar Park will have an installed capacity of 300MW to be developed in four phases of 75MW each. The exact number and placement of photovoltaic cells associated with each 75MW phase will be investigated in more detail during the EIA phase of the study. The energy will be linked via an on-site substation to the Eskom grid. The project is therefore an Independent Power Producer (IPP) project.

Photovoltaic technology uses the energy from the sun to generate electricity through a process known as the Photovoltaic Effect. Simply speaking, this refers to light knocking electrons into a higher state of energy to create electricity, best illustrated by the small photovoltaic cell on hand held solar calculators. A photovoltaic array typically consists of the following components.

Photovoltaic Cells

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. However, in order to transmit this power within the Eskom grid it must be converted to alternating current which requires an inverter.

Support Structure

The PV panels will be attached to a support structure approximately 3.4 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.

The components associated with the Merapi Solar Park will include:

- Photovoltaic (PV) panels with an installed capacity of up to 300MW;
- Arrays of photovoltaic (PV) panels;
- Inverter/Transformer enclosures;
- Grid connection substation and 132kV overhead power lines;
- Auxiliary Electrical equipment;
- Cabling between the project components, to be laid underground where practical;
- Internal access roads; fencing; and
- Workshop area for maintenance storage, office, toilets and small water treatment unit.

Based on the information from the proponent the construction phase for a 300MW PVSEF (4 x 75MW phases) is expected to extend over a period of 8 years and create approximately 391 employment opportunities. The capital expenditure on completion is anticipated to be in the region of R 5.4 billion for a 300MW facility. The total wage bill for the construction phase will be in the region of R240 million. The operational phase will employ approximately 144 people full time for a period of up to 20 years.

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;
- Site visit and interviews with key interested and affected parties;
- Review of information from similar projects; and
- Identification of social issues associated with the proposed project.

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.

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);
- Free State Provincial Growth and Development Strategy (2004-2014); and
- Mantsopa Integrated Development Plan (2010-2011 Review).

The findings of the review indicated that renewable energy is strongly supported at a national, provincial, and local level. Based on this it is reasonable to assume that the establishment of the proposed Merapi Solar Park 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 proposed 300 MW Merapi Solar Park will be developed in 4 x 75MW phases. For the purposes of the assessment it is assumed that each phase will be developed concurrently. The construction phase will therefore extend over a period of ~ 8 years. In terms of employment it is assumed that 70% of the original 291 construction workers employed to construct the first 75MW, will be employed for the remaining 3 phases. The construction of the remaining 3 phases will therefore create an additional 90 employment opportunities (30% of 291) over and above the initial 291 associated with the construction of the first 75MW. The total number of employment opportunities created by the construction of all 4 x 75MW phases will therefore be in the region of 381. Of this total ~ 60% (229) will be available to low-skilled workers (construction labourers, security staff etc.), 15% (57) to semi-skilled workers (drivers, equipment operators etc.) and 25% (95) to skilled personnel (engineers, land surveyors, project managers etc.).

Given the location of the site and its proximity to Excelsior, Winburg, Ladybrand and Bloemfontein, the majority of low and semi-skilled employment opportunities are likely to benefit members from the local community. The majority of the beneficiaries are also likely to be historically disadvantaged (HD) members of the community. The extended duration of the construction phase (8 years) also creates an ideal opportunity for contractor/s to implement an on-site training and skills development programme. This will further enhance to the potential employment opportunities for members from the local community.

The total wage bill for the 4 x 75MW phases will be in the region of R 240 million. A percentage of the wage bill will be spent in the local economy and will create opportunities for local businesses in the MLM and MMM, including Excelsior, Winburg, Ladybrand and Bloemfontein. 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 non-local construction workers are also likely to be accommodated in Excelsior, Winburg, Ladybrand and Bloemfontein. This will create opportunities for local hotels, B&Bs, guest farms and people who want to rent out their houses. The benefits to the local economy will extend over the 8 year construction phase.

The establishment of the proposed Merapi Solar Park will also support co-operation between the public and private sectors in order for the economic development potential of the Free State to be realised. The FSPGDS highlights the importance of enterprise development, and notes that the current levels of private sector development and investment in the Free State are low. The proposed PVSEF therefore has the potential to create opportunities to promote private sector investment and the development of SMMEs in the Free State Province.

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 proximity of the site to Excelsior, Winburg, Ladybrand and Bloemfontein the majority of the low and semi-skilled employment opportunities are likely to be taken up by members from the local community. The potential risk to local family structures and social networks posed by construction workers will therefore 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/Enhancement
Creation of employment and business opportunities	Medium (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 144. Of this total approximately 80% will be low and medium-skilled and 20% high skilled positions. Given the proximity of the site to Excelsior, Winburg, Ladybrand and Bloemfontein the majority of employment opportunities are likely to benefit members from the local communities in the area. The majority of the beneficiaries are also likely to be historically disadvantaged (HD) members of the community. 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 MLM IDP and the FSPGDP.

The establishment of a Community Trust also creates an opportunity to support local economic development in the area. Solairedirect has indicated that they are committed to establishment of a Trust. The Trust will benefit from two sources of revenue, namely dividends, as a 2.5% shareholder in the Project Company the Trust will receive dividends, and socio-economic contribution payments. The Project Company has committed, as part of its bid response, to making a socio-economic contribution payment of 1% of Gross Revenue to the Trust. This method of having the same entity as both a shareholder of the Project Company and the recipient of the socio-economic

contributions from the Project Company will mean that the Trust will have funds available from an early stage in the project life, rather than having to wait for what could be several years for dividend payments if it were only a shareholder. Community Trusts provide an opportunity to generate a steady revenue stream that is guaranteed for a 20 year period. The revenue from the proposed solar plant can be used to support a number of social and economic initiatives in the area, including:

- Creation of jobs;
- Education;
- Support for and provision of basic services;
- School feeding schemes;
- Training and skills development;
- Support for SMME's.

The long term duration of the revenue stream associated with a solar plant linked Community Trust also enables local municipalities and communities to undertake long term planning for the area. 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. 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 findings of the VIA indicate that the areas sense of place has been altered by the existing Merapi sub-station and associated power lines. The impact of the proposed SolaireDirect Merapi Solar Park on the areas sense of place is rated as Medium Negative with mitigation. 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/Enhancement
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 SolaireDirect Merapi Solar Park, are largely linked to the impact on sense of place and visual impacts. In the case of the proposed SolaireDirect Merapi Solar Park 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 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.

The proposed Merapi Solar Park and establishment of the other renewable energy projects in the area also has the potential to result in significant positive cumulative socio-economic impacts for the area and the Free State Province. The positive cumulative impacts include creation of employment, skills development and training opportunities (construction and operational phase) and creation of downstream business opportunities. The significance of this impact is rated as High positive with enhancement.

Transmission lines

The findings of the SIA indicate that the impacts associated with the proposed overhead power line will be low due to the short distance required.

No-Development Option

The No-Development option would represent a lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy. Given South Africa's

position as one of the highest per capita producer of carbon emissions in the world, this would represent a High negative social cost.

The no-development option also represents a lost opportunity in terms of the employment and business opportunities (construction and operational phase) associated with the proposed Merapi Solar Park and the benefits associated with the establishment of a Community Trust. Due to the size of the project this represents a significant negative social cost.

Decommissioning phase

The total number of permanent employees will be ~ 144, which represents a relatively high number of people who stand to lose their jobs after 20 years. However, 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).

SolaireDirect 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. SolaireDirect have indicated that the sale of scrap metal etc. will be used to cover the costs of rehabilitation.

CONCLUSIONS AND RECOMMENDATIONS

The findings of the SIA indicate that the development of the proposed 300MW SolaireDirect Merapi Solar Park 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 300MW Merapi Solar Park 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 economic 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 300MW SolaireDirect Merapi Solar Park is therefore supported by the findings of the SIA.

IMPACT STATEMENT

The findings of the SIA undertaken for proposed 300MW SolaireDirect Merapi Solar Park 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 proposed 300MW SolaireDirect Merapi Solar Park as proposed be supported, subject to the implementation of the recommended mitigation measures and management actions contained in the report.

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ACRONYMS

CSP	Concentrated solar power
DEA&DP	Department of Environmental Affairs and Development Planning (Western Cape)
DM	District Municipality
DoE	Department of Energy
EIA	Environmental Impact Assessment
FSPGDS	Free State Provincial Growth and Development Strategy
GDPR	Gross Domestic Product of the Region
HDI	Human Development Index
IDP	Integrated Development Plan
IPP	Independent Power Producer
IRP	Integrated Resource Plan
kV	Kilovolts
LED	Local Economic Development
LM	Local Municipality
MMM	Mangaung Metropolitan Municipality
MLM	Mantsopa Local Municipality
MMW	Megawatt
PGDS	Provincial Growth and Development Strategy
PSEF	Photovoltaic Solar Energy Facility
PV	Photovoltaic
PVSEF	Photovoltaic solar energy facility
RBS	Revised Balanced Scenario
SDF	Spatial Development Framework
SIA	Social Impact Assessment
UNFCCC	United Nations Framework Convention on Climate Change

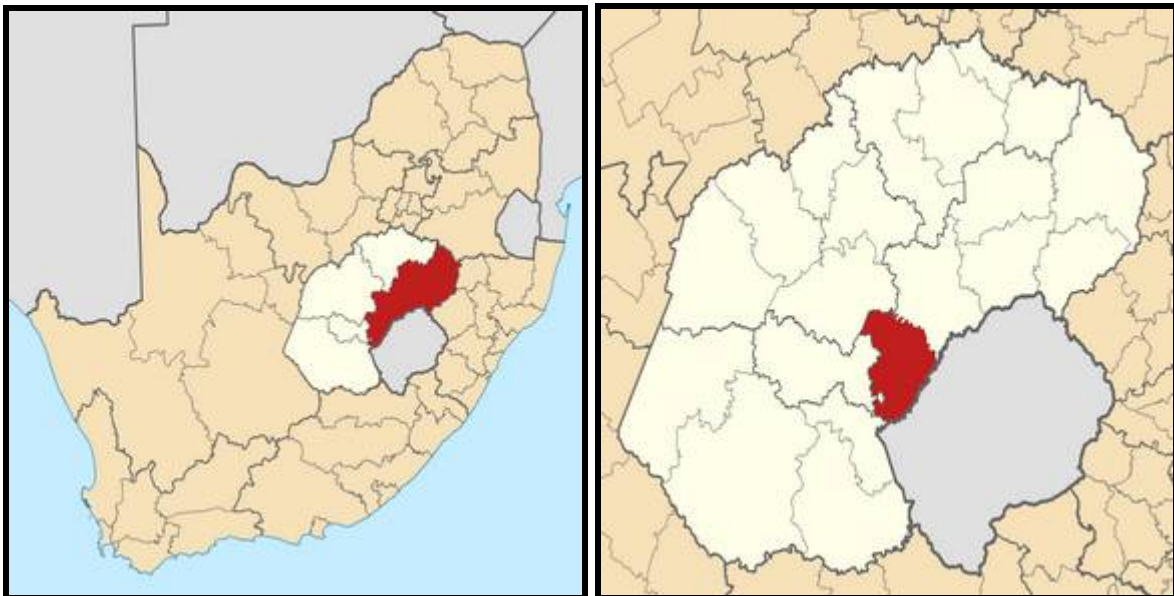
SECTION 1: INTRODUCTION

1.1 INTRODUCTION

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Source: Wikipedia

Figure 1.1: The location of Thabo Mofustanyana District Municipality (left) Merapi Local Municipality (right) within the Free State Province

The town of Bloemfontein is located ~ 80 km west of the site. The main land uses in the area are linked to agriculture (maize, sunflowers and cattle farming). Access to the site is via the R703 and 709 which link to the N1 to the north west of Excelsior and the N8 to the south of the town respectively. The town of Winburg is located ~ 53 km north of Excelsior and access is via the R 709 (Figure 1.2). In terms of the Department of Energy's (DoE) competitive bidding process for procuring renewable energy from Independent Power Producers (IPPs) in South Africa, a threshold has been set for the maximum amount of megawatts per project entered into the bid. The generating threshold for a single solar PV facility for submission has been set at 75 MW. In order to comply with these thresholds, the proposed Merapi Solar Park will be split into four phases of 75MW each. Each phase of the project will ultimately be managed by a separate Special Purpose Vehicle (SPV). Therefore each phase of the project must obtain a separate authorisation, which will in time be registered under the corresponding SPV.

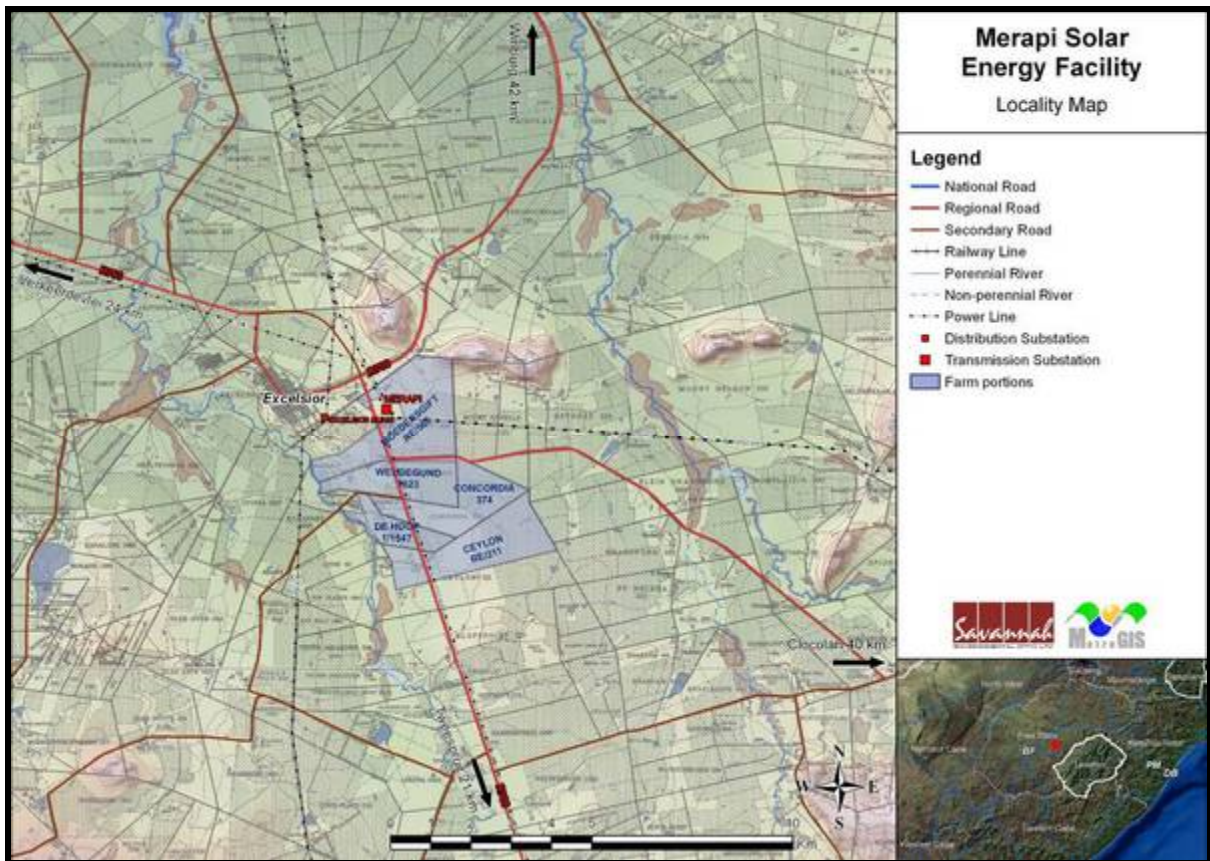


Figure 1.2: Location of Merapi Solar Park

In terms of the EIA Regulations of June 2010 (Government Notice 543 – 546 published in terms of the National Environmental Management Act (NEMA; No. 107 1998), the construction of the proposed facilities is a listed activity requiring environmental authorisation. As the project comprises a power generation facility with a generating capacity of 20MW or more, and which occupies an area of more than 20ha, the undertaking of an Environmental impact Assessment (EIA) process is required to be undertaken. This process comprises two phases – i.e. Scoping and Impact Assessment - and involves the identification and assessment of environmental impacts through specialist studies, as well as public participation. This process would be relevant for the

proposed Merapi PV Facility which is proposed to be up to 300 MW in capacity developed into four phases of 75MW each.

Tony Barbour has been appointed by Savannah to undertake a specialist Social Impact Assessment (SIA) as part of the EIA for the full 300MW.

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 DESCRIPTION

As indicated above, the proposed Merapi Solar Park will have an installed capacity of 300MW to be developed in four phases of 75MW each. The exact number and placement of photovoltaic cells associated with each 75MW phase will be investigated in more detail during the EIA phase of the study. The energy will be linked via an on-site substation to the Eskom grid. The project is therefore an Independent Power Producer (IPP) project.

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Support Structure

The PV panels will be attached to a support structure approximately 3.4 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: Illustration of Photovoltaic panels

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- 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 involved a site visit to the area and consultation with affected individuals and communities;

- 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;
- Site visit and interviews with key stakeholders;
- Identification and assessment of the social issues associated with the proposed project.

Annex A contains a list of stakeholders interviewed and secondary information reviewed. Annex B summarises the assessment methodology used to assign significance ratings to the assessment process.

1.4.1 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, ethnic, 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.

1.4.2 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.

1.5 ASSUMPTIONS AND LIMITATIONS

1.5.1 Assumptions

Identification of area for the Photovoltaic Solar Energy Facility

The identification of the proposed site was informed by technical information relating to local climatic conditions in the area, specifically annual rates of solar radiation, local topography and land availability.

Strategic importance of the project

The strategic importance of promoting renewable energy is supported by the national and provincial energy policies.

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, it is acknowledged that the location of solar energy facilities is informed by technical requirements, specifically solar radiation conditions.

1.5.2 Limitations

Demographic data

The demographic data used in the study is largely based on the 2001 Census. The results of the 2011 Census will only be available in 2013. 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.

1.6 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.

Daniel Rogatschnig, the co-author of this report, has an MSc in Environmental Science from the University of Cape Town and has worked closely with Tony Barbour on a number of SIAs over the four years, including on a number of renewable energy projects.

1.7 DECLARATION OF INDEPENDENCE

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

1.8 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 Merapi Solar Park. 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);
- Free State Provincial Growth and Development Strategy (2004-2014); and
- Mantsopa Integrated Development Plan (2010-2011 Review).

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 Solar Park, is supported by the White Paper on Energy Policy for South Africa (December 1998). 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 Protocol¹, Government is determined to make good 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.

¹ 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)

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 ³	300 ²
2019	250	0	0	237 ²	0	400 ⁴	100 ³	300 ²
2020	250	0	0	237 ²	0	400	100	300
2021	250	0	0	237 ²	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 Free State Province Provincial Growth and Development Strategy

The Free State Provincial Growth and Development Strategy (FSPGDS) is a nine-year strategy (2004-2014) which aims to achieve the objectives of Vision 2014. As a provincial policy framework, it sets the tone and pace for shared growth and development in the Province. It addresses the key social, economic, environmental and spatial imperatives in the Province. Underlying the FSGDS are the following imperatives:

- The need to effectively use scarce resources within the Province, whilst addressing the real causes of development challenges.
- The need to accelerate service delivery based on a common provincial development agenda as the basis for provincial strategic direction.
- The need to identify investment opportunities and provide an environment of certainty critical for private-sector investment.
- The need to promote intergovernmental coordination between the three spheres of government.
- The need to facilitate facilitates the implementation of the People's Contract within the Province.
- The need to provide a common vision as the basis for common action amongst all stakeholders, both inside and outside government.
- The need to provide a framework for budgets, implementation, performance management and spatial development.

The implementation of the FSGDS is informed by the following vision, mission, and value statements.

Vision: A unified prosperous Free State that fulfils the needs of all its people

Mission: Serving the people of the Province by working effectively with our social partners through:

- Economic growth, development, and employment.
- Human and social development.
- Justice and crime prevention.
- Efficient governance and administration.

The FSPGDS states the importance of applying the principles of sustainable development, specifically:

- Acknowledge the ecological limitation of the environment;
- Ensure integrated development planning and implementation;
- Actively address economic and social inequalities;
- Promote economic infrastructure investment and development spending in areas of potential and need according to the principles of the NSDP;
- Acknowledge the importance of BEE, as well as the need to broaden access to the economy;
- Promote labour intensive approaches to development.

The FSPGDS identifies a number of key provincial priorities. The priorities that are relevant to the proposed Solar Park include:

- Economic development, employment, and investment;
- Human and social development. Economic growth is underpinned by a good socio-economic environment. Future strategies

The following key objectives are set for economic development, employment and investment:

- To achieve an economic growth rate of 6%-7% per annum;
- To reduce unemployment from 30% to 15%;
- To reduce the number of households living in poverty by 5% per annum;
- To provide adequate infrastructure for economic growth and development.

Regarding the above objectives and the discussion of development trajectories, trade-offs, and barriers, the key strategic approaches towards the economy are divided into economic driving and economic enabling strategies. The key economic drivers that are relevant to the renewable energy sector are:

- Expanding the manufacturing sector in key sub-sectors;
- Developing tourism;

To enhance these drivers, the following enabling strategies are followed:

- Emphasising SMME development;
- Providing economic infrastructure;
- Promoting human resource development;
- Creating an enabling environment.

SMME development: The FSPGDS acknowledges the key role played by SMMEs in terms of economic development and job creation. To bolster economic growth and create employment opportunities, SMME development is high on the agenda of government.

Tourism: The emphasis in respect of tourism is to optimise its benefits. More specifically, the weekend tourism market for the north and north-eastern parts of the Province should be explicitly marketed. Emphasis is on nature tourism and heritage tourism. Events tourism should be focused on in the larger urban areas of Bloemfontein and Welkom.

Human resource development and economic growth: Providing the skills for a growing economy will be done by means of the learnerships, providing skills through the FET sector and internships.

The FSPGDS also identifies a number of barriers to economic growth and infrastructure that need urgent attention in order to foster economic growth. The barriers that are pertinent to the renewable energy sector include:

- The lack of appropriate skills.
- Access to capital;
- Poor institutional arrangements in respect of business support;
- Lack of basic infrastructure and the maintenance of basic infrastructure.
- Lack of appropriate R&D to foster the emphasis in the NSDP on innovation and economy, appropriate R&D is vital to the economic development of the Province. Not only should partnerships with local research institutions be fostered, but various national institutions also exist to assist in this regard;
- The HIV and AIDS pandemic.

The FSPGDS also identifies a number of natural constraints to economic growth and development. These include, low rainfall coupled with the limited soil potential and the impact of this on agriculture, limited water availability and depletion of mineral resources. What is of interest is that none of the natural constraints impact on the renewable energy sector, specifically the solar energy sector. Solar energy, specifically PV solar energy, therefore provides the Free State with an opportunity to diversify its economy in a way that is not affected by natural constraints such as low rainfall and limited water supplies.

2.3.2 Mantsope Municipality Integrated Development Plan

The vision for the MM as set out in the MM IDP (2010-2011 Review) is "Mantsope Local Municipality shall be a leading force to achieve an accessible, integrated, sustainable and equitable social and economic development of her community".

The MMs mission is to "To achieve an accessible, integrated, sustainable and equitable social and economic development of the municipality"

The IDP identifies 5 focus or key performance areas, namely:

- Provision of sustainable infrastructure and basic services;
- Stimulate socio-economic development and tourism;
- Sustain financial management excellence;
- Improve human resource management excellence (Institutional transformation);
- Improve good governance through effective leadership.

Of these, the first two are relevant to the proposed Merapi Solar Park.

The priority issues identified in the IDP include: sanitation, electricity, water, roads and stormwater, community facilities, housing and land, local economic development, education, waste management, health, safety and security, social welfare, environmental management and conservation.

The construction and operation of the proposed Merapi Solar Park, including the establishment of a Community Trust, can assist the MM in meeting some of these priorities, specifically, the provision of electricity, establishment of community facilities and promotion of local economic development.

The Municipal Strategy outlined in the IDP lists the key developmental objectives of the MM. The following are relevant to the proposed SEF:

- To provide sustainable infrastructure and basic services
- To stimulate sustainable economic development and tourism

Basic Services

The IDP indicates that the provision of infrastructure services was identified as a key priority by communities in the MLM. The provision of electricity is listed under the heading of basic services.

Local Economic Development

The IDP notes that local economic development is the most important sector of development in MM. Once the people have escaped the vicious circle of poverty, they can become active generators of income. This income will be spent in Mantsopa towns and will represent a further investment in development. As the economy grows, so the people will be able to provide their own needs and eventually contributes the national economy.

One of the key strategies identified in the IDP is to support small businesses. The key objectives of the national small business strategy that are relevant to the proposed Merapi Solar Park include:

- Creation of an enabling environment for small enterprises;
- Address the legacy of apartheid based disempowerment of black business;
- Support the advancement of women and youth in all business sectors;
- Create long term jobs;
- Stimulate sector focused economic growth;
- Strengthen cohesion between small enterprises; and
- Level the playing fields between bigger and small business as well as between rural and urban business.

The IDP also lists the outcomes of an IDP meeting held on 16 March 2010 at the Ladybrand town hall in which new projects for 2010/2011 were identified. Of specific reference for the proposed Merapi Solar Park the meeting identified the establishment of a "Solar Power Station" and provision of solar panels for all Mantsopa Towns. This clearly indicates that the MLM supports the establishment of renewable energy projects and initiatives in the area, specifically solar energy.

SECTION 3: OVERVIEW OF STUDY AREA

3.1 INTRODUCTION

Section 2 provides an overview of:

- The provincial context;
- The policy and planning environment affecting the proposed Merapi Solar Park; and
- The local socio-economic environment;
- Local and surrounding land uses.

3.2 PROVINCIAL CONTEXT

The proposed solar energy facility is located in the Free State Province which covers an area of 129 464 km², or 10.6% of the total land area of the country. The western part of the Free State is characterised by flat plains, pans, and undulating land. The south is primarily lowlands with hills. To the east the escarpment extends from Lesotho into low mountains and irregular undulating land with hills. The northern and central portions are marked by undulating land and hills. The climatic conditions range from moist and warm in the east to dry and warm in the west.

The Free State consists of 4 District Municipalities, namely Xhariep, Thabo Mofutsanyana, Fezile Dabi and Lejweleputswa District Municipalities, and 1 Metropolitan Municipality, the Manguang Metropolitan Area (MMM). The MMM was established in July 2001. Before this the majority of what is now the MMM fell within a fifth DM, the Motheo DM.

The Motheo DM contains the large population and comprises mainly open grassland, with mountains in the most eastern region. The majority of the Motheo was formal made up of what is now the MMM. The main urban centre is Bloemfontein. The city is the trade and administrative hub of the Province and boasts the provincial government and the seat of the Appeal Court of South Africa. It also has a rich history, which includes the establishment of the ANC in 1912 and the National Party in 1914. Motheo has 26.9% of the Province's population and contributes 32.7% of GDP in the Province.

The Xhareip DM is located in the southwest of the Province and is a semi-arid area with extensive farming, mainly sheep. The district comprises open grasslands with small wide dispersed towns. The district accounts for 5% of the Province population and contributes 2.8% to the Gross Domestic Product (GDP) in the Province (Table 3.1).

The MMM contains three prominent urban centres, namely Bloemfontein, Botshabelo and Thaba Nchu. The Metropolitan accounts for ~ 27% of the Province's population and contributes ~ 33 of GDP in the Province (Table 3.1). The main urban centre is Bloemfontein, which is the administrative capital of the province and is the seat of the Appeal Court of South Africa. Bloemfontein also has a rich history, which includes the establishment of the ANC in 1912 and the National Party in 1914.

The Thabo Mofutsanyana DM borders Lesotho to the east and is one of the most important tourism due to the spectacular scenic beauty of the Drakensberg and Maluti

mountain ranges. This district accounts for 26.8% of the Province's population contributes to 11.7% of the GDP in the Province (Table 3.1).

The Fezile Dabi DM is an important agricultural production area, particularly maize. The Vaal Dam is the main source of water and offers a wide variety of sports and leisure facilities. The SASOL coal to oil and gas refinery operations Sasolburg is also located in the district. The district accounts for 17% of the Province's population, and contributes 32.2% to the GDP (Table 3.1).

The Lejweleputswa DM is home of the Free State Goldfields and is also a major agricultural area. The first gold was discovered in the early 1940s. The district accounts for 24.3% of the Province's population and contributes 20.6% of the GDP in the Province (Table 3.1).

Table 3.1: Population and contribution to GDP (Source FSPGDS, 2007)

District	Population, 2001		Area		GDP Contribution (%) in the Free State, 2004
	Number	% share	Ha	%	
Xhariep	135245	5.0	3 421 312	26.4	2.8
Motheo	728262	26.9	1 399 483	10.8	32.7
Lejweleputswa	657010	24.3	3 190 855	24.6	20.6
Thabo Mofutsanyana	725939	26.8	2 830 200	21.8	11.7
Fezile Dabi	460315	17.0	2 127 178	16.4	32.2

Note large part of the Motheo DM is now the MMM.

Population

In 2001 the population of the Free State was ~ 2.7 (Census 2001), and increase over the 2.64 million in 1996. The population grew at a rate of 0.6% between 1996 and 2001, which was lower than the national population growth rate ~ 2% per annum for the same period. This has been attributed to a number of factors, including the declining contribution of the agricultural and the mining sectors. The impact of HIV/AIDS has also been identified as a contributing factor. The FSPGDS indicates that the Province's population is expected to stabilise at about 2.89 million people by 2010.

In terms of the age breakdown, the largest percentage of children is found in the communal areas where 34.9% of the population is children. The lowest percentage is found in larger urban areas, where 25.6% of the population is children. The percentage of children increases from the larger urban areas (25.6%), to regional towns (27.3%), to medium-sized towns (30.8%), to small towns (32.8%), and to communal areas (34.9%). The cities have the highest percentage of youths (39.3%), while the commercial farms, communal areas, and small towns have the lowest percentage. This pattern reflects the lack of employment in the rural areas and the associated small rural towns and the tendency for the youth to migrate to the bigger urban centres to search for work.

The highest percentage of elderly people is found in the small towns (8.4%), regional towns (8.1%), and the communal areas (7.8%). The provinces gender statistics also reflect the tendency for males, especially younger males, to relocate in search of work. In this case the migration of males to the Free State in search of work on the mines has decreased. This reflected in the by the increase in the percentage of females between 1996 and 2001. In 1996, 50.7% of the Province's population was female. This increased

to 52.1% in 2001. The FSPGDS notes that the main reason for the increase in the percentage of females is the decline of the mining industry and, therefore, a decline in the number of male migrant workers.

The tendency for males to migrate to the cities from the urban areas in search of work is also reflected in the gender statistics. Cities (51.8%), followed by regional towns (52.6%), medium-sized and small towns (52.7%) have the lowest percentage of females compared to rural areas (53.8%). Commercial farms have the lowest percentage of females (48.9%).

The spatial patterns indicate that ~ 70% of the Province's population is 70% urban, compared with the national percentage of just over 50%. The urban areas grew at 2.2% between 1991 and 2001. This growth has placed increasing pressure on the ability of municipalities to provide basic services. The towns that have experience rapid growth between 1991 include Bloemfontein and Sasolburg. The annual growth rate of Bloemfontein has been more 3% per annum between 1991 and 2001. The urban areas grew by 2.8 % per annum between 1991 and 1996 and by 1.5% per annum between 1996 and 2001. In real terms, this represents a growth of nearly 400 000 people between 1991 and 2001. Over the same period rural areas experienced a population decline of 3.4 % per annum between 1991 and 1996 and an even larger decrease of 3.7% between 1996 and 2001. In this regard the number of people residing on commercial farms has declined considerably over the past 15 years. In 1991, more than 630 000 (24.3% of the Province's population) people resided on commercial farms. By 2001, this had declined to about 14.7% of the Province's population.

Economy

The nominal GDP of the Province, which measures the total of final products and services produced within the Province, amounted to just over R65 billion in 2004 (Global Insight, 2006). This represents only 4.7% of South Africa's total GDP. The Free State therefore has the third smallest economy in South Africa after the Northern Cape and Limpopo Province. The 4.7% is also less than the comparative size (6.3%) of the provincial population (Figure 3.1). By comparison, the populations of Gauteng and the Western Cape are substantially smaller than the contribution of their economies, while the Free State and some of the other Provinces, such as the Eastern Cape and Limpopo, contribute less towards the domestic economy than their contribution to the national population.

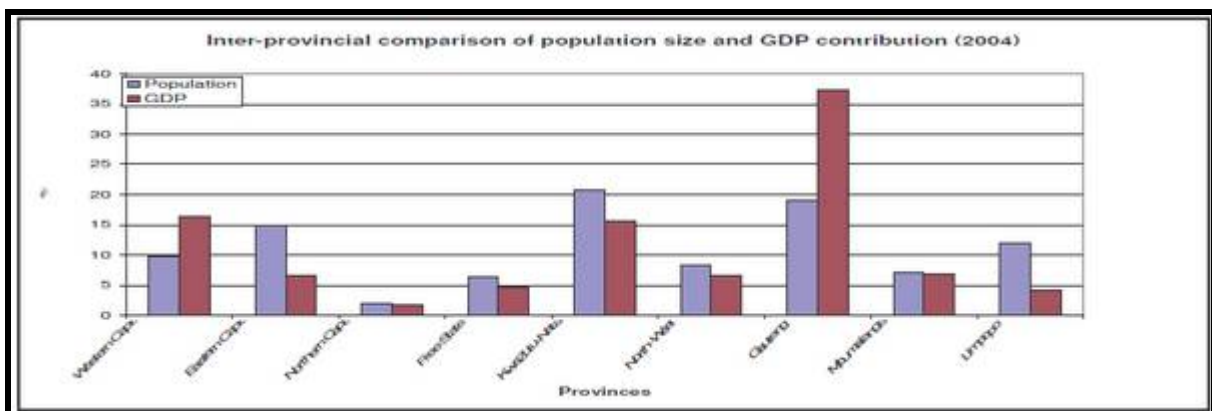


Figure 3.1: Comparison of population size and GDP contribution for Provinces in South Africa (Source FSPGDS, 2007)

For the period 1996 to 2004 the average economic growth rate for the Province was 0.7% compared to 2.8% for South Africa as a whole. The Provincial economy has therefore underperformed since 1996. On the positive side, the economic growth rate for 2004-2005 increased to just above 4%. However, these gains are likely to have been impacted by the financial crisis of 2008, which has resulted in a loss of ~ 1 million jobs in the South African Economy by the end of 2011.

Historically, the economy of the Province was based on mining and agriculture. Both pillars of the provincial economy have been declining since the early 1990s (Centre for Development and Enterprise. 2005). However, in recent years the role of the Mining sector has declined and is expected to continue declining, while the Services sector has experienced a dramatic increase (Premier's Economic Advisory Council, 2005). In 1990 the Mining sector was the most important sector, contributed ~ 22% to the economic output of the Province. By 2004 this had dropped to ~ 9% (Figure 3.2). More alarming was the fact that the employment levels in the mining industry dropped from 19% in 1990 to 9.9% in 2004. Although the declines are not unique to the Province, their impact on has probably been more serious because, historically, the mining sector had been the dominant sector in the Province's economy. The lower contribution of mining is due to the increase in the production cost, increase in exchange rates, and a long term depletion of the resource base. The most important sectors in 2004 were the Community Services (~ 27%) and Manufacturing sectors (20%). The Services sector includes the various provincial government departments and the district local municipalities. The contribution of this sector to the provincial economy increased from about 19% in 1990 to 27% in 2004. However, the sector is generally not structured to be a driver of the economy as the largest portion of the GVA is paid as salaries and is not a value-added or saleable product or service. The large amount paid in salaries represents a significant contribution to the available spending power, which in turn, supports sectors such as the trade sector.

Other sectors that experienced declines were the Agriculture, Construction and Energy sectors. The Finance, Transport, and Trade sectors have seen marginal increases. The contribution of agriculture remained more or less constant between 1990 and 2002. However, considering that this sector's contribution to the Province's economy amounted to 18% in 1980, there has also been a trend of decline over the past 25 years. More than 55 000 jobs were lost in the agricultural sector between 1981 and 1996. These changes in the structural composition indicate a gradual shift away from the primary and secondary sectors towards the tertiary sector. A gradual movement away from the primary sector towards the secondary and tertiary sectors is normally considered to be characteristic of a maturing economy.

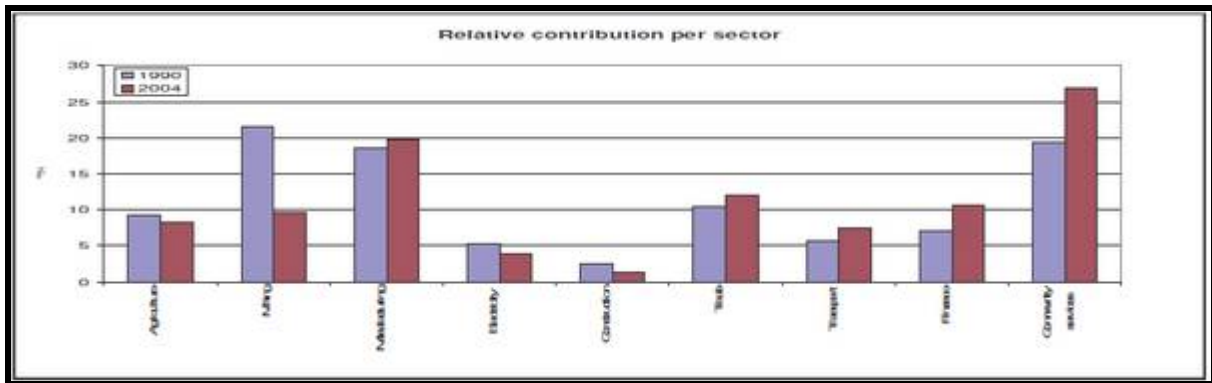


Figure 3.2: Relative contribution of the different sectors to the economy, 1990-2004 (Source FSPGDS, 2007)

Spatially, the FSPGDS identifies five distinct spatial patterns in the Province economy. First, large-scale agricultural output is prevalent in the northern and north-eastern Free State. Maize and wheat are the main agricultural products grown in these areas. Although agriculture is also dominant in the southern and south-western parts, it is less extensive and more dependent on stock farming.

The second is the dominance of the petrochemical industry in Sasolburg. This industry is closely related to the Sasol factories, with ~ 20% of the employment in the Manufacturing sector located in Sasolburg.

The third major economic hub is the Free State Goldfields, which is dominated by the gold-mining industry. As indicated above, the mining sector played key historically role in the development of the Province's economy. However, following the boom in the late 1980s the sector has been in decline, which has impacted significantly on the local economies of the mining towns.

The fourth spatial characteristic of the Province's economy is the large-scale manufacturing infrastructure which is located in the former homeland areas. This infrastructure was created through the policy of economic decentralisation under apartheid. The operation of these firms was highly subsidised and in the process, large manufacturing estates were erected in the Phuthaditjhaba, Thaba Nchu, and Botshabelo areas. With the phasing-out of the subsidies, jobs were lost.

The fifth characteristic of the Province's economy is the dominance of Bloemfontein, mainly as a public-sector and retail city. Although Bloemfontein is one of the few urban areas where a positive economic growth is being experienced, it compares very poorly with other secondary cities in South Africa (Centre for Development and Enterprise, 2005). Bloemfontein and Sasolburg together contribute approximately 51% of the Province's economy and if Welkom is added, this rises to above 60%.

At a District Municipal level the MMM (Previously the Motheo DM) and the Fezile Dabi are the districts with the highest contribution to the Province's economy. In terms of GDP, the MMM and Fezile Dabi contributed to almost two-thirds (64.7%) of the Province's economy. In contrast, Thabo Mofutsanyana and Xhariep together contributed to only 14.6% of the total output of the Province's economy. While Lejweleputswa contributed the most towards the provincial economy in 1996, it dropped to third place (20.8%) in 2004. The top five localities in terms of contributions to the economy during 2004 were

Bloemfontein (R 17.7 billion), Sasolburg (R 15.2 billion), Welkom (R6.5 billion), Kroonstad (R2.3 billion) and Bethlehem (R2.2 billion).

In terms of future economic development, there is likely to be a decline in the role played by mining, which will also impact negatively on employment in the Province. The FSPGDS notes that it is unlikely that the mining industry will ever again contribute more than its current contribution to GDP. In addition, the mining industries will never again absorb the percentages of labour that have historically been the case. The economic future of the agriculture also appears to be less than prosperous based on limited economic growth over the period from 1996 to 2004. However, the labour-absorption capacity of agriculture compared to other sectors is still relatively high. In addition, the ability of the agricultural sector to absorb low skilled labour is higher than the secondary and tertiary economic sectors. In terms of economic development at district and local levels, agricultural diversification is seen as a key strategy for farmers. This includes looking at new products such as olives, organic farming, and essential oils.

Tourism is identified a key economic sector for the future. The FSPGDS identifies a number of strategies aimed at promoting the tourism sector. These include events tourism, such as sporting and festivals, weekend tourism, aimed at the market in the north and north-eastern of the Province, specifically Gauteng, and international tourists.

Employment

In 2004 ~ 500 000 people were unemployed, which represented an unemployment rate of 39.1%. This represents an almost 10% increase from the 1996 level of 29.9%. Lejweleputswa had almost a third of the unemployed (30.9%), followed by the Thabo Mofutsanyane DM and the Motheo (now the MMM) (Table 3.2). the Lejweleputswa DM also experienced the highest poverty rate increase of all five districts. The FSPGDS identifies unemployment as one of the key challenges facing the Province.

Table 3.2: National, Provincial and District Unemployment rates (Source FSPGDS, 2007)

District	1996			2004		
	People unemployed	% of total people unemployed	Unemployment rate	People unemployed	% of total people unemployed	Unemployment rate
Xhariep	17 160	5.8	26.9	28 301	5.6	34.0
Motheo	74599	25.2	31.3	120 173	23.7	37.8
Lejweleputswa	82654	27.9	26.2	156 568	30.9	38.8
Fezile Dabi	45477	15.4	27.4	75 893	15.0	35.6
Thabo Mofutsanyana	75926	25.7	36.7	125 941	24.8	45.8
Free State	296427	100.0	29.9	506 876	100.0	39.1
South Africa	4 627 824		33.9	7 382 156		40.4

Note large part of the Motheo DM is now the MMM.

Different economic sectors differ in their capacity to create employment opportunities. The most important economic sectors in terms of employment in the Province in 2004 were the Community Services (~ 31%) and Agricultural sectors (26%) (Figure XXX). These two sectors therefore accounted for 56% of all the employment opportunities in the Province in 2004. Of concern is the fact that the percentage of jobs associated with the Mining and Manufacturing sectors fell between 1996 and 2004. The Mining and Manufacturing, two sectors that are usually capital-intensive, lost a substantial number

of formal jobs while community service, agriculture, and trade gained in terms of employment (Figure 3.3).

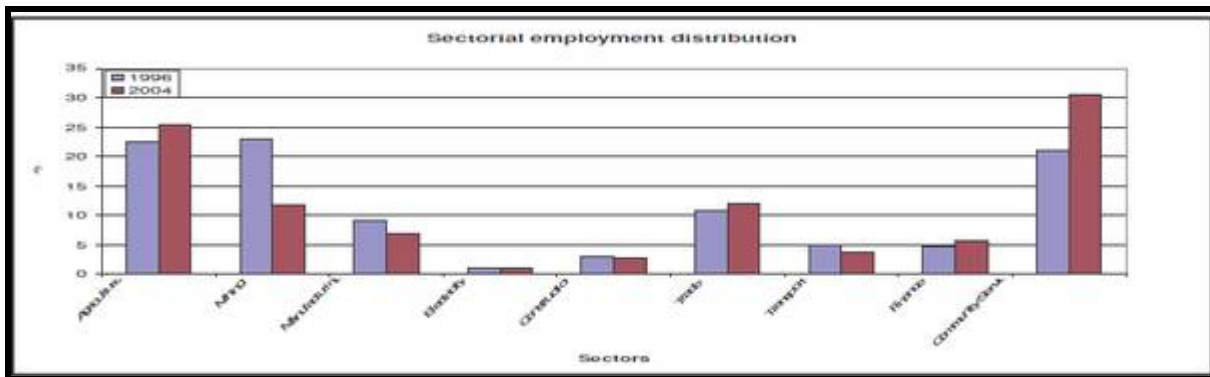


Figure 3.3: Contribution to employment per sector (Source FSPGDS, 2007)

Although the Agricultural only contributes 8% to the GDP of the Province’s economy, is accounts ~ 21% of all formal employment opportunities. The Agricultural sector is therefore a key labour intensive sector in the Province’s economy.

In terms of future development, economic growth in conjunction with a reduction of unemployment is seen as crucial, especially in poverty reduction. The priority in respect of unemployment is to narrow the gap between unemployment and economic growth. Although the gap only started to narrow in the Province in 2004, national trends are already showing that a constantly high economic growth will start to narrow the gap. The projected high economic growth rates have however been negatively affected by the 2008 financial crisis. The development trajectory in respect of reducing poverty in the Province has shown that the percentage of people living in poverty increased from 38.6% to 55.9% between 1996 and 2004. However, in 2004, there was a small decrease in the percentage of people living in poverty.

Human Development

While there has been an improvement in the human development status of people in the Province (HDI 0.53 to 0.55), the income inequality has also increased (Gini 0.59 to 0.64). This means that, although some people have benefitted from economic growth, the income gap between the rich and the poor has increased and has resulted in greater inequality. Table 3.3 provides an overview of the Human Development Index (HDI)² and the Gini-coefficient³.

² HDI is a composite, relative index that attempts to quantify the extent of human development of a community or country. It is based on measures of life expectancy, literacy and per capita income. It is thus seen as a measure of people’s ability to live a long and healthy life and to have sufficient resources to obtain a decent living. The HDI can assume a maximum level of 1, indicating a high level of human development, and a minimum value of 0, indicating a low level of development.

³ The Gini-coefficient is a well-known measure of income distribution is the, which can take a value between zero and one. The closer the coefficient approximates to one, the more unequal the distribution of income. For South Africa the coefficient is 0.64 for 2004. This makes South Africa a country with one of the worst, if not the worst, income distributions in the world.

In terms of poverty levels, the number of people living in poverty in the Province grew from over one million in 1996 to almost 1.7 million in 2004, representing 55.9% of the total population of the Province⁴. This is compared to the figure of 38.6% in 1996 (Table 3.4).

Table 3.3: Human Development and Inequality, 1996-2004 (Source FSPGDS, 2007)

Province	HDI ^a		Gini-coefficient ^a	
	1996	2004	1996	2004
Free State	0.53	0.55	0.59	0.64
Western Cape	0.66	0.68	0.55	0.58
Eastern Cape	0.49	0.52	0.60	0.65
Northern Cape	0.54	0.57	0.59	0.61
KwaZulu-Natal	0.52	0.57	0.60	0.65
North West	0.50	0.53	0.55	0.61
Gauteng	0.67	0.70	0.58	0.59
Mpumalanga	0.50	0.55	0.59	0.64
Limpopo	0.45	0.50	0.58	0.65
South Africa	0.56	0.59	0.60	0.64

This represents a significant increase in the number of people living in poverty in the Free State Province. Besides Thabo Mofutsanyana, which has the largest proportion and number of people living in poverty (68.1% or 510 124), more than 56.1% of the population in Lejweleputswa and Fezile Dabi were also living in poverty. However, in real terms, Lejweleputswa has almost double the number of people living in poverty (448 163) compared to Fezile Dabi (289 284) (Table 3.5).

Table 3.4: Number of people living in poverty (Source FSPGDS, 2007)

Year	Number of people ('000)	As % of total Free State population
1996	1 064	38.6
2004	1 672	55.9

⁴ The poverty rate is the percentage of people living in households with an income less than the poverty income. The poverty income is defined as the minimum monthly income needed to sustain a household and it varies according to household size: the larger the household, the larger the income required to keep its members out of poverty.

Table 3.5: Poverty per District Municipality (Source FSPGDS, 2007)

District	1996			2004		
	People Living in Poverty	% of People Living in Poverty in the FS	% of People Living in Poverty of total Population	People Living in Poverty	% of People Living in Poverty in the FS	% of People Living in Poverty of Total Population
Xhariep	66515	6.3	36.1	98 590	5.9	49.5
Motheo	218096	20.6	33.2	325 958	19.5	44.9
Lejweleputswa	260183	24.5	34.9	448 163	26.8	56.1
Fezile Dabi	193152	18.2	40.4	289 284	17.3	56.1
Thabo Mofutsanyana	321935	30.4	47.1	510 124	30.5	68.1
Free State	1059881	100.0	28.6	1 672 119	--	55.9
South Africa	17100720		40.5	23500962		49.7

Note large part of the Motheo DM is now the MMM.

If the poverty figures and proportions for the five municipal districts for 1996 and 2004 are compared the following key observations can be made:

- The real numbers of people living in poverty almost doubled in Lejweleputswa – from just more than 260 000 to almost half a million people during this nine year interval. This district also experienced the largest increase, 21.3%, in its poverty rate – from 34.9% to 56.1%;
- Thabo Mofutsanyana showed an increase of 21% in its poverty rate and is the district in which a third of the Province’s people living in poverty reside;
- Xhariep, Motheo, and Fezile Dabi experienced marginal decreases in their share of poor people in the Province between 1996 and 2004. This is largely due to the magnitude of the poverty problem in Thabo Mofutsanyana and Lejweleputswa.

Education

Level of education is one of the most important contributors to the HDI. The percentage of people five years and older in the Free State in 2001 who had not completed primary school and who, as a result, are classified as functionally illiterate was 43.4%. The national figure was 45.7%. Only 14.6% of people five years and older had completed Grade 12 or higher in 2001 (Table 3.6). The DM with the lowest education levels was the Xhariep DM (52.5% functionally illiterate), followed by the Thabo Mofutsanyane DM (46.8%). The Motheo DM (now the MMM) had the lowest number of people over the age of five who were functionally illiterate (39%). The education levels in the Province are low and this will impact on ability to promote economic growth.

Table 3.6: Education statistics for Free State and District Municipalities (Source FSPGDS, 2007)

Area	% no schooling		% some primary		% completed primary		% some secondary		% Std 10/ Grade 12		% higher	
	1996	2001	1996	2001	1996	2001	1996	2001	1996	2001	1996	2001
South Africa	22.3	15.8	26.1	29.9	7.5	6.9	28.7	27.9	11.2	13.9	3.9	5.4
Free State	17.3	13.1	27.6	30.3	7.9	7.2	26.1	25.5	8.4	10.9	3.0	3.7
Xhariep	23.7	17.5	32.2	35.0	7.4	7.3	18.2	20.4	5.4	7.5	2.5	2.5
Motheo	14.2	10.2	25.5	28.8	7.8	7.1	27.1	26.1	11.4	13.6	4.2	5.4
Lejweleputswa	16.5	13.2	28.3	30.2	8.5	7.8	27.6	26.4	7.5	9.9	2.4	2.9
Thabo Mofutsanyana	20.6	15.7	27.9	31.2	7.5	6.7	24.3	24.1	6.7	9.4	2.4	3.0
Fezile Dabi	16.3	11.9	28.2	29.8	7.6	7.2	27.0	26.8	8.4	11.5	3.2	3.8

Note large part of the Motheo DM is now the MMM.

Income and poverty

The poverty indicator of the United Nations stands at \$1 per day, an amount of R800 per month, and a household size of approximately four for these poorer households. In the light of this indicator, R800 per month is viewed as an appropriate benchmark in South Africa.

The FSPGDS notes that the poverty levels in the Province (57.1%) are markedly higher than in South Africa as a whole (49.4%) (Table 3.7). If the income poverty levels in the Province are compared to those of the other Provinces, the Free State has the third highest level of poverty in the country. Only the Eastern Cape (64%) and Limpopo (67%) Provinces have higher percentages of households earning less than R800 per month. The percentage of households earning less than R800 per month also grew by 11.3% in the Province between 1996 and 2001. In terms of real numbers, the households with an income of below R800 per month have increased by approximately 145 000 households.

Table 3.7: Household income below R800 per month for South Africa and Free State (Source FSPGDS, 2007)

Area	% of households earning less than R800 p/m (1996) – 2001 prices	Number of households earning less than R800 p/m (1996) – 2001 prices	% of households earning less than R800 p/m (2001)	Number of households earning less than R800 p/m (2001)	% of Free State households earning less than R800 p/m (2001)	Percentage of Free State population (2001)
South Africa	37.4	3770723	49.4	5810058	-	-
Free State	45.8	286731	57.1	432579	-	-
Xhariep District Municipality	56.1	17578	64.7	25367	5.9	5
Motheo District Municipality	38.1	65178	51.5	108446	25.1	26.9
Lejweleputswa District Municipality	44.1	71156	56.2	110468	25.5	24.3
Thabo Mofutsanyana District Municipality	55.7	87364	65.5	121859	28.2	26.8
Fezile Dabi District Municipality	43.1	45455	53.2	66439	15.4	17

Note large part of the Motheo DM is now the MMM.

At a DM level, the Thabo Mofutsanyana (65.5%) has the highest percentage of households earning less than R800 per month in 2001. It is also significant that this

represents 28.2% of the households in the Province that have an income of below R800 per month (Table 3.7). Although Xhariep DM (64.7%) had the second highest percentage of households living below the R800 income level, this only represented 5.9% of all households in the Province with an income of below R800 per month (2001 figures). Approximately 79% of all households with an income of below R800 per month lived in Thabo Mofutsanyana, Lejweleputswa, and Motheo (now MMM). In Motheo (now MMM), the percentage of households earning less than R800 per month increased from 38.1% in 1996 to 51.5% in 2001. The other district in which a marked increase was recorded is the Lejweleputswa DM (12.1%).

As a result of the high poverty levels there were 592 443 state grant beneficiaries in the Province in 2007. The expenditure on social security amounts to R251 577 827 every month and makes up 89% of the total welfare budget.

3.3 SOCIO-ECONOMIC OVERVIEW OF THE PROPOSED PROJECT AREA

As indicated in Section 1.5.2 Limitations, it is no longer possible to access Census 2001 data at Ward level via the Municipal Demarcation Board. As a result it was not possible to obtain ward level data for the MM. The social baseline for this part of the study area is therefore described at a broader municipal level only.

3.3.1 Mantsopa Local Municipality

The MM is located within the Motheo District Municipality (MDM) and was one of three local municipalities that make up MDM. Originally, the other two local municipalities that made up the MDM were the Mangaung and Naledi LMs. On July 1 2011 the status of the Mangaung Local Municipality (MLM) was elevated from a category B municipality to a category A metropolitan municipality. The municipality is now the Mangaung Metropolitan Municipality (MMM) and no longer forms part of the MDM. The MDM is one of five district municipal areas within the Free State and accommodates 26.18% of the Free State's population (FSGDS, 2007). Table 3.8 provides a breakdown of the composition and size of MDM area:

Table 3.8: Motheo District Municipal Area

Local Municipality	Number of Farms	Area in km ²	% Coverage
Mangaung	3 368 (*2886)	6262.51 km ²	44.89%
Naledi	1 147 (*38)	3 412.08 km ²	24.46%
Mantsopa	1 888	4 275.59 km ²	30.65%
Total	6 403 (*2924)	13 950.18 km²	100.00%

Source: Free State Growth and Development Strategy, 2007.

Note: the Mangaung LM became a Metropolitan Municipality in 2011

The MM was established on 5 December 2000 and comprises the previous areas of jurisdiction of Tweespruit Transitional Local Council (TLC), Ladybrand TLC, Hobhouse TLC, Excelsior TLC, Thaba Patchoa TLC and Maluti Transitional Rural Council. The MLM is located in the Eastern Free State and falls within the MDM area. It borders the Kingdom of Lesotho in the east, MMM to the west, Naledi Local Municipality to the south and Masilonyana and Setsoto to the north. The area is accessible via the N8 and R26 roads which transverse the area. A railway line that runs along these routes also services the area.

The MM is the second largest local municipality in the MDM and covers an area of 4290 km², which constitutes ~ 31% of the total area of covered by the MDM. However, in terms of population the MM only accounts for 7% of the total population of MDM (This total includes the population of the previous Mangaung LM). The municipal area comprises five urban areas that are dispersed throughout the region with a surrounding commercial farming area that are utilised for mixed farming practises. The five urban areas are Ladybrand, Excelsior, Tweespruit, Hobshouse and Thaba Patchoa.

Ladybrand is a service centre to the predominantly agricultural orientated surrounding rural area and also neighbouring Lesotho. It is the most progressive and largest of all the towns in the MLM and has a well-established economy. It is also located on the N8 which links Bloemfontein with Maseru in Lesotho.

Excelsior is located along the R703 between Tweespruit and Verkeerdevlei. The town serves as a service centre for the agricultural activities in the surrounding area. The role as an important service centre has however declined in recent years and many local residents now chose to travel to Thaba 'Nchu and Bloemfontein to do their shopping. This has had a negative impact on the town's local economy and work opportunities.

Tweespruit is situated along the N8 between Bloemfontein and Ladybrand. There is also a direct link between Tweespruit and Excelsior along the R709. The town serves as a service centre for the agricultural sector in the area, which is one on the major sunflower production regions in the Free State. A large silo complex has been developed in the town which has benefitted the local economy.

Hobhouse is located along the R26 between Wepener and Ladybrand and is also directly accessible from Tweespruit. The town serves as a service centre for the predominant agricultural sector in the area.

Thaba Patchoa is located approximately 30 km from Tweespruit in a south -easterly direction and is inaccessible from the major access routes in the region. The town was a farming settlement that was established for the coloured community during the apartheid era. Due the legacy of apartheid the town lacks economic infrastructure and the economic opportunities are limited. The main activities in the area are linked to agricultural in the form of livestock and dry land cultivation of crops such as maize, sunflower and lucern. The bulk of commonages has been set aside as fields and for communal grazing and has been leased to farmers on a long-term basis.

Population

It is estimated that the population increased from 47980 in 1996 to 60 841 in 2001. This is a growth of 5% per annum. The MM IDP indicates that the total population of the MLM is estimated to be the region of 72 000 people. The MM covers an area of 4 290 km² and incorporates 5 small towns, which collectively accommodates ~ 66.5% of the total population in the MLM. All of the towns are surrounded by extensive agricultural lands. The rural survey conducted by the MLM found that the rural population in the MLM was ~ 12 329 people.

Of the total population, ~ 86% were African, 9% White, 4% Coloured while the rest of the ethnic groups represent 1% of the total population. In terms of gender, ~ 52% of the total population were female, while 48% were male. This reflects the tendency for males for leave the rural municipal areas and migrate to urban municipal areas in search of work opportunities.

Based on the 2001 Census data the majority of the population in 2001 resided in Ladybrand (34%), while 25.29% resided in the rural areas surrounding Ladybrand. This implies that 59% of the total population resided within the Ladybrand magisterial district. This emphasises the importance of Ladybrand in the MLM. The IDP indicates that Ladybrand will continue to remain the focus of economic growth in the MM, while Tweespruit is also likely to grow due to its central location in relation to the municipal area.

The Census 2001 data also found that ~ 40% of the total population lived on farms in 2001. The rural population has however decreased since 2001. This is due to farm retrenchments and the impact on the Extension of Security of Tenure Legislation. As a result many farm workers have left the rural areas and migrated to the urban areas. A rural survey conducted by the municipality in 2001 confirmed found that the rural population had decreased from 19 425 in 1996 to 12 329 in 2001. The IDP indicates that the total number of households currently living in the rural, farming areas is in the region of 4 430. The number of urban households is estimated to be in the region of 10 627.

Age profile

The IDP refers to the 1996 Census data, which indicates that in 1996 45.29% of the total population was 19 years and younger. In terms of the economically active sector, 58.17% of the total population fell within the economically active age group of between 15 – 65 years. These figures could have changed due to migration and the impact of HIV/AIDS but it still gives a good overview of the age composition of the population. Table 3.9 provides a breakdown of the age profile per geographical area based on the 2007 Community Survey.

Table 3.9: Age profile for Mantsopa Municipality per geographical area

Age Profile per geographical area							
Age	Excelsior	Tweespruit	Hobhouse	Ladybrand	Excelsior Non-Urban	Ladybrand Non-Urban	Total
0-4	421	484	222	1632	826	1367	4952
5-9	588	572	305	1622	858	1534	5479
10-14	723	558	269	1887	1018	1546	6001
15-19	704	526	237	1795	846	1193	5301
20-24	545	538	193	1470	631	951	4328
25-29	299	375	149	1456	517	841	3637
30-34	312	346	130	1344	407	707	3246
35-55	855	869	366	3381	1234	2260	8965
56-65	284	224	138	825	379	587	2437
65+	329	337	162	827	260	483	2398
Unspecified	75	55	14	112	315	666	1237
Total	5135	4884	2185	16351	7291	12135	47981

Source: CS (2007).

Education

According to 2007 Community Survey, 16 % of the total population had no formal schooling. Of this total 55% lived in urban areas. The 2007 data estimated that 31 % of the total population had only primary schooling (grade 0 – 7) as their highest level of education, while 42 % had secondary schooling (grade 8 – 12). Only 9 % of the total population had matric and 2 % had tertiary training (Figure 3.4). Grade 7 is regarded as the minimum qualification for functional literacy. Therefore it is safe to assume that over 30% of the population of the MM are functionally illiterate. The IDP notes that illiteracy levels in the rural areas are likely to be higher than in the more established urban areas. The low levels of education, specifically the high illiteracy levels, are likely to hamper economic development and growth in the MM.

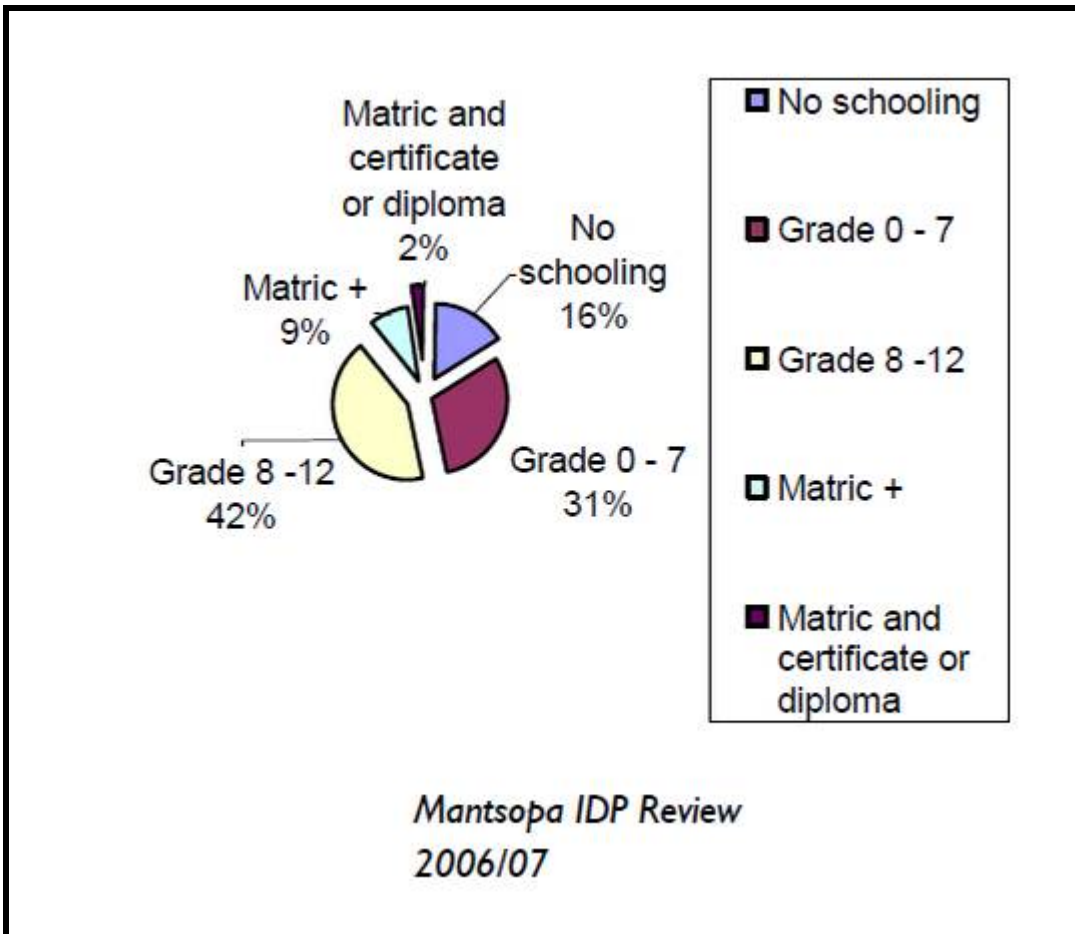


Figure 3.4: Education levels in Mantsopa Municipality

Unemployment

Based on the Census 2001 data the unemployment rate in the MM was only 18 % (economic active people is defined as those between the ages of 15 – 65 years). However, the IDP notes that the 10 933 (38%) of the population were not accounted for in the census which could have an effect on the accuracy of the data. A study undertaken by the Demarcation Board in 2000 estimated that the unemployment rate for MLM was 29%. This represented an increase of 11% over a 4-year period and reflected the stagnation experienced in the rural economies in the Free State. However, the study also found that the highest unemployment rates were recorded in the urban areas. This is likely due to migration of from the rural areas to the urban areas.

Level of Income

According to Census 2001, 61 % of the total MM population had no formal income. The IDP notes that although this figure is alarming, it does include people who make a living from informal business activity, children, scholars, disabled people, etc. and are therefore not a true reflection in terms of dependency. The IDP also notes that 63 % of people that had no income stayed in urban areas, which correlates with the higher unemployment rate experienced in the urban areas. In addition, 83 % of the total population earned less than R 1 500 per month. According to the Municipality's Indigent Policy, indigent or low-income households are classified as households "where the verified total gross monthly income of all occupants do not exceed R 1 300 per month or R 15 600 per annum". A large percentage of the MM's population is therefore classified as indigent. Based on the 2007 Community Survey, 9% of all households in the MM had no income, while 66% of all households earned less than R1000 per month. This highlights the high levels of poverty experienced in the municipal area. As a result a substantial segment of the municipality's population cannot afford to pay for municipal services. Table 3.10 provides information on household income levels in each of the wards in the MM and for the MM as a whole.

Table 3.10: Annual household income for Mantsopa Municipality per ward (2007)

Annual Household Income	W1	W2	W3	W4	W5	W6	W7	W8	Mantsop a
None	2%	1%	1%	1%	1%	1%	0%	1%	9%
R1 - 2400	1%	2%	1%	1%	1%	1%	2%	4%	14%
R2401 - 6000	3%	4%	3%	2%	4%	2%	5%	6%	29%
R6001 - 12000	1%	2%	2%	1%	2%	1%	2%	3%	14%
R12001 - 18000	1%	1%	1%	1%	2%	1%	0%	1%	7%
R18001 - 30000	1%	1%	1%	1%	2%	1%	1%	1%	6%
R30001 - 42000	0%	0%	0%	1%	1%	0%	0%	0%	3%
R42001 - 54000	0%	0%	0%	1%	0%	0%	0%	0%	2%
R54001 - 72000	0%	0%	0%	1%	0%	0%	0%	0%	2%
R72001 - 96000	0%	0%	0%	1%	0%	0%	0%	0%	2%
R96001 - 132000	0%	0%	0%	1%	0%	0%	0%	0%	2%
R132001 - 192000	0%	0%	0%	1%	0%	0%	0%	0%	1%
R192001 - 360000	0%	0%	0%	0%	0%	0%	0%	0%	1%
Over R360000	0%	0%	0%	0%	0%	0%	0%	0%	0%
Unspecified	0%	1%	1%	2%	1%	1%	0%	1%	8%
N/A	0%	0%	0%	0%	0%	0%	0%	0%	0%
Total	10%	12%	12%	13%	15%	9%	13%	17%	100%

Source: CS, 2007.

Safety and security

Crime has decrease on average for the area as a whole but stock theft remains a problem along the border. There are also an increased number of rape cases reported (South African Police Service (SAPS), 2007).

3.4 LOCAL AND SURROUNDINGS LAND USES

As indicated above, the proposed Merapi Solar Park is located ~ 5 km south-east of the town of Excelsior, which is located within the MLM in the Free State Province. Excelsior is located ~ 70 km north west of the town of Ladybrand (LM administrative centre), which is located on the border of Lesotho. The town of Winburg is located ~ 53 km north of Excelsior and access is via the R 709. The provincial capital of Bloemfontein is located ~ 80 km as the crow flies west of the site. According to the Mantsopa IDP, Excelsior accommodates 10.6% of the total population of the LM.

The proposed PVSEF is located on the following properties:

- Portion 0 of Farm 311 Ceylon;
- Portion 0 of Farm 566 Moedersgift;
- Portion 0 of Farm 1623 Welgegund;
- Portion 0 of Farm 374 Concordia; and
- Portion 1 of Farm 1547 De Hoop.

Excelsior serves as a general agricultural service centre for the local agricultural community (Photograph 3.1). The main social and economic function of the town is to serve as (a) general service centre (postal, banking, police, magistrate) to surrounding farming areas, (b) social functions such as residence, education and medical services, and (c) transport support services on major routes.



Photograph 3.1: Entrance to Excelsior from the R703

However, in recent years, this function has declined due largely to the liberalisation and mechanisation of the agricultural sector. Changes in markets and improved technology have reduced the role of small service towns such as Excelsior. Produce is now delivered directly from the producer to the large, urban markets, while maintenance of equipment

is undertaken on site. As a result the local commercial role played by Excelsior has declined over time. In addition, many local residents and farmers in the area prefer to travel to Bloemfontein, which is located ~80km from Excelsior, to do their shopping. This has impacted negatively on the local economy and work opportunities in the town.

The main access to Excelsior is either via the R703, which links up with the N1 to the north-west, or the R709, which links up with the N8 to the south of the town via Tweespruit. The R 703 also provides access to the town of Clocolan to the east, while the R 709 links up with Winburg to the north. For a short section the R 703 and 709 share the same alignment just to the east of Excelsior, before the R 703 turns off the R 709 towards Clocolan in the east.

The proposed Merapi site consists of 6 individual development sites located on 5 farm properties (Figure 3.5). The site is bisected by the R709 and the R 703 which run in a north south and east west direction respectively. Site 3 and 5 are located to the west of the R703, while Site 1, 2, 4 and 6 are located to the east of the R 709. The R 703 affects the sites located to the east of the R 709, with Site 1 and 2 located to the north of the road and Site 4 and 6 located to the south (Figure 3.5). The topography of the site is generally flat with gentle slope rising from the Lengana River in the west towards a low range of hills in the north east (Photograph 3.2). Site 1 is located at the highest elevation adjacent to the ridge bordering the northern section of the broader development area.



Figure 3.5: Location of 4 development sites associated with the Merapi Solar Park



Photograph 3.2: View of development area looking south-east from the R709

The Merapi substation is located to the east of the R 709/703, adjacent to north-western boundary of Site 2 (Photograph 3.3). Two power lines associated with the substation traverse the proposed development site. One power line runs in an east west direction along the northern boundary of Site 2, while the other follows the alignment of the R709 and runs between the road and the western boundary of Site 2, 4 and 6 (Photograph 3.4 and 3.5).



Photograph 3.3: Merapi substation looking east from the R703



Photograph 3.4: Power lines running south from the Merapi substation



Photograph 3.5: Power lines running east across the site

The WEF site is located on commercial agricultural land that is currently under mielie (corn) and sunflower cultivation (Photograph 3.6). There are no occupied homesteads located on the site. Two homesteads, namely Farm Ceylon (Mr T. Wessels) and Retreat (Mr F. Nel) and one school (CVO Excelsior) are located adjacent to the broader development site (Figure 3.6). However, none are located directly adjacent to any of the 6 proposed solar park sites. A cluster of farm labourer's cottages on Farm Ceylon are located opposite the entrance to the Merapi Solar Park 6 across the R709 (Figure 3.6). The local farmers and their families have been living and farming in the area for approximately 3-5 generations (Pers comm. October 2012).



Photograph 3.6: Fields being prepared for planting (mielie/corn and sunflower)

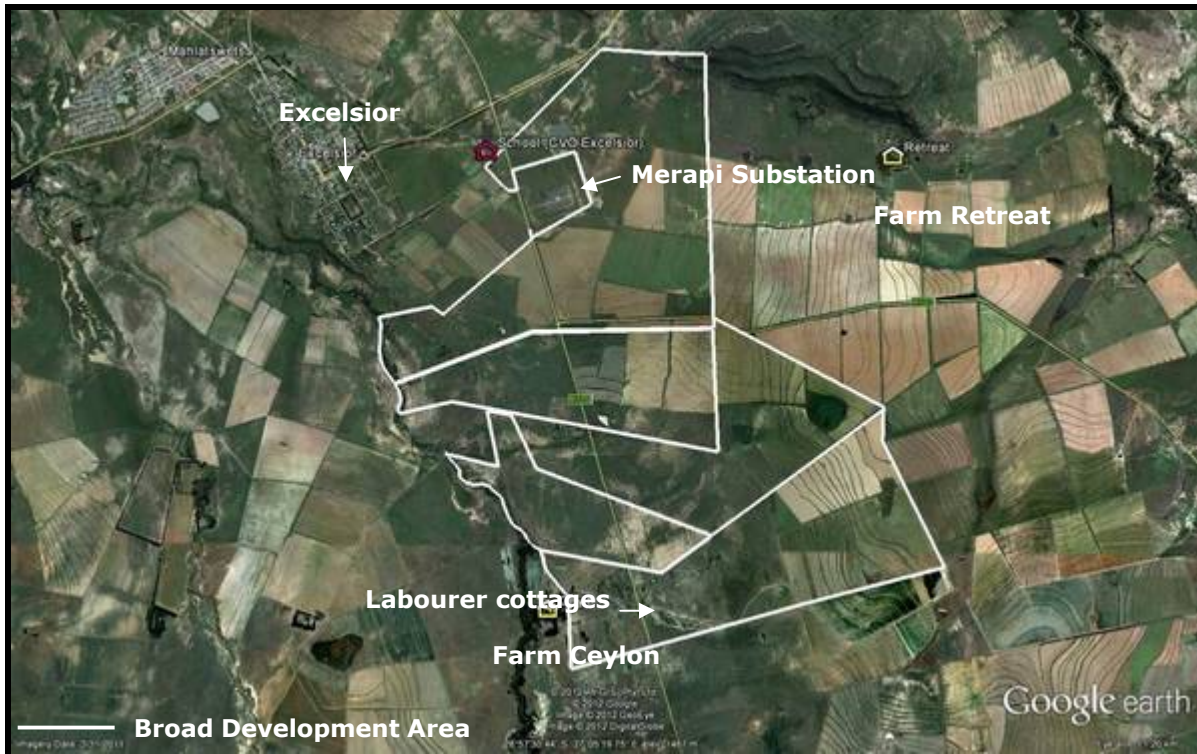


Figure 3.6: Location of homesteads and labourer’s cottages on the site

SECTION 4: IDENTIFICATION OF KEY 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;
- 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 assessment. 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);
- Free State Provincial Growth and Development Strategy (2004-2014); and
- Mantsopa Integrated Development Plan (2010-2011 Review).

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

At a national level the White 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.

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

The FSPGDS does not specifically make reference to renewable energy. However, there are a number of key provincial priorities that are relevant to the proposed PVSEF. These include economic development, employment, and investment. The FSPGDS also emphasises the importance of SMME development and the provision of economic infrastructure, which would include energy related infrastructure.

The FSPGDS also identifies a number of natural constraints to economic growth and development. These include, low rainfall coupled with the limited soil potential and the impact of this on agriculture, limited water availability and depletion of mineral resources. What is of interest is that none of the natural constraints impact on the renewable energy sector, specifically the solar energy sector. Solar energy, specifically PV solar energy, therefore provides the Free State with an opportunity to diversify its

economy in a way that is not affected by natural constraints such as low rainfall and limited water supplies.

At a local level the Free State Development Corporation (FDC) has identified the potential for solar energy projects in the larger XDM (including the KLM) due to the excellent solar radiation rate in southern XDM (only surpassed by that of Upington) and the availability of land for such developments. In addition, the XDM IDP 2010/11 states that one of its key opportunities is, *“diversifying production of energy from renewable sources such as biomass and rivers and **solar** to ensure both the price competitiveness of agriculture and help meet South Africa’s CO₂ reduction targets.”*

At a local level, the MLM IDP lists the outcomes of an IDP meeting held on 16 March 2010 at the Ladybrand town hall in which new projects for 2010/2011 were identified. Of specific reference for the proposed Merapi Solar Park the meeting identified the establishment of a “Solar Power Station” and provision of solar panels for all Mantsopa Towns. This clearly indicates that the MLM supports the establishment of renewable energy projects and initiatives in the area, specifically solar energy.

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 solar park 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 provided by the proponent the construction phase is expected to extend over a period of 18-24 months and create approximately 291 employment opportunities, depending on the final design. Of this total ~ 60% (175) will be available to low-skilled workers (construction labourers, security staff etc.), 15% (43) to semi-skilled workers (drivers, equipment operators etc.) and 25% (73) to skilled personnel (engineers, land surveyors, project managers etc.). 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.

The proposed Merapi Solar Park will be developed in 4 phases. For the purposes of the assessment it is assumed that the full 300MW will be developed and that each phase will be developed concurrently. The construction phase will therefore extend over a period of ~ 8 years. In terms of employment it is assumed that 70% of the original 291 construction workers employed to construct the first phase, will be employed for the remaining 3 phases. The construction of the remaining 3 phases will therefore create an additional 90 employment opportunities (30% of 291) over and above the initial 291 associated with the construction of the first phase. The total number of employment opportunities created by the construction of all 4 phases will therefore be in the region of 381. Of this total ~ 60% (229) will be available to low-skilled workers (construction labourers, security staff etc.), 15% (57) to semi-skilled workers (drivers, equipment operators etc.) and 25% (95) to skilled personnel (engineers, land surveyors, project managers etc.).

Given the location of the site and its proximity to Excelsior, Winburg, Ladybrand and Bloemfontein, the majority of low and semi-skilled employment opportunities are likely to benefit members from the local community. The majority of the beneficiaries are also likely to be historically disadvantaged (HD) members of the community. The extended duration of the construction phase (8 years) also creates an ideal opportunity for contractor/s to implement an on-site training and skills development programme. This will further enhance to the potential employment opportunities for members from the

local community. However, 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 construction of a 75MW phase is estimated to be in the region of R 60 million. This is based on the assumption that the average monthly salary for low skilled, semi-skilled and skilled workers will be in the region of R 5 000, R 8 000 and R 25 000 respectively for a period of 20 months. The total wage bill for the 4 x 75MW phases will be in the region of R 240 million. A percentage of the wage bill will be spent in the local economy and will create opportunities for local businesses in the MLM and MMM, including Excelsior, Winburg, Ladybrand and Bloemfontein.

The capital expenditure for a 75MW facility is in the region of R 1.35 billion. The capital expenditure associated with the fully developed 300MW facility will therefore be ~ R5.4 billion. In terms of business opportunities for local companies, the capital expenditure 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 MLM will be limited. However, opportunities may exist for local contractors and engineering companies in Excelsior, Winburg, Ladybrand and Bloemfontein. Implementing the enhancement measures listed below can enhance these opportunities.

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 non-local construction workers are likely to be accommodated in Excelsior, Winburg, Ladybrand and Bloemfontein. This will create opportunities for local hotels, B&Bs, guest farms and people who want to rent out their houses. The hospitality industry in the local area 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.

The implementation of the proposed enhancement measures listed below would also enable the establishment of the proposed Merapi Solar Park to support co-operation between the public and private sectors in order for the economic development potential of the Free State to be realised. In this regard the FSPGDS highlights the importance of enterprise development, and notes that the current levels of private sector development and investment in the Free State are low. The proposed PVSEF therefore has the potential to create opportunities to promote private sector investment and the development of SMMEs in the Free State Province. The IDP coordinator for the MDM (Ms Thoko Vanqa) and the Head of the Technical Division (Mr Mphahlale) both indicated that they supported the development and that it was in line with both the DM and LM development vision for the area. The local councilor, Councilor MC Sebotsa, also indicated that she supported the project and that it would provide much need employment opportunities in the area.

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) (Rated as 2 due to potential opportunities for local communities and businesses)	Local – Regional (3) (Rated as 3 due to potential opportunities for local communities and businesses)
Duration	Medium Term (3)	Medium Term (3)
Magnitude	Medium (6)	Medium (6)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (44)	Medium (48)
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 may 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 solar park 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, SolaireDirect 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 contractors that are compliant with Black Economic Empowerment (BEE) criteria;
- Before the construction phase commences SolaireDirect should meet with representatives from the MMM to establish the existence of a skills database for the area. If such a 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 SolaireDirect 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

- SolaireDirect 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, SolaireDirect should assist local BEE companies to complete and submit the required tender forms and associated information.
- The MMM, 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)

As indicated above, given the proximity of the site to Excelsior, Winburg, Ladybrand and Bloemfontein, including Botshabelo and Thaba Nchu, the majority of the 230 low and semi-skilled employment opportunities associated with the construction phase are likely to be taken up by members from the local community. If these workers are accommodated in their respective home towns then the potential risk posed to local communities will be low. 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. While the significance of the risk to the community as a whole will be low, the

significance to individual members of the community who are impacted by the behavior of construction workers would be medium to high.

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 (2) (Rated as 2 due to potential severity of impact on local communities)	Local (1) (Rated as 1 due to potential severity of impact on local communities)
Duration	Medium term for community as a whole (3) Long term-permanent for individuals who may be affected by STD's etc. (5)	Medium term for community as a whole (3) Long term-permanent for individuals who may be affected by STD's etc. (5)
Magnitude	Low for the community as a whole (4) High-Very High for specific individuals who may be affected by STD's etc. (10)	Low for community as a whole (4) 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) Moderate-High for specific individuals who may be affected by STD's etc. (57)	Low for the community as a whole (24) 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 resources?	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods	
Can impact be mitigated?	Yes, to some degree. However, the risk cannot be eliminated	
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, SolaireDirect 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;
- SolaireDirect should consider the need to establish 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;
- SolaireDirect 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;
- SolaireDirect 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 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.

Despite the proximity of the farms to the R 709 and R 703, the local farmers interviewed indicated that stock theft was not serious problem in the area. In addition, stock farming was not carried out on a large scale in the area. Sunflowers and mielies (corn) are the main crops grown in the area.

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 (3)	Local (2)
Duration	Medium Term (3)	Medium Term (3)
Magnitude	Moderate (6) (Due to reliance on agriculture and livestock for maintaining livelihoods)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (36)	Low (27)
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:

- SolaireDirect should enter into an agreement with the affected landowner/s 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.;
- SolaireDirect 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 SolaireDirect and the contractors before the contractors move onto site;
- SolaireDirect 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 SolaireDirect, the contractors and neighbouring landowners. The agreement should also cover losses and costs associated with fires caused by construction workers or construction related activities (see below);
- The EMP must outline procedures for managing and storing waste on site, specifically plastic waste that poses a threat to livestock if ingested;

- Contractors appointed by SolaireDirect 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 SolaireDirect 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. The local farmers in the area interviewed did however indicate that veld fires were not a major concern. In addition, livestock farming is not the major agricultural activity in the area.

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
Extent	Local (3) (Rated as 3 due to potential severity of impact on local farmers)	Local (2) (Rated as 2 due to potential severity of impact on local farmers)
Duration	Medium Term (3)	Medium Term (3)
Magnitude	Moderate (6) (Due to reliance on agriculture and livestock for maintaining livelihoods)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (36)	Low (27)
Status	Negative	Negative
Reversibility	Yes, compensation paid for stock and crop losses etc.	
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	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

SolaireDirect 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. The main access to the site would be via either the R 709 and or 703. These two roads link up with the N8, to the south, and N1, to the north-west, respectively. Both the N1 and N8 are important communication routes, specifically the N1. The movement of construction related vehicles along either of these two routes has the potential to cause delays for other road users. However, these impacts will be spread out over the eight year timeframe of the construction phase, and can therefore, be effectively managed and mitigated. 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	Medium Term (3)	Medium Term (3)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Low (27)	Low (18)
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

SolaireDirect 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 timing of the transport of components to the site should be timed to avoid weekends and holiday times so as to minimise the potential impact on travellers using the N1, N8, R 709 and R 703;
- 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 potential loss of agricultural land has been raised by the Local Farmer Union and the Free State Department of Agriculture. This is an issue that will need to be addressed by the Agricultural Specialist study. None of the affected farmers interviewed indicated that the loss of productive farmland would be an issue. In this regard Mr Glen Wessels (Concordia Farm) indicated that they would manage their farming operations accordingly and would not be impacted by the activities associated with the construction phase.

In addition, it is standard practice for the affected landowner/s is to enter into a lease agreement that includes monthly rental. The loss of productive farmland would therefore be offset by such an agreement. It may also be possible for livestock and game to graze between the PV panels. The final disturbance footprint can also 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, If compensation is not paid or area is not rehabilitated (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 the information provided by the proponent, the establishment of the proposed PVSEF will create ~ 60 permanent employment opportunities during the 20 year operational phase. Of this total ~ 30 (50%) will be low skilled (security and maintenance), 10 (17%) semi-skilled and 20 (33%) skilled employees. For the purposes of the assessment it is assumed that there will be some overlap in terms of roles and responsibilities. For the purposes of the assessment it is assumed that there will be a 20% overlap for each additional phase. The total number of employment opportunities associated with the additional 3 phases will therefore be 144 (48 x 3).

As indicated above, due the proximity of the site to Excelsior, Winburg, Ladybrand and Bloemfontein, including Botshabelo and Thaba Nchu, the majority of the work opportunities associated with the operational phase is likely to be taken up by members

from the local community. 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 MLM IDP. The IDP coordinator for the MDM (Ms Thoko Vanqa) and the Head of the Technical Division (Mr Mphahlale) both indicated that they supported the development and that it was in line with both the DM and LM development vision for the area. The local councilor, Councilor MC Sebotsa, also indicated that she supported the project and that it would provide much need employment opportunities in the area.

In terms of accommodation options, a percentage of the permanent employees may purchase houses in Excelsior, while others may decide to rent. Both options would represent a positive economic benefit for the town. 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 Excelsior 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)	Moderate (6)
Probability	Probable (3)	Highly Probable (4)
Significance	Medium (30)	Medium (52)
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:

- SolaireDirect 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. The proponents have indicated that the Local Community Trust (the 'Trust') will be established upon successful ward of Preferred Bidder status. The Trust will be given a 2.5% shareholding in the Project Company. The Trust will be administered by a Board of Trustees made up of key local stakeholders. The Trustees will include persons representing the following organisations: Solar Project (the 'Project Company', a local Accountant, a local Lawyer and three local Non-Government Organisations.

The Trust will benefit from two sources of revenue, namely dividends, as a 2.5% shareholder in the Project Company the Trust will receive dividends, and socio-economic contribution payments. The Project Company has committed, as part of its bid response, to making a socio-economic contribution payment of 1% of Gross Revenue to the Trust. This method of having the same entity as both a shareholder of the Project Company and the recipient of the socio-economic contributions from the Project Company will mean that the Trust will have funds available from an early stage in the project life, rather than having to wait for what could be several years for dividend payments if it were only a shareholder.

In terms of allocating funds for development related projects, the Trust will issue a request for socio-economic project proposals on an annual basis. The criteria for selection will be fully developed and detailed in the relevant documentation and interested parties will be invited to present their proposal in person to the Trustees. Project proposals will be adjudicated and awarded by all Trustees in a fair and equitable manner, ensuring that the needs of the community are being met. Based on the assessment of the Trustees the Trust will then make a formal offer of financial assistance to the relevant project initiators, including the agreed contract terms and payment milestones.

The objective of the Trust is to make a tangible difference to the lives of the people in the Local Community for not only the 20 year life of the project but beyond. The development priorities for the trust will be linked to the objectives and projects listed in the local IDP. Each Municipality is required under the terms of the Municipal Systems Act 2000 to develop and publish an Integrated Development Plan (IDP) and to review this plan on an annual basis. This plan essentially maps out a five (5) year development plan

for the municipal area. It is a requirement of the IDP process that public consultation and stakeholder engagement take place, specifically including Local Communities, to arrive at a consensus with respect to the broader development priorities of the Municipal area. The proponent believes that the comprehensive and inclusive nature of the IDP stakeholder engagement process employed by the Municipality makes it the ideal mechanism for determining the socio-economic development priorities for the Trust. The shareholders of the Project Company believe that the proposed socio-economic development strategy has the following key advantages:

- The Trust is independent of any political involvement;
- Although independent of the local municipality, the trust will still be able to assist in addressing the needs of the community. Constant engagement with the municipality will ensure this occurs;
- The Trust makes use of an existing transparent, inclusive and locally focused method of determining socio-economic priorities
- The funding mechanism allows for an immediate flow of funds into the Trust, in turn allowing for an immediate ability to fund socio-economic projects

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 solar park can be used to support a number of social and economic initiatives in the area, including:

- Creation of jobs;
- Education;
- Support for and provision of basic services;
- School feeding schemes;
- Training and skills development;
- Support for SMME's.

In addition, the establishment of a solar park is not likely to have a significant impact on the current agricultural land uses that underpin the local economic activities in the area. The loss of this relatively small area will not 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 Enhancement⁵
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.

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 solar park.

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.

⁵ Enhancement assumes effective management of the community trust

However, the overall contribution of the proposed Merapi Solar Park relative to South Africa's total energy requirements will be limited. In addition, the current application is not unique. In this regard, a significant number of solar energy projects are currently proposed in other parts of South Africa. The potential contribution of the proposed Merapi Solar Park 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 its 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 SolaireDirect 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.

None of the local farmers, including adjacent farmers, interviewed raised concerns regarding the potential visual impact of the proposed project. Mr A Visagie, the principal of CVO Excelsior School, also indicated that the project was unlikely to have any impact on the school due to the distance of the school from the site. In addition, the Merapi substation is located on the north western boundary of the site, and two power lines associated with the substation traverse the site. The visual integrity of the site and the surrounding area has therefore been impacted by the existing energy related infrastructure on the site.

The findings of the Visual Impact Assessment (VIA) undertaken by Zone Land Solutions (September 2012) are summarised below:

Assessment of impact on sensitive receptors in foreground-and middle ground

The VIA indicates that the sensitive receptors in the *fore-and middle ground* of the generated viewshed are largely associated with road users of the road network in the area and the town of Excelsior itself. The R703 and R709 are the major link roads in the region and solar facility will be visible to the roads users on these two roads. The proposed activity will represent a change in land use and land form to what is currently the status quo. The VIA notes, however, that the introduction of foreign structures and forms in the agrarian landscape will have a limited impact on these sensitive receptors. The significance of the impact with mitigation is rated as Low Negative.

Assessment of Impact on Sense of Place

The sense of place of Excelsior is very much one of an agricultural town in an agrarian landscape, dotted by agricultural farmsteads set against a backdrop of mountains and hills in the distance. However, the sense of place attributes and intrinsic values have, to a large degree, been impacted by the Merapi substation and associated infrastructure and the uncontrolled expansion of the town in the direction of Mahlatswetsa. The significance of the impact with mitigation is rated Medium Negative.

In terms of mitigation measures, the VIA recommends that the project phases located on the northern section of the property be relocated to the south-eastern portions of the site (eastern portions of Farms Concordia and Ceylon). The northern phases of the project located on Farm Moedersgift No. 566 presents the areas that are most visually prominent. A relocation of this particular phase to an area further away from the receptors in Excelsior would benefit the project from a visual perspective. In addition, it is recommended that the project phases that front onto movement corridors be set back at least 200m from the latter roads in order to establish a buffer between the observer and the observed view.

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 (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Medium (4)	Medium (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (30)	Medium (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 FSPGDP identifies tourism as an important economic sector. However, based on the findings of the SIA and 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 location of the proposed project and the areas altered sense of place. 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	Negative

	(Potential to distract from the tourist experience of the area) Positive (Potential to attract people to the area)	(Potential to distract from the tourist experience of the area) Positive (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 Mantsopa 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:

- SolaireDirect should liaise with representatives from the MLM and local tourism representatives to raise awareness of the proposed facility;
- SolaireDirect 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 OF POWER LINE OPTIONS

The social impacts associated with multiple 22kV overhead power line are linked to the visual impact and associated impact on the sense of place and landscape character of the area. An existing substation is located adjacent to the site and therefore only a short power line would be required to connect the facility to the electricity grid. The significance of the impact is therefore rated as low negative. This is due to the relatively short length of the line and presence of an existing substation and power lines located adjacent to and on 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	Local (2)	Local (1)
Duration	Long term (4)	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 its current energy needs with clean, renewable energy. Given South Africa's position as one of the highest per capita producer of carbon emissions in the world, this would represent a negative social cost. However, as indicated above, the overall contribution of the proposed Merapi Solar Park relative to South Africa's total energy requirements will be limited. In addition, the current application is not unique. The potential contribution of the proposed SolaireDirect Merapi solar park 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 solar park would be forfeited. The revenue from the proposed plant can be used to support a number of social and economic initiatives in the area. These benefits for the MLM and the local community in the area would be forgone if the proposed facility was not developed. Given the limited economic opportunities in the area this would represent a significant negative social cost for the local community and the MLM.

Table 4.13: Assessment of no-development option

Nature: The no-development option would result in the lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy. The No-Development option would also result in the loss of the benefits to the local community and economy associated with the creation of employment opportunities and the establishment of a Community Trust.		
	Without Mitigation	With Enhancement⁶
Extent	Local-Regional (3)	Local-Regional (4)
Duration	Long term (4)	Long term (4)
Magnitude	Medium (6)	Medium (6)
Probability	Definite (5)	Definite (5)
Significance	High (65)	High (70)
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

⁶ Enhancement assumes development of the proposed PVSEF and establishment of Community Trust

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 concern identified with regard to wind farms and the impact on landscapes is also likely to apply to solar facilities. However, the visual impacts associated with solar farms are lower than those associated with wind farms.

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 solar parks proposed in the immediate vicinity of the site. The potential for significant cumulative impacts is therefore likely to be low. However, the relevant 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 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 renewable 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 CUMULATIVE IMPACT ON LOCAL ECONOMY

In addition to the potential negative impacts, the establishment of the other renewable energy projects in the area also has the potential to result in significant positive cumulative socio-economic impacts for the region and the Free State Province as a whole. The positive cumulative impacts include creation of employment, skills development and training opportunities (construction and operational phase), creation of downstream business opportunities and stimulation of the local property market.

Table 4.15: Cumulative impacts on local economy

Nature: The establishment of a number of solar energy facilities in the Free State Province will create employment, skills development and training opportunities, creation of downstream business opportunities and stimulation of the local property market.		
	Without Enhancement	With Enhancement
Extent	Local and regional (3)	Local and regional (4)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Highly Probable (4)	Definite (5)
Significance	Medium (44)	High (70)
Status	Positive	Positive
Reversibility	Yes. Solar energy plant components and other infrastructure can be removed.	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
Enhancement: See below		
Cumulative impacts: Positive impact on the local and regional economy through the creation of downstream opportunities and wage spend in the local economy		
Residual impacts: See cumulative impacts		

Assessment of No-Go option

There is no impact as it maintains the current status quo. However, the no-go option would represent a lost socio-economic opportunity for the MLM and the Free State Province.

Recommended mitigation measures

The establishment of a number of large solar energy facilities in the area does have the potential to have a negative cumulative impact on the areas sense of place and the landscape. However, the Free State Province and the MLM does support the establishment of renewable energy facilities in the area. The environmental authorities therefore need to take into account the potential positive and negative cumulative impacts before a final decision is taken with regard to the number and location of renewable energy facilities in an area.

4.10 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.

The total number of permanent employees will be ~ 144, which represents a relatively high number of people who stand to lose their jobs after 20 years. However, 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).

The decommissioning phase will also involve the disassembly of the PVSEF rehabilitation of the site. The decommissioning phase will therefore also create additional, construction type jobs. Based on other PVSEF projects ~ 50 people will be employed during the decommissioning phase.

Table 4.16: Social impacts associated with decommissioning

Nature: Social impacts associated with retrenchment including loss of jobs, and source of income		
	Without Mitigation	With Mitigation
Extent	Local and regional (3)	Local and regional (2)
Duration	Medium Term (2)	Very Short Term (1)
Magnitude	Moderate (6)	Low (4)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	Medium (44)	Low (16)
Status	Negative	Negative-Neutral
Reversibility	Yes, assumes retrenchment packages are paid to all affected employees	
Irreplaceable loss of resources?	No	
Can impact be mitigated?	Yes	
Mitigation: See below		
Cumulative impacts: Loss of jobs and associated loss of income etc. can impact on the local economy and other businesses. However, decommissioning can also create short term, temporary employment opportunities associated with dismantling etc.		
Residual impacts: See cumulative impacts		

Recommended mitigation measures

The following mitigation measures are recommended:

- SolaireDirect 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;
- SolaireDirect 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 20-25 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. SolaireDirect have indicated that the rehabilitation programme will be funded by sale of scrap metal etc. on closure of the facility.

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

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);
- Free State Provincial Growth and Development Strategy (2004-2014); and
- Mantsopa Integrated Development Plan (2010-2011 Review).

The findings of the review indicated that renewable energy is strongly supported at a national, provincial, and local level. Based on this it is reasonable to assume that the establishment of the proposed Merapi Solar Park 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 proposed 300 MW Merapi Solar Park will be developed in 4 x 75MW phases. For the purposes of the assessment it is assumed that each phase will be developed concurrently. The construction phase will therefore extend over a period of ~ 8 years. In terms of employment it is assumed that 70% of the original 291 construction workers employed to construct the first 75MW, will be employed for the remaining 3 phases. The construction of the remaining 3 phases will therefore create an additional 90 employment opportunities (30% of 291) over and above the initial 291 associated with the construction of the first 75MW. The total number of employment opportunities created by the construction of all 4 x 75MW phases will therefore be in the region of 381. Of this total ~ 60% (229) will be available to low-skilled workers (construction labourers, security staff etc.), 15% (57) to semi-skilled workers (drivers, equipment operators etc.) and 25% (95) to skilled personnel (engineers, land surveyors, project managers etc.).

Given the location of the site and its proximity to Excelsior, Winburg, Ladybrand and Bloemfontein, the majority of low and semi-skilled employment opportunities are likely to benefit members from the local community. The majority of the beneficiaries are also likely to be historically disadvantaged (HD) members of the community. The extended duration of the construction phase (8 years) also creates an ideal opportunity for contractor/s to implement an on-site training and skills development programme. This will further enhance to the potential employment opportunities for members from the local community.

The total wage bill for the 4 x 75MW phases will be in the region of R 240 million. A percentage of the wage bill will be spent in the local economy and will create opportunities for local businesses in the MLM and MMM, including Excelsior, Winburg, Ladybrand and Bloemfontein. 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 non-local construction workers are also likely to be accommodated in Excelsior, Winburg, Ladybrand and Bloemfontein. This will create opportunities for local hotels, B&Bs, guest farms and people who want to rent out their houses. The benefits to the local economy will extend over the 8 year construction phase.

The establishment of the proposed Merapi Solar Park will also support co-operation between the public and private sectors in order for the economic development potential of the Free State to be realised. The FSPGDS highlights the importance of enterprise development, and notes that the current levels of private sector development and investment in the Free State are low. The proposed PVSEF therefore has the potential to create opportunities to promote private sector investment and the development of SMMEs in the Free State Province.

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 proximity of the site to Excelsior, Winburg, Ladybrand and Bloemfontein the majority of the low and semi-skilled employment opportunities are likely to be taken up by members from the local community. The potential risk to local family structures and social networks posed by construction workers will therefore be 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/Enhancement
Creation of employment and business opportunities	Medium (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 144. Of this total approximately 80% will be low and medium-skilled and 20% high skilled positions. Given the proximity of the site to Excelsior, Winburg, Ladybrand and Bloemfontein the majority of employment opportunities are likely to benefit members from the local communities in the area. The majority of the beneficiaries are also likely to be historically disadvantaged (HD) members of the community. 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 MLM IDP and the FSPGDP.

The establishment of a Community Trust also creates an opportunity to support local economic development in the area. Solairedirect has indicated that they are committed to establishment of a Trust. The Trust will benefit from two sources of revenue, namely dividends, as a 2.5% shareholder in the Project Company the Trust will receive dividends, and socio-economic contribution payments. The Project Company has committed, as part of its bid response, to making a socio-economic contribution payment of 1% of Gross Revenue to the Trust. This method of having the same entity as both a shareholder of the Project Company and the recipient of the socio-economic contributions from the Project Company will mean that the Trust will have funds available from an early stage in the project life, rather than having to wait for what could be several years for dividend payments if it were only a shareholder. Community Trusts provide an opportunity to generate a steady revenue stream that is guaranteed for a 20 year period. The revenue from the proposed solar plant can be used to support a number of social and economic initiatives in the area, including:

- Creation of jobs;
- Education;
- Support for and provision of basic services;
- School feeding schemes;
- Training and skills development;
- Support for SMME's.

The long term duration of the revenue stream associated with a solar plant linked Community Trust also enables local municipalities and communities to undertake long term planning for the area. 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. 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 findings of the VIA indicate that the areas sense of place has been altered by the existing Merapi sub-station and associated power lines. The impact of the proposed SolaireDirect Merapi Solar Park on the areas sense of place is rated as Medium Negative with mitigation. 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/Enhancement
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 SolaireDirect Merapi Solar Park, are largely linked to the impact on sense of place and visual impacts. In the case of the proposed SolaireDirect Merapi Solar Park 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 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.

The proposed Merapi Solar Park and establishment of the other renewable energy projects in the area also has the potential to result in significant positive cumulative socio-economic impacts for the area and the Free State Province. The positive cumulative impacts include creation of employment, skills development and training opportunities (construction and operational phase) and creation of downstream business opportunities. The significance of this impact is rated as High positive with enhancement.

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 its current energy needs with clean, renewable energy. Given South Africa's position as one of the highest per capita producer of carbon emissions in the world, this would represent a High negative social cost.

The no-development option also represents a lost opportunity in terms of the employment and business opportunities (construction and operational phase) associated with the proposed Merapi Solar Park and the benefits associated with the establishment of a Community Trust. Due to the size of the project this represents a significant negative social cost.

5.2.7 Decommissioning phase

The total number of permanent employees will be ~ 144, which represents a relatively high number of people who stand to lose their jobs after 20 years. However, 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).

SolaireDirect 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. SolaireDirect 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 300MW SolaireDirect Merapi Solar Park 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 300MW Merapi Solar Park 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 economic 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 300MW SolaireDirect Merapi Solar Park is therefore supported by the findings of the SIA.

5.4 IMPACT STATEMENT

The findings of the SIA undertaken for proposed 300MW SolaireDirect Merapi Solar Park 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 proposed 300MW SolaireDirect Merapi Solar Park as proposed be supported, subject to the implementation of the recommended mitigation measures and management actions contained in the report.

ANNEXURE A

Interviews

- Cllr MC Sebotsa, Ward 8 Councillor MLM, 10/10/2012;
- Ms Thoko Vanqa, MDM IDP Coordinator, 10/10/2012;
- Mr B Mphahlale, MDM, Technical Head, 10/10/2012;
- Mr. A. Visagie, Principal, CVO Excelsior School, 12/12/2012;
- Andre Heinz, adjacent landowner, Killarney and Utopia Farm, 12/10/2012;
- Mr. DB Homes, adjacent landowners and Deputy Chairperson of Farmers Union, 11/10/2012;
- Fannie Nel, adjacent farm owner, Retreat, 11/10/2012;
- Mrs Dieketseng Thekiso, landowner, 11/10/2012;
- Mr Theodorus Wessels, landowner, Ceylon, 11/10/2012;
- Mr Gian Wessels, landowner, Concordia Farm, 11/10/2012;
- Mr Johannes Wessels, Landowner, Moedersdrift, 11/10/2012

Repeated efforts were made to contact representatives from the MLM with limited success.

References

- Free State Provincial Growth and Development Strategy (2004-2014)
- Integrated Resource Plan (IRP) for South Africa (2010-2030);
- Mantsopa Local Municipality Integrated Development Plan (2010-2011 Review);
- StatsSA Community Survey, 2007;
- The National Energy Act, 2008;
- The White Paper on Renewable Energy, November 2003; and
- The White Paper on the Energy Policy of the Republic of South Africa, December 1998;
- Zone Land Solutions: Visual Impact Assessment for Proposed Merapi Solar Park (September, 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 resources*.
- The *degree* to which the impact can be *mitigated*.

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

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

S = Significance weighting

E = Extent

D = Duration

M = Magnitude
P = Probability

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

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

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	SolaireDirect, in discussions with the MLM, 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. SolaireDirect should also develop a database of local BEE service providers	
Mitigation: Action/control	Responsibility	Timeframe
<ul style="list-style-type: none"> Attempt to employ a minimum of 80% of the low-skilled workers are sourced from the local area; Where required, implement appropriate training and skills development programmes prior to the initiation of the construction phase to ensure that 80% target is met. Skills audit to be undertaken to determine training and skills development requirements; Develop a database of local BEE service providers and ensure that they are informed of tenders and job opportunities; Identify potential 	<ul style="list-style-type: none"> SolaireDirect & contractors SolaireDirect SolaireDirect SolaireDirect SolaireDirect 	<ul style="list-style-type: none"> Employment and business policy document that sets out local employment targets to be in place before construction phase commences. Where required, training and skills development programmes to be initiated prior to the initiation of the construction phase. Skills audit to determine need for training and skills development programme undertaken within 1 month of commencement of construction phase commences. Database of potential local BEE services providers to be completed before

opportunities for local businesses		construction phase commences.
Performance Indicator	<ul style="list-style-type: none"> • Employment and business policy document that sets out local employment and targets completed before construction phase commences; • 80% of semi and unskilled labour locally sourced. • Database of potential local BEE services providers in place before construction phase commences. • Skills audit to determine need for training and skills development programme undertaken within 1 month of commencement of construction phase. 	
Monitoring	<ul style="list-style-type: none"> • SolaireDirect 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
<ul style="list-style-type: none"> • 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 Bloemfontein. • Local construction workers should be able to provide proof of having lived in the area for five years or longer. 	<ul style="list-style-type: none"> • SolaireDirect and contractors • SolaireDirect 	<ul style="list-style-type: none"> • Identify suitable local contractors prior to the tender process for the construction phase. • 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

<ul style="list-style-type: none"> • Identify local contractors who are qualified to undertake the required work. • Develop a Code of Conduct to cover the activities of the construction workers housed on the site. • 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. • Ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct. • 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. • 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. • 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. 	<ul style="list-style-type: none"> • SolaireDirect • SolaireDirect • SolaireDirect and contractors • SolaireDirect and contractors • Contractors • Contractors • Contractors 	<p>etc.,</p> <ul style="list-style-type: none"> • MF established before construction phase commences. • Code of Conduct drafted before construction phase commences. • Briefing session for construction workers held before they commence work on site.
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<p>Performance Indicator</p>	<ul style="list-style-type: none"> • Employment policy and tender documents that sets out local employment and targets completed before construction phase commences; • 80% of semi and unskilled labour locally sourced; • Local construction workers employed have proof that they have lived in the area for five years or longer;
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	<ul style="list-style-type: none"> • Tender documents for contractors include recommendations for construction camp; • MF set up prior to implementation of construction phase; • Code of Conduct drafted before commencement of construction phase; • Briefing session with construction workers held at outset of construction phase;
Monitoring	<ul style="list-style-type: none"> • SolaireDirect 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
<ul style="list-style-type: none"> • Consider establishing a MF with the adjacent farmers and develop a Code of Conduct for construction workers. • Inform all workers of the conditions contained in the Code of Conduct. • Dismiss all workers that do not adhere to the code of conduct for workers. All dismissals must be in accordance with South African labour legislation. • Compensate farmers / community members at full market related replacement cost for any losses, such as livestock, damage to infrastructure etc. 	<ul style="list-style-type: none"> • SolaireDirect and contractors • SolaireDirect • SolaireDirect and contractor • Contractors 	<ul style="list-style-type: none"> • Establish MF before construction phase commences. • Develop Code of Conduct prior to commencement of construction phase. The Code of Conduct should be signed by SolaireDirect and the contractors before the contractors move onto site; • Inform all construction workers of Code of Conduct requirements before construction phase commences. • Compensate farmers / community members within 1 month of claim being verified by SolaireDirect and or Contractor/s.
Performance	<ul style="list-style-type: none"> • Community MF in place before construction phase commences. 	

Indicator	<ul style="list-style-type: none"> • Code of Conduct developed and approved prior to commencement of construction phase. • All construction workers made aware of Code of Conduct within first week of being employed. • Compensation claims settled within 1 month of claim being verified by Community MF.
Monitoring	<ul style="list-style-type: none"> • SolaireDirect 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
<ul style="list-style-type: none"> • Ensure that open fires on the site for cooking or heating are not allowed except in designated areas. • Provide adequate fire fighting equipment onsite. • Provide fire-fighting training to selected construction staff. • Compensate farmers / community members at full market related replacement cost for any losses, such as livestock, damage to infrastructure etc. • Join Fire Protection Agency 	<ul style="list-style-type: none"> • SolaireDirect and contractors • SolaireDirect and contractors • Contractors • Contractors 	<ul style="list-style-type: none"> • Ensure that these conditions are included in the Construction Phase EMP. • Ensure that designated areas for fires are identified on site at the outset of the construction phase. • Ensure that fire fighting equipment and training is provided before the construction phase commences. • Compensate Farmers within 1 month of claim being verified by MF.
Performance Indicator	<ul style="list-style-type: none"> • Conditions contained in the Construction EMP. • Designated areas for fires identified on site at the outset of the construction phase. • Fire fighting equipment and training provided before the construction phase commences. • Compensation claims settled within 1 month of claim being verified by Community MF. 	
Monitoring	<ul style="list-style-type: none"> • SolaireDirect 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
<ul style="list-style-type: none"> 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. Ensure that all vehicles are road-worthy; drivers are qualified and are made aware of the potential noise, dust and safety issues. Ensure that drivers adhere to speed limits. Vehicles should be fitted with recorders to record when vehicles exceed the speed limit. Ensure that damage to roads is repaired before completion of construction phase; 	<ul style="list-style-type: none"> Contractors Contractors Contractors Contractors 	<ul style="list-style-type: none"> Ensure that these conditions are included in the Construction Phase EMP. Ensure that dust suppression measures are implemented for all heavy vehicles that require such measures during the construction phase commences. Ensure that drivers are made aware of the potential safety issues and enforcement of strict speed limits when they are employed. Fit all heavy vehicles with speed monitors before they are used in the construction phase. 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.
Performance Indicator	<ul style="list-style-type: none"> Conditions included in the Construction Phase EMP. Dust suppression measures implemented for all heavy vehicles that require such measures during the construction phase commences. Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed. All heavy vehicles equipped with speed monitors before they are used in the construction phase. 	

	<ul style="list-style-type: none"> Road worthy certificates in place for all heavy vehicles at outset of construction phase and up-dated on a monthly basis.
Monitoring	<ul style="list-style-type: none"> SolaireDirect 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
<ul style="list-style-type: none"> Minimise the footprint of the PV facility and the associated infrastructure. Rehabilitate disturbed areas on completion of the construction phase. Details of the rehabilitation programme should be contained in the EMP. 	<ul style="list-style-type: none"> Contractor and SolaireDirect ECO and Contractors 	<ul style="list-style-type: none"> Footprint for PV facility should be defined in the Construction EMP before construction phase commences. Rehabilitation should be on-going and completed within 3 months of the completion of the construction phase. Meeting/s with local farmers to discuss lease options should take place during the construction phase.
Performance Indicator	<ul style="list-style-type: none"> Footprint of PV facility included in the Construction Phase EMP. Meeting/s held with farmers during construction phase. 	
Monitoring	<ul style="list-style-type: none"> 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 60 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
<ul style="list-style-type: none"> The workforce of 144 permanent staff is likely to be based in the local area. SolaireDirect 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. Identify local members of the community who are suitably qualified or who have the potential to be employed full time. 	<ul style="list-style-type: none"> SolaireDirect SolaireDirect 	<ul style="list-style-type: none"> Develop 5 year training and skills development programme during the construction phase Identify local members of the community who are suitably qualified or who have the potential to be employed full time during the construction phase.
Performance Indicator	<ul style="list-style-type: none"> 5 year training and skills development programme developed and designed before construction phase completed. Potential locals identified before construction phase completed. 	
Monitoring	<ul style="list-style-type: none"> SolaireDirect 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. The number of people affected will be ~ 144. 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
<ul style="list-style-type: none"> Retrenchments should comply with South African Labour legislation of the day 	<ul style="list-style-type: none"> SolaireDirect 	<ul style="list-style-type: none"> When PV facility is decommissioned
Performance Indicator	<ul style="list-style-type: none"> South African Labour legislation relevant at the time 	
Monitoring	<ul style="list-style-type: none"> SolaireDirect and Department of Labour 	