SOCIAL ASSESSMENT

FOR

SCOPING REPORT

75 MW BLACKWOOD SOLAR ENERGY FACILITY

FREE STATE PROVINCE

AUGUST 2013

Prepared for

SAVANNAH ENVIRONMENTAL

By

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EXECUTIVE SUMMARY

Savannah Environmental (Pty) Ltd was appointed by Blackwood Solar Energy Facility (Pty) Ltd as the lead consultants to manage the Environmental Impact Assessment (EIA) process for the establishment of the proposed 75 MW Blackwood Solar Energy Facility (SEF) and associated infrastructure located ~ 25 km south-east of Kimberly and ~ 45 km south-west of Boshof within the Tokologo Local Municipality (TLM) of the Free State Province.

Tony Barbour Environmental Consulting was appointed by Savannah to undertake a specialist Social Impact Assessment (SIA) as part of an Environmental Impact Assessment (EIA) process. This report contains the findings of the Scoping level social assessment for the EIA process.

The facility is proposed to include several arrays of photovoltaic (PV) solar panels with a generating capacity of approximately 75 MW and includes the following associated infrastructure:

- Appropriate mounting structures;
- Cabling between the project components, to be lain underground where practical;
- An on-site substation and overhead power line to facilitate the connection between the solar energy facility and the Eskom grid via one of the following options:
  - A loop in/loop out of the 132kV power line which traverses the site;
  - Construction of an overhead distribution power line of approximately 20km in length to the Boundary Substation.
- Internal access roads and fencing;
- Workshop area for maintenance, storage, and offices.

Based on the information from other SEF projects the construction phase for a 75 MW SEF is expected to extend over a period of 12-18 months and create approximately 300 employment opportunities. The capital expenditure on completion is anticipated to be in the region of R 1.25 billion for a 75 MW facility. The operational phase will employ approximately 60 people full time for a period of up to 20 years.

Socio-economic data from Census 2011 indicates that the population in the TLM decreased marginally from 32 455 in 2001 to 28 986 in 2011. The dependency ratio improved from 62.4% to 58.9%. In terms of employment, unemployment increased from 26.8% in 2001 to 27.5% in 2011. The main contributor was the increase in youth unemployment from 33.1% to 35.8%. In terms of employment, there was an improvement in the education levels, with the number of people with no schooling decreasing from 31.5% to 20.8%. This does, however, still represent a high level of people over the age of 20 with no schooling. For example the figure for the Free State Province as a whole was 7.1% in 2011. While the percentage of the population over the age of 20 with matric also increased from 12% in 2001 to 17.8% in 2011, this is still well below the provincial average of 26.7%. Education levels in the TLM are therefore low. This can be attributed to the rural nature of the area.

The level of services provided by government also improved, with households supplied with flush toilets linked to sewage increasing from 13.9% to 18.5%, households with piped water within the house increasing from 19% to 22.7% and households provided with electricity growing from 73.1% to 84.2%. It is therefore reasonable to say that the quality of life of the residents of the TLM has improved since 2001. However, having said this, the services levels in the TLM are substantially lower than those for the Free State Province as a whole. The percentages for flush toilets, piped water and household with

electricity for the Free State Province as a whole in 2011 were 64.9%, 44.8% and 89.9% respectively. The level of household services in the TLM is therefore low.

The key conclusions of the Scoping level study are the following:

- The establishment of solar energy facilities is supported at national and provincial levels;
- The potential negative impacts associated with the construction phase include the presence of construction workers on the site and the associated potential, social, safety and security related impacts;
- The potential positive impacts relate to the creation of local employment and skills development opportunities;
- Key potential operational phase issues relate to the potential negative impacts on livelihoods associated with loss of land and impacts on the scenic integrity (visual) of the landscape. Positive impacts relate to the provision of renewable energy for South Africa and the creation of employment opportunities and the benefits associated with the establishment of a Community Trust.

The investigation and assessment of social impacts during the EIA phase will be guided by the Guidelines for specialist SIA input into EIAs adopted by the Western Cape Environmental authorities. The approach will include:

- Identification of key interested and affected parties;
- Meetings and interviews with interested and affected parties;
- Identification and assessment of key social issues based on feedback from key interested and affected parties.
- Identification of mitigation measures aimed at avoiding and or minimizing potential negative social impacts; and
- Identification of mitigation measures aimed at enhancing potential positive social impacts.

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ACRONYMS

DEA	Department of Environmental Affairs (National)
DEA&DP	Department of Environmental Affairs and Development Planning (WCP)
DM	District Municipality
HD	Historically Disadvantaged
EIA	Environmental Impact Assessment
IDP	Integrated Development Plan
IPP	Independent Power Producer
kV	Kilovolts
LED	Local Economic Development
LM	Local Municipality
LDM	Lejweleputswa District Municipality
Mtoe	Million tonnes of oil equivalent
MW	Megawatt
NDP	National Development Plan
FSPGDS	Free State Provincial Growth and Development Strategy
PSDF	Provincial Spatial Development Framework
PV	Photovoltaic
RES	Renewable Energy Strategy (NWP)
SDF	Spatial Development Framework
SEF	Solar Energy Facility
SIA	Social Impact Assessment
TLM	Tokologo Local Municipality

SECTION 1: INTRODUCTION

1.1 INTRODUCTION

Savannah Environmental (Pty) Ltd was appointed by Blackwood Solar Energy Facility (Pty) Ltd as the lead consultants to manage the Environmental Impact Assessment (EIA) process for the establishment of the proposed 75 MW Blackwood Solar Energy Facility (SEF) and associated infrastructure located ~ 25 km south-east of Kimberly and 45 km south-west of Boshof within the Tokologo Local Municipality (TLM) of the Free State Province (Figure 1.1).

Tony Barbour Environmental Consulting was appointed by Savannah to undertake a specialist Social Impact Assessment (SIA) as part of an Environmental Impact Assessment (EIA) process. This report contains the findings of the Scoping level social assessment for the EIA process.

Figure 1.1: Location of Blackwood SEF

1.2 TERMS OF REFERENCE

The terms of reference for the Scoping Report Assessment include:

- A description of the environment that may be affected by the proposed activity and the manner in which the environment may be affected by the proposed facility;
- A description of the potential social issues associated with the proposed facility; and
- A description of the approach proposed for assessing the potentially significant issues that will be addressed by the SIA in the EIA phase.

1.3 PROJECT LOCATION AND DESCRIPTION

The proposed 75 MW Blackwood SEF is located on remainder of portion 1 of the farm Pandamsfontein 1593 which falls within the Tokologo Local Municipality. The site is located to the north of the N8, ~ 45 km south-west of the town of Boshof and ~ 25 km south-east of Kimberly. The energy would be fed into the Eskom grid and the project is therefore an Independent Power Producer (IPP) project. The exact number and placement of photovoltaic cells and arrays will be finalized based on the outcome of the EIA. Based on the Google Earth image the surrounding land uses are largely agricultural (Figure 1.1).

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 facility is proposed to include several arrays of photovoltaic (PV) solar panels with a generating capacity of approximately 75 Megawatts and includes the following associated infrastructure:

- Appropriate mounting structures;
- Cabling between the project components, to be lain underground where practical;
- An on-site substation and overhead power line to facilitate the connection between the solar energy facility and the Eskom grid via one of the following options:
  - A loop in/loop out of the 132kV power line which traverses the site;
  - Construction of an overhead distribution power line of approximately 20km in length to the Boundary Substation.
- Internal access roads and fencing;
- Workshop area for maintenance, storage, and offices.

Based on the information from other SEF projects the construction phase for a 75 MW SEF is expected to extend over a period of 12-18 months and create approximately 300 employment opportunities. The capital expenditure on completion is anticipated to be in the region of R 1.25 billion for a 75 MW facility. The operational phase will employ approximately 60 people full time for a period of up to 20 years.

Figure 1.2: Stationary solar PV panels.

1.4 ASSUMPTIONS AND LIMITATIONS

1.4.1 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.

1.4.2 Limitations

Demographic data

Demographic data was mainly obtained from Census 2011. For the purpose of the scoping report, the Census 2011 Municipal Fact Sheet publication was mainly referred to, and information in this report is therefore at local municipal level. More detailed (Ward level) information will be sourced during the EIA phase.

Consultation with affected communities

At this stage in the process there has been no interaction by the SIA Consultants with communities and other affected parties that live in the area. However, the author has worked on other solar energy projects and the issues identified by the affected parties in these projects are, in many instances, likely to be similar to those for the associated with the SEF site. Detailed consultation will be undertaken during the assessment component of the SIA.

1.5 APPROACH TO STUDY

The approach to the study is based on the Western Cape Department of Environmental Affairs and Development (DEA&DP) Planning Guidelines for Social Impact Assessment. The Guidelines are based on accepted international best practice guidelines, including the Guidelines and Principles for Social Impact Assessment (Inter-organizational Committee on Guidelines and Principles for Social Impact Assessment, 1994). The scoping level study involved:

- A review of socio-economic data;
- A review of relevant planning and policy frameworks for the area;
- A review of information from similar studies; and
- A literature review of social issues associated with solar energy facilities.

The identification of potential social issues associated with the proposed SEF is based on a review of relevant documentation and experience with similar projects in South Africa. Annexure A contains a list of the secondary information reviewed.

1.6 SPECIALIST DETAILS

Tony Barbour has 24 years' experience in the field of environmental management. In terms of SIA experience Tony Barbour has undertaken in the region of 120 SIA's and is the author of the Guidelines for Social Impact Assessments for EIA's adopted by the Department of Environmental Affairs and Development Planning (DEA&DP) in the Western Cape in 2007. Tony Barbour has also undertaken the specialist SIA studies for a number of energy projects, including SEFs.

1.7 DECLARATION OF INDEPENDENCE

This confirms that Tony Barbour, the specialist consultant responsible for undertaking the study and preparing the report, is independent and does not have vested or financial interest in proposed project being either approved or rejected.

1.8 REPORT STUCTURE

The report is divided into four sections, namely:

- Section 1: Introduction;
- Section 2: Policy and planning environment;
- Section 3: Overview of the study area; and
- Section 4: Description of the key social issues that need to be assessed during the EIA phase. This section also includes information that will be required from the developer to facilitate the SIA.

SECTION 2: POLICY AND PLANNING ENVIRONMENT

2.1 INTRODUCTION

Legislation and policy embody and reflect key societal norms, values and developmental goals. The legislative and policy context therefore plays an important role in identifying, assessing and evaluating the significance of potential social impacts associated with any given proposed development. An assessment of the "policy and planning fit[1]" of the proposed development therefore constitutes a key aspect of the Social Impact Assessment (SIA). In this regard, assessment of "planning fit" conforms to international best practice for conducting SIAs.

Section 2 provides an overview of the policy and planning environment affecting the proposed SEF. 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);
- The National Development Plan (NDP);
- Free State Provincial Growth and Development Strategy (2004-2014);
- Lejweleputswa District Municipality Integrated Development Plan (2010/2011);and,
- Tokologo Local Municipality Integrated Development Plan (2010-2011 Revision).

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 (December1998). In this regard the document notes:

[1] Planning fit" can simply be described as the extent to which any relevant development satisfies the core criteria of appropriateness, need, and desirability, as defined or circumscribed by the relevant applicable legislation and policy documents at a given time.

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

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

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

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

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

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

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

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

Disadvantages include:

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

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

2.2.3 White Paper on Renewable Energy

This White Paper on Renewable Energy (November, 2003) (further referred to as the White Paper) supplements the *White Paper on Energy Policy*, which recognizes that the medium and long-term potential of renewable energy is significant. This Paper sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa.

The White Paper notes that while South Africa is well-endowed with renewable energy resources that have the potential to become sustainable alternatives to fossil fuels, these

have thus far remained largely untapped. As signatory to the Kyoto Protocol[2],, Government is determined to make good the country's commitment to reducing greenhouse gas emissions. To this purpose, Government has committed itself to the development of a framework in which a national renewable energy framework can be established and operate.

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

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

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

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

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

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

A second round of public participation was conducted in November/December 2010, which led to several changes to the IRP model assumptions. The main changes were the disaggregation of renewable energy technologies to explicitly display solar photovoltaic (PV), concentrated solar power (CSP) and wind options; the inclusion of learning rates, which mainly affected renewables; and the adjustment of investment costs for nuclear

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

units, which until then represented the costs of a traditional technology reactor and were too low for a newer technology reactor (a possible increase of 40%).

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

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

Table 2.1 National Energy Development Commitments before the next IRP

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

Firm commitment necessary now

Final commitment in IRP 2012

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

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

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

The Policy-Adjusted IRP includes the same amount of coal and nuclear new builds as the RBS, while reflecting recent developments with respect to prices for renewables. In addition to all existing and committed power plants (including 10 GW committed coal), the plan

includes 9,6 GW of nuclear; 6,3 GW of coal; 17,8 GW of renewables; and 8,9 GW of other generation sources. The Policy-Adjusted IRP has therefore resulted in an increase in the contribution from renewables from 11,4 GW to 17,8 GW.

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

General

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

PV Solar energy

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

Conclusions

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

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

2.2.5 National Development Plan

The National Planning Commission tasked with outlining a developmental growth vision and plan for the country during the course of 2011 released documents providing a diagnostic overview and vision statement/ plan. The National Development Plan (NDP) contains a plan aimed at eliminating poverty and reducing inequality by 2030, and provides that such should be the guiding objectives of the NDP over the next 20 years. While the Plan aims to address poverty and exclusion on the one hand, it simultaneously attempts to nurture economic growth by creating a virtuous cycle of expanding opportunities, building capabilities, poverty reduction, involving communities in their own development, all leading to rising living standards.

The NDP identifies 9 key challenges and associated remedial plans. While all nine challenges/ plans are envisaged as part of integrated whole, the highest priorities are regarded employment creation and improving the quality of national education. Managing the transition towards a low carbon national economy is identified as one of the 9 key national challenges. Expansion and acceleration of commercial renewable energy is identified as a key intervention strategy.

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 the 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 are 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 Lejweleputswa District Municipality Integrated Development Plan

The LDM IDP is informed by and aligned with the Free State Provincial Growth and Development Strategy (FSGDS) and other governmental programmes and policies. In this regard the FSPGDS identified four key priority areas, two of which are relevant to the proposed SEF project, namely:

- Economic development, employment and investment;
- Social and Human Development.

The IDP identifies a number of priority areas, of which the following are regarded as relevant:

- Local Economic Development
- Basic Service Delivery and Infrastructure Investment

2.3.3 Tokologo Integrated Development Plan

The vision for the TLM is "A progressive municipality, which through cooperative governance, creates conditions for economic growth, social development and meet the basic needs of the community and improve the quality of life of all residents". The Mission statement linked to the vision notes that the:

"Tokologo Local Municipality is committed to provide a better life for all residents within its area of jurisdiction through:

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

The IDP notes that Local Economic Development within the municipal area will require strategic and focused efforts in those economic areas where TLM already shows stability and growth. An economic SWOT analysis was undertaken as part of the IDP revision. The key findings that are of relevance to the project include:

Strengths
- One of the most fertile agricultural regions of the Free state;
- Strong and versatile agricultural sector;
- Skilled and semi-skilled labour force;
- Well-developed infrastructure;
- Tourism destinations.

Weaknesses
- High rate of poverty, especially women and children;
- High unemployment and dependency rates;
- High levels of illiteracy;

Opportunities
- Development of skills;
- Transfer of skills
- Availability of labour;
- Development of a holistic LED Strategy for Tokologo

Threats/constraints
- Limited job opportunities

A Community Needs assessment undertaken as part of the IDP revision lists a number of needs that are relevant to the proposed project, including, job-creation, up-grading of community facilities and infrastructure, support for local economic development and SMME's, and bursaries for learners. The need to protect the natural environment is also identified as a key objective in the IDP.

The IDP also notes that the bulk electrical network in the TLM is well established. However, development has been hampered by the quality/ stability of the supply.

In terms of land uses the proposed site is located outside the area between Boshof and Dealsville identified as a Tourism Development Corridor identified in the TLM Spatial Development Framework (Figure 2.1). The proposed SEF is therefore unlikely to have a negative impact on tourism potential of the TLM.

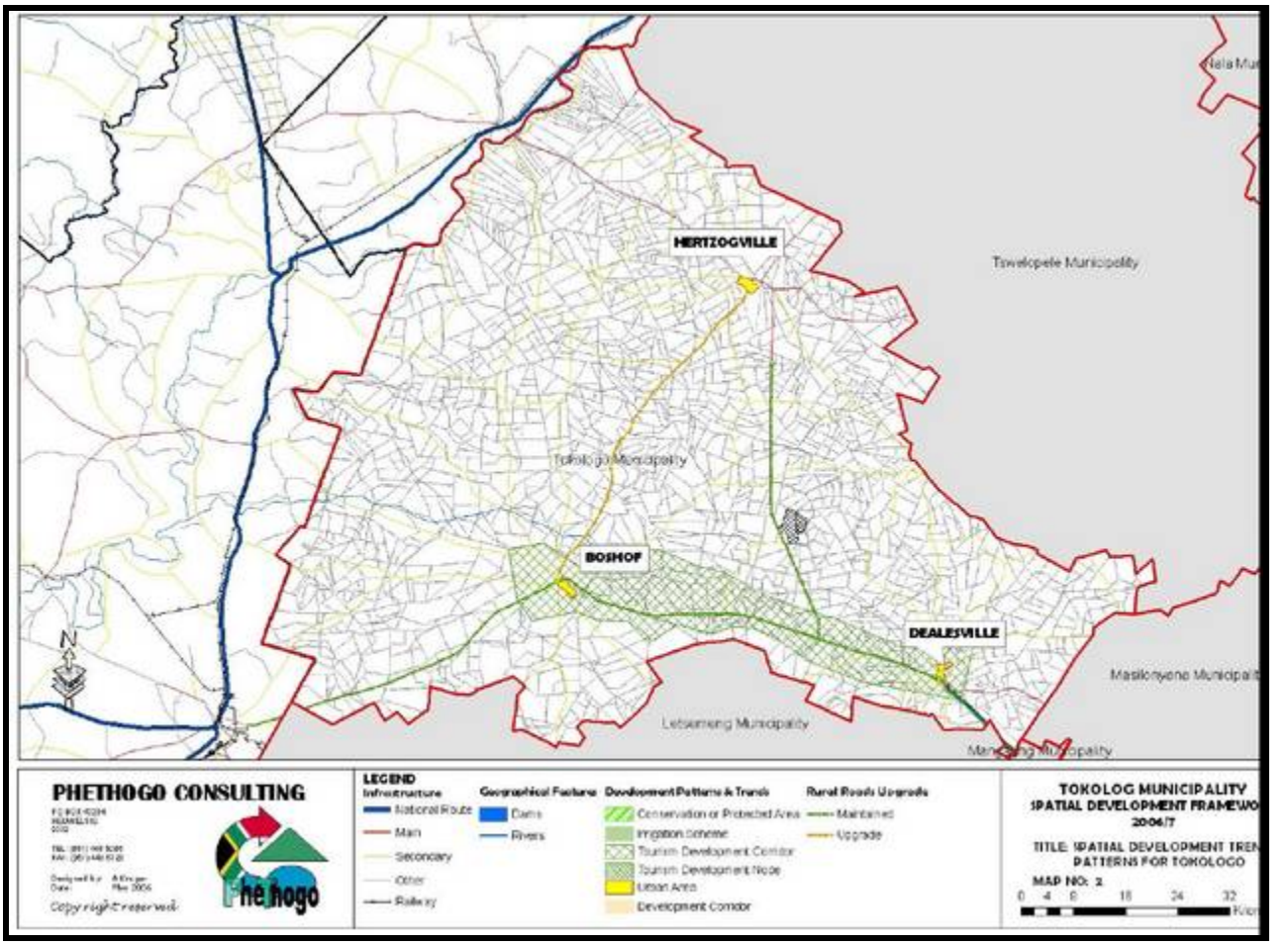


Figure 2.1: Land Use Map for TLM

SECTION 3: OVERVIEW OF STUDY AREA

3.1 INTRODUCTION

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

- The relevant administrative context;
- The provincial and district level socio-economic context;
- The municipal level socio-economic context;
- Local, site specific context.

3.2 ADMINISTRATIVE CONTEXT

The Blackwood SEF is located within the TLM, which is one of five local municipalities that make up the Lejweleputswa District Municipality (LDM) in the Free State Province. The town of Welkom is the administrative seat for both the LDM and TLM.

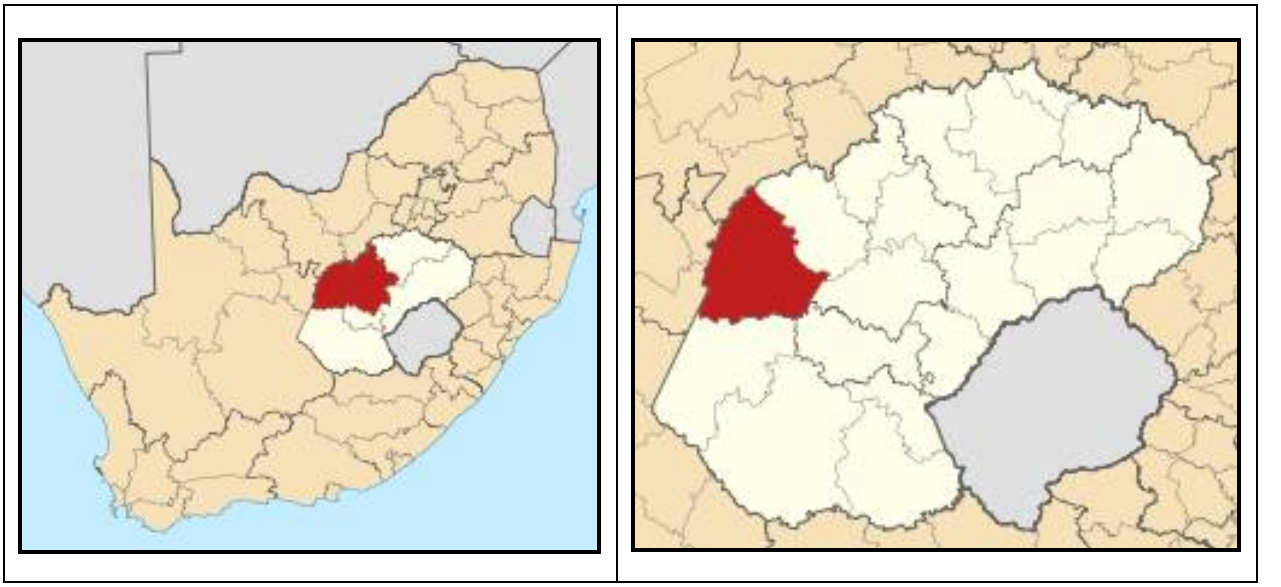


Figure 3.1: Location of Lejweleputswa District Municipality (left) and Tokologo Local Municipality (right) within the Free State Province

3.3 PROVINCIAL CONTEXT[3]

The proposed solar energy facility is located in the Free State Province which covers an area of 129 464 km^2, 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 Felzile 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).

[3] The information in this section is largely based on the information contained in the Free State Provincial Growth and Development Strategy 2004-2014. The information from Census 2011 has therefore not been captured in the document. Where relevant key information from Census 2011 has been added.

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 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. Based on the data from Census 2011 the population of the Free State was 2 633 504 (Table 3.2).

Table 3.2: Total population per district for the Free State Province (Census 2011)

Municipality	Total population		Growth rate (1996–2001)	Total population	Growth rate (2001–2011)
	1996	2001		2011	
DC16: Xhariep	**146 616**	**162 727**	**2,1**	**146 259**	**-1,1**
FS161: Letsemeng	35 449	42 847	3,8	38 628	-1,0
FS162: Kopanong	50 017	56 079	2,3	49 171	-1,3
FS163: Mohokare	36 238	36 321	0,0	34 146	-0,6
FS164: Naledi	24 912	27 479	2,0	24 314	-1,2
DC18: Lejweleputswa	**703 170**	**657 012**	**-1,4**	**627 626**	**-0,5**
FS181: Masilonyana	65 851	64 409	-0,4	63 334	-0,2
FS182: Tokologo	26 767	32 455	3,9	28 986	-1,1
FS183: Tswelopele	51 648	53 714	0,8	47 625	-1,2
FS184: Matjhabeng	476 763	408 170	-3,1	406 461	0,0
FS185: Nala	82 141	98 264	3,6	81 220	-1,9
DC19: Thabo Mofutsanyane	**731 826**	**782 302**	**1,3**	**736 238**	**-0,6**
FS191: Setsoto	109 768	123 194	2,3	112 597	-0,9
FS192: Dihlabeng	107 798	129 338	3,6	128 704	0,0
FS193: Nketoana	64 284	61 951	-0,7	60 325	-0,3
FS194: Maluti a Phofung	353 238	360 549	0,4	335 784	-0,7
FS195: Phumelela	46 657	51 928	2,1	47 772	-0,8
FS196: Mantsopa	50 081	55 342	2,0	51 057	-0,8
DC20: Fezile Dabi	**448 365**	**459 294**	**0,5**	**488 036**	**0,6**
FS201: Moqhaka	169 440	167 892	-0,2	160 532	-0,4
FS203: Ngwathe	120 007	118 810	-0,2	120 520	0,1
FS204: Metsimaholo	106 912	115 955	1,6	149 108	2,5
FS205: Mafube	52 005	56 637	1,7	57 876	0,2
MAN: Mangaung	**603 528**	**645 440**	**1,3**	**747 431**	**1,5**
Free State	**2 633 504**	**2 706 775**	**0,5**	**2 745 590**	**0,1**

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.

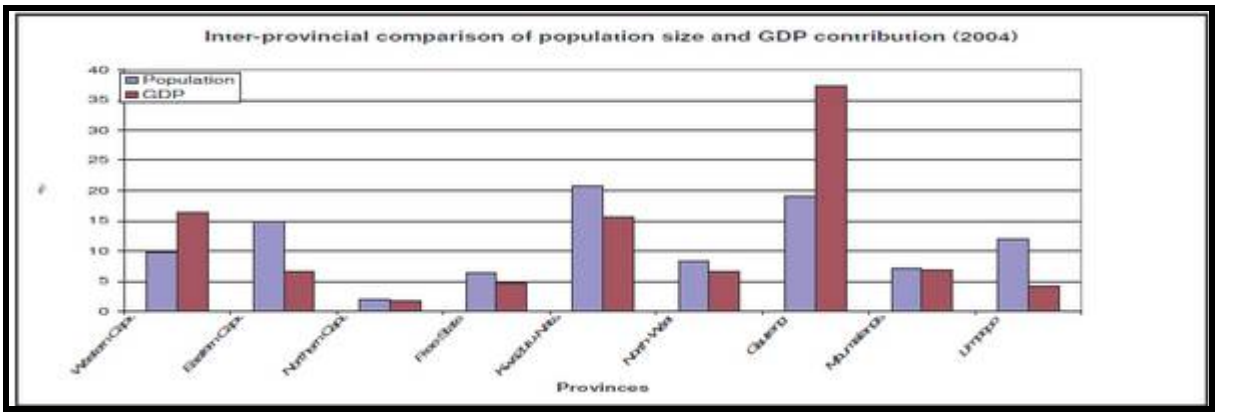


Figure 3.1: Comparison of population size and GDP contribution for Provinces in South Africa (Source FSPGDS, 2007)

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, the 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.

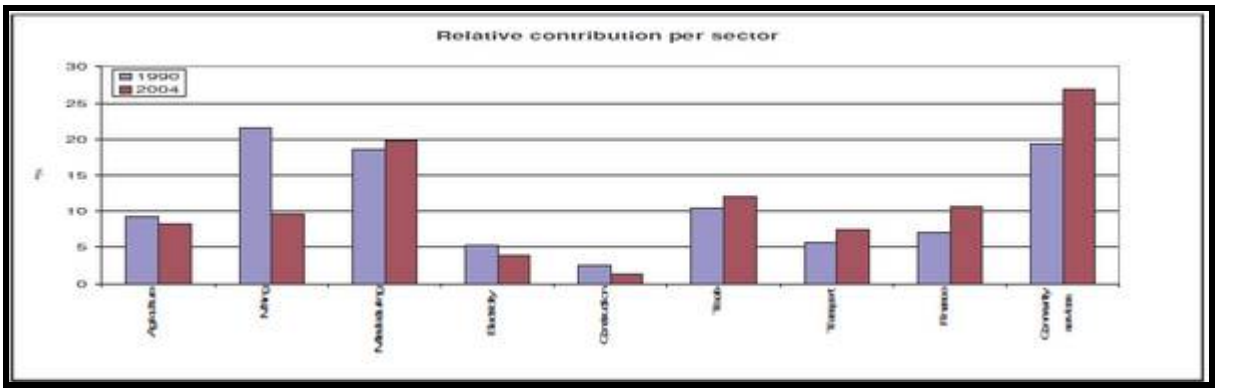


Figure 3.2: Relative contribution of the different sectors to the economy, 1990-2004 (Source FSPGDS, 2007)

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 3.3). 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 3.3: 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 19.5X) 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).

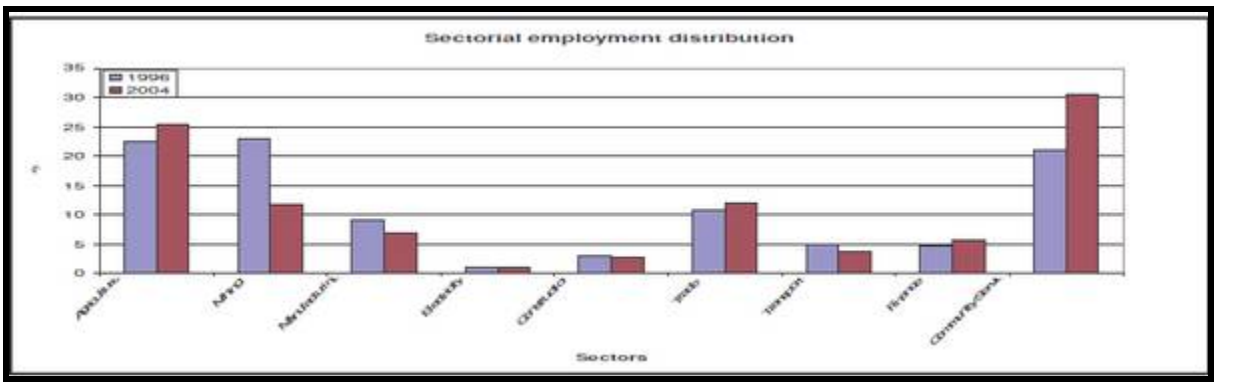


Figure 3.3: Contribution to employment per sector (Source FSPGDS, 2007)

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 3.4 provides an overview of the Human Development Index (HDI)[4] and the Gini-coefficient[5].

Table 3.4: Human Development and Inequality, 1996-2004 (Source FSPGDS, 2007)

Province	HDI[4]		Gini-coefficient[5]	
	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**

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 Province[6]. This is compared to the figure of 38.6% in 1996 (Table 3.5).

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 3.6).

[4] 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.

[5] 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.

[6] 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: 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

Table 3.6: 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 3.7). 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 3.7: 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 3.8). 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 3.8: 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 pm (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.

3.4 SOCIO-ECONOMIC OVERVIEW OF THE PROPOSED PROJECT AREA

3.4.1 Lejweleputswa District Municipality

The Lejweleputswa District Municipality (LDM) is located in the north western part of the Free State and is one of five district municipalities in the Free State. The other four are Motheo DM in the south east, Thabo Mofutsanyana DM in the north east, Fezile Dabi DM in the north and the Xhariep DM in the south east. The LDM borders North West to the north, the Thabo Mofutsanyane DM to the north east and east, Motheo and Xhariep DM to the south and the Northern Cape to the west. The district covers an area of 31686 km^2 and is made up of 5 local municipalities, namely:

- Masilonyana Local Municipality, which includes the towns of Theunissen, Brandfort, Winburg, Soutpan and Verkeedevlei;
- Matjhabeng Local Municipality, which includes the towns of Welkom, Virginia, Odendaalsrus, Hennenman, Ventersburg and Allanridge;
- Nala Local Municipality, which includes the towns of Bothaville and Wesselsbron;
- Tokologo Local Municipality, which includes the towns of Boshof, Dealesville and Hertzogville; and,
- Tswelopele Local Municipality, which includes the towns of Bultfontein and Hoopstad.

According to the FSPGDS (2006-14), Lejweleputswa is the major contributor in the Free State Geographic Product (GGP) and is also an important agricultural area. The district is predominantly known as the Free State Goldfields which forms a part of the larger Witwatersrand basin. The economy of the region is dominated by the gold mining industry and agriculture sectors in particular maize production. Bothaville is considered one of the most important maize centres in South Africa. The annual NAMPO Harvest festival attracts more than 20 000 visitors and is the second largest agricultural show centre in the world.

The impact of the mining sectors is mainly situated in the densely populated urban areas while the main impact of the agricultural sector is the surrounding rural areas. At a national level both these sectors are recording negative growth rates and this trend is repeating itself at a regional level.
The negative growth in the agricultural sector can be attributed to a number of factors including drought, precarious weather conditions, and market conditions. There are other factors causing a large percentage of commercial farmers to experience financial problems. Most farmers are also mechanizing their operations, which is causing job losses and migration to urban areas. As the economies of the smaller towns are based on businesses

supporting agriculture, the business climate of the smaller towns is showing negative trends.

As indicated above, the industrial base of the region is mainly centred on the mining and agricultural sectors with very little new industrial development. Apart from moderate industrial activities in the main towns very little industrial activity is taking place in the rest of the region apart from Henneman and Bothaville. One of the challenges for the region is to develop a diversified industrial and commercial base.

There is very little economic development in all the previously disadvantaged areas with a lack of business infrastructure and business activities. It will be absolutely essential to develop a stronger business presence in these areas and make more business services accessible to local communities. Serious attempts to move the labour force from unskilled work towards skilled work will be absolutely necessary to increase the economic viability of the region.

Tourism in the area is suppressed, particularly as the region is not endowed with areas of natural attractions. There is however a potential to develop tourism with regard to specific areas such as eco-tourism, game farming, mining and cultural tourism and major sporting activities. The tourism infrastructure of the region is underdeveloped and will require upgrading before any serious attempts are done. The remote rural areas, such as Boshof, Brandfort and Hertzogville offer opportunities towards eco-tourism and farming.

Lejweleputswa contributes nearly 91% of the GGP in the mining sector in the Free State province. Agriculture and construction and trade respectively contributes nearly a third of the GGP of the province (Table 3.9).

Table 3.9: Contribution of economic sectors to GGP

GGP SECTOR	Lejweleputswa	Total per Province	Percentage per District
Agriculture	1030977	2837171	36.34
Mining	3739593	4131246	90.52
Manufacturing	346700	3354360	10.34
Electricity/Water	88290	1335149	6.61
Construction	265372	729950	35.12
Trade	914821	2852988	32.07
Transport	195497	1646121	11.88
Finance	614995	2929949	20.99
Community	78567	282111	27.84

General Government	515907	3362911	15.34
Other producers	77395	516735	11.18
Total	7949114	23978691	33.15

Population

The total population of the LDM in 2011 was 627 626 compared to 657 012 in 2001. The Black/African population group constitute the majority in the Free State Province (85%), followed by the White population group (12%). The Coloured and Indian/ Asian population groups constitute the minority in the province (3,0 % and 0,1% respectively) (Figure 3.4). The same pattern exists in the LDM.

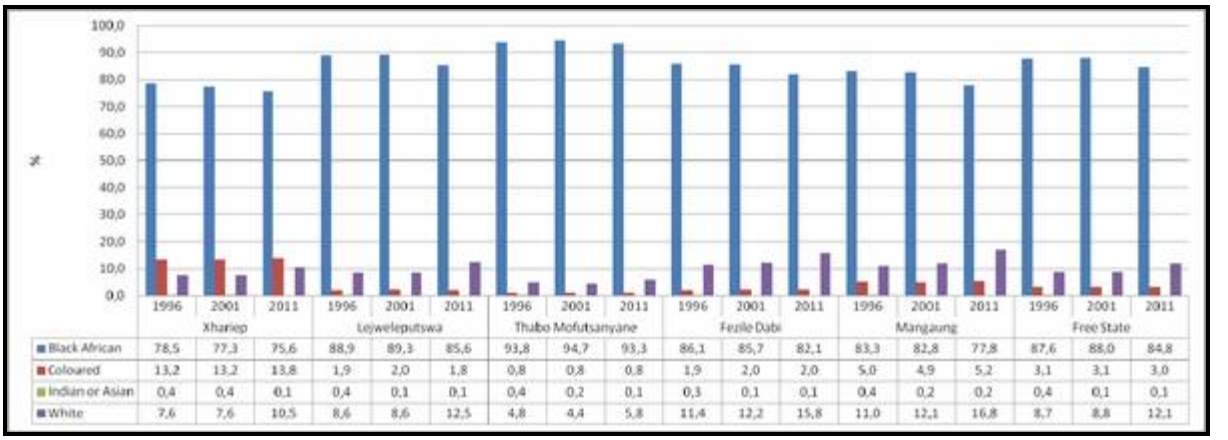


Figure 3.4: Distribution of the population by population group and district municipality – 1996, 2001 and 2011

Figure 3.5 shows the population growth rate from 1996 to 2001 and 2001 to 2011 respectively. The results show that Free State grew by 0,5% in the period 1996–2001 and 0,1% in the period 2001–2011. Xhariep, Lejweleputswa and Thabo Mofutsanyane Districts experienced a negative growth in the period 2001–2011. For the LDM the population growth rate decreased by 0.5% over the period 2001-2011. This is likely to be attributed to the decline in the mining sector over this period.

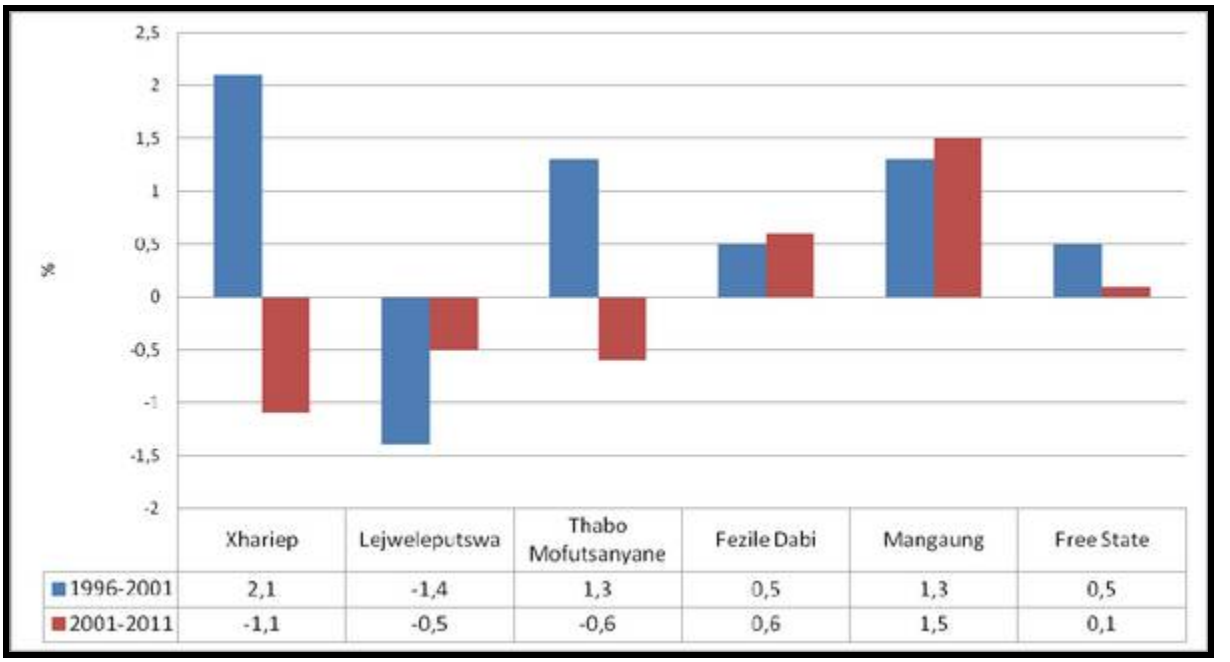


Figure 3.5: Population growth rates by district municipality – 1996, 2001 and 2011 (Source, Census 2011)

Household income

Over the same period household income in the LDM and the Free State Province as a whole has increased. Figure 3.6 shows the increase in the average household income across all districts, including the LDM.

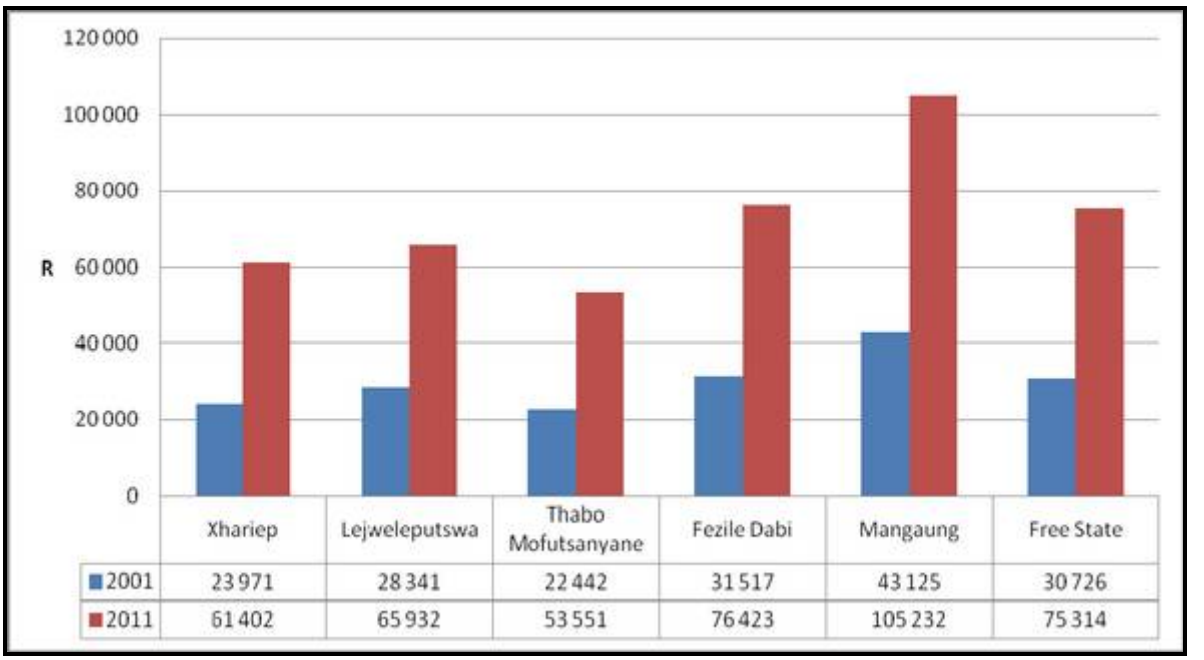
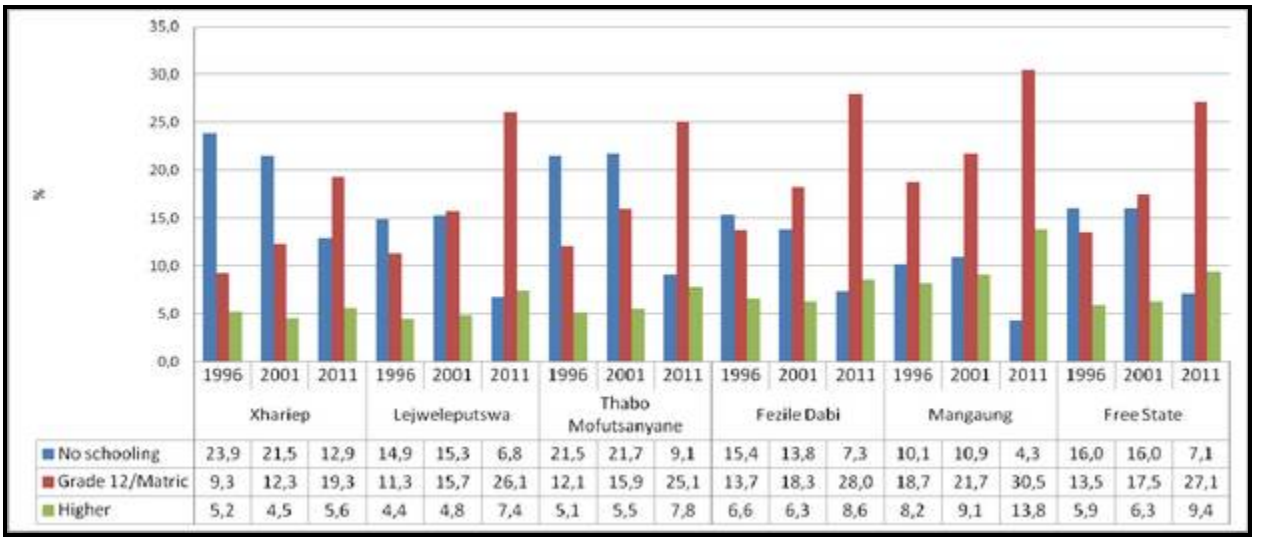


Figure 3.6: Distribution of average household income by district municipality – 2001 and 2011 (Source, Census 2011)

Education

Figure 3.7 shows a general increase in the proportion of the population with higher education and who completed Grade 12/Matric. Mangaung district has the highest proportion of the population with higher education (13,8% compared to the 9,4% provincial average), followed by Fezile Dabi and the LDM. In addition, there has been a decline in the population with no schooling, with a significant improvement in the LDM since 2001. The relatively low percentage with education levels higher than Matric is still a concern.

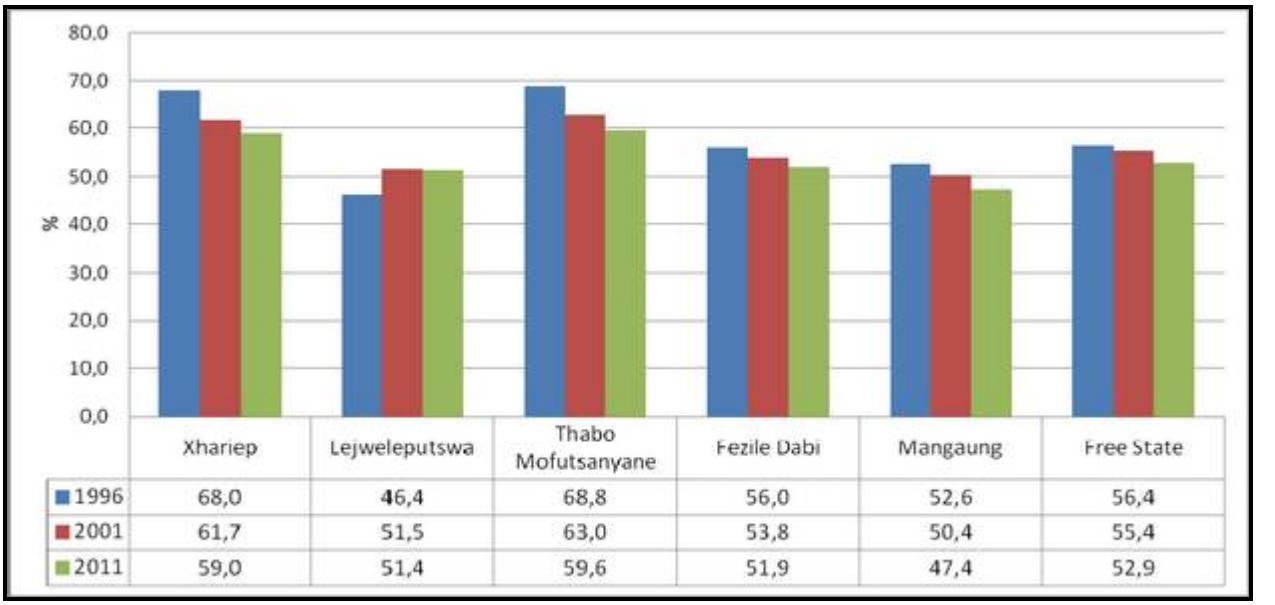


	1996	2001	2011	1996	2001	2011	1996	2001	2011	1996	2001	2011	1996	2001	2011	1996	2001	2011
	Xhariep			Lejweleputswa			Thabo Mofutsanyane			Fezile Dabi			Mangaung			Free State		
No schooling	23,9	21,5	12,9	14,9	15,3	6,8	21,5	21,7	9,1	15,4	13,8	7,3	10,1	10,9	4,3	16,0	16,0	7,1
Grade 12/Matric	9,3	12,3	19,3	11,3	15,7	26,1	12,1	15,9	25,1	13,7	18,3	28,0	18,7	21,7	30,5	13,5	17,5	27,1
Higher	5,2	4,5	5,6	4,4	4,8	7,4	5,1	5,5	7,8	6,6	6,3	8,6	8,2	9,1	13,8	5,9	6,3	9,4

Figure 3.7: Distribution of the population aged 20 years and older by highest level of education attained and district municipality – 1996, 2001 and 2011

Dependency ratios

Dependency ratios provide insights into the burden borne by those who are in the working age group (15–64) to support those aged 0–14 and 65+ years. Figure 3.8 suggests that Xhariep and Thabo Mofutsanyane districts consistently have higher dependency ratios relative to the provincial average. However, the Census 2011 data also indicates that the dependency ratio in the LDM has increased since 1996, with a slight decrease between 2001 and 2011. The pattern for each of the other 4 Districts is a decrease since 1996. The increase in the LDM is likely to be linked to the decline in the role of the mining sector since 1996.

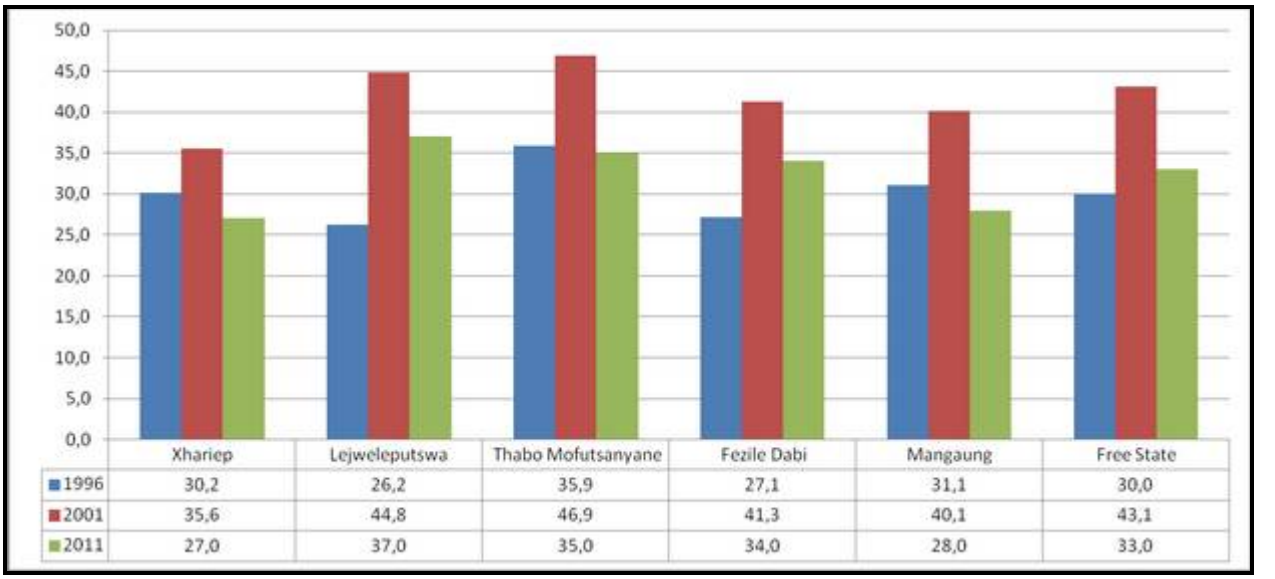


	Xhariep	Lejweleputswa	Thabo Mofutsanyane	Fezile Dabi	Mangaung	Free State
1996	68,0	46,4	68,8	56,0	52,6	56,4
2001	61,7	51,5	63,0	53,8	50,4	55,4
2011	59,0	51,4	59,6	51,9	47,4	52,9

Figure 3.8: Dependency ratios by district municipality – 1996, 2001 and 2011

Unemployment rate

The data from Census 2011 suggest an increase in unemployment between 1996 and 2001 and thereafter a decline across districts (Figure 3.9). The unemployment rate in 2011 is however still higher than the level in 1996 in the LDM. This is likely to be linked to the decline in the role of the mining sector since 1996.



	Xhariep	Lejweleputswa	Thabo Mofutsanyane	Fezile Dabi	Mangaung	Free State
1996	30,2	26,2	35,9	27,1	31,1	30,0
2001	35,6	44,8	46,9	41,3	40,1	43,1
2011	27,0	37,0	35,0	34,0	28,0	33,0

Figure 3.9: Unemployment rate (official definition) by district municipality – 1996, 2001 and 2011

3.4.2 Tokologo Local Municipality

The TLM covers an area of 9 326 km^2 and is located in the Western part of the Free State Province within Lejweleputswa District Municipality (LDM). The TLM consists of three former Transitional Local Councils, namely Boshof, Dealesville and Hertzogville, as well as a portion of a former Transitional Rural Council (Moddervaal) which contained approximately 1480 farms. The administrative seat of the TLM is Boshof. The other two main towns in the TLM are Dealesville in the east and Hertzogville to the north of the municipal area.

Boshof is the administrative seat of the TLM and is located approximately 124km west of Bloemfontein and 53km east of Kimberley, along the R64 (old Bloemfontein/Kimberley Road). The majority of the commercial and industrial activities in the TLM are based in Boshof. The associated townships of Kareehof and Seretse are predominantly dormitory towns dominated by low income households with limited economic activities, save for corner shops and informal traders.

Dealesville is located approximately 55km south east of Boshof and 69 km west of Bloemfontein along the R64 (old Bloemfontein/Kimberley Road). The town consists of two suburbs, namely Dealesville and Tshwaraganang, and functions as a service centre for the local farming sector in the area. Livestock and crop farming are the most common in the area. There are also a number of small salt works linked to the salt pans in the area.

Hertzogville is located along the R59 approximately 140km and 93km north of Bloemfontein Boshof respectively. The town functions as the service centre for the local urban and surrounding farming community. The industrial sector in Hertzogville consists of the agriculture cooperative, the abattoir and a few light industrial activities relating to vehicle maintenance and the agricultural sector. Tourism is limited to the municipality's Palmietpan Nature Reserve. The economic potential of the town is hampered by the fact that Hertzogville is not located along the major transportation routes between the large urban centres.

Socio-economic data from Census 2011 indicates that the population in the TLM decreased marginally from 32 455 in 2001 to 28 986 in 2011. The dependency ratio improved from 62.4% to 58.9%. In terms of employment, unemployment increased from 26.8% in 2001 to 27.5% in 2011. The main contributor was the increase in youth unemployment from 33.1% to 35.8%. In terms of employment, there was improvement in the education levels, with the number of people with no schooling decreasing from 31.5% to 20.8%. This does, however, still represent a high level of people over the age of 20 with no schooling. For example the figure for the Free State Province as a whole was 7.1% in 2011. While the percentage of the population over the age of 20 with matric also increased from 12% in 2001 to 17.8% in 2011, this is still well below the provincial average of 26.7%. Education levels in the TLM are therefore low. This can be attributed to the rural nature of the area.

The level of services provided by government also improved, with households supplied with flush toilets linked to sewage increasing from 13.9% to 18.5%, households with piped water within the house increasing from 19% to 22.7% and households provided with electricity growing from 73.1% to 84.2%. It is therefore reasonable to say that the quality of life of the residents of the TLM has improved since 2001. However, having said this, the services levels in the TLM are substantially lower than those for the Free State Province as a whole. The percentages for flush toilets, piped water and household with electricity for the Free State Province as a whole in 2011 were 64.9%, 44.8% and 89.9% respectively. The level of household services in the TLM is therefore low.

SECTION 4: IDENTIFICATION OF KEY ISSUES

4.1 INTRODUCTION

Section 4 identifies the key social issues that will need to be assessed by the SIA specialist study during the EIA Phase. In identifying said key issues the following assumptions are made:

- The area identified for the proposed SEF meets the technical criteria required for such facilities; and
- The issues associated with the proposed facility are likely to be similar to the potential positive and negative issues associated with other solar energy facilities in South Africa.

4.2 IDENTIFICATION OF KEY SOCIAL ISSUES

The key social issues that need to be assessed during the EIA Phase include:

- The policy and planning related issues; and
- Local and site-specific issues.

4.2.1 Policy and planning issues

As indicated in Section 1.5.1, 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 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);
- The National Development Plan (2011);
- Free State Provincial Growth and Development Strategy (2004-2014);
- Lejweleputswa District Municipality Integrated Development Plan (2010/2011); and,
- Tokologo Local Municipality Integrated Development Plan (2010-2011 Revsion).

The findings of the review indicated that solar energy generation was strongly supported at national and provincial levels, both as a means to avoid negative environmental impacts associated with the use of finite fossil fuels and the generation of greenhouse gasses, as well a means to provide economic development ("green economy") and employment creation. Managing the transition towards a low carbon national economy is identified as one of the 9 key national challenges in the NDP (2011). Expansion and acceleration of commercial renewable energy is identified as a key intervention strategy.

Currently available policy documents provide no guidance on a site-specific level or land use principles in siting SEFs. This issue will be assessed during the EIA phase.

4.2.2 Local and site specific issues

Based on a review of information relating to solar energy facilities and experience with SIAs undertaken for other solar energy facilities, the most key social issues that are likely to be raised include:

- Potential impact on rural sense of place (this will be closely linked to the visual impacts). The impact on sense of place is also linked to the associated 132 kV power line/s;
- Potential impact on farming activities and other existing land uses;
- Potential impact on property prices, specifically adjacent properties;
- Potential impact on tourism, both locally and regionally;
- Potential impacts associated with the presence of construction workers during the construction phase. The typical impacts associated with the presence of construction workers include increase in sexually transmitted diseases, including HIV/AIDS; increase in prostitution; increase in alcohol and drug related incidents; increase in crime; and creation of tension and conflict in the community etc.;
- Potential impacts associated with the influx of job seekers into the area during the construction phase. These impacts are similar to those associated with the presence of construction workers;
- Creation of employment and business opportunities during the construction phase;
- Creation of employment and business creation opportunities during the operational phase;
- Creation of potential training and skills development opportunities for local communities and businesses during the construction and operational phases;
- Potential up and down-stream economic opportunities for the local, regional and national economy;
- Provision of a clean, renewable energy source for the national grid; and
- Benefits associated with the establishment of a Community Trust.

4.3 APPROACH TO IDENTIFYING AND ASSESSING SOCIAL IMPACTS

Definition of social impacts

Social change is recognised as a natural and on-going process, however, it is important to recognise and understand that projects of this scale and nature have the potential to influence and alter both the rate and direction of specific social change both positive and negative. Social impacts can be defined as the consequences (both positive and negative) to human populations through any public or private actions (these include policies, programs, plans and or projects) that alter the way in which people function as members of society. These impacts are felt at various levels, including, individual, family or household, community and organisation or society level (Vanclay, 2002)[7].

Categories of social impacts

- **Way of life** – how people live, work, play and relate to other people on a day-to-day basis;
- **Culture** – shared beliefs, customs, values, and language or dialect;
- **Community health** – its cohesion, stability, character, services and facilities;

[7] Vanclay, F. 2002. Conceptualising Social Impacts. *Environmental Impact Assessment Review, 22*. 183-221.

- **Political system** – extent to which people are able to participate in decisions affecting their lives, the level of democracy and the resources available;
- **Environmental health** – quality of the natural environment in which people live, including the air and water people use; the availability and quality of the food they eat; the level of hazard or risk, dust and noise they are exposed to; the adequacy of sanitation, their physical safety and their access and control over resources;
- **Health and well-being** – health is defined as a state of complete physical, mental, social and spiritual well-being and not merely the absence of disease or infirmity; and
- **Personal and property rights** – particularly in cases where people are economically affected, or experience personal disadvantage, which may include a violation of their civil liberties.

The identification and assessment of social impacts will be guided by the Guidelines for specialist SIA input into EIAs adopted by DEA&DP in the Western Cape in 2007. The Guidelines are based on accepted international best practice guidelines, including the Guidelines and Principles for Social Impact Assessment (Inter-organizational Committee on Guidelines and Principles for Social Impact Assessment, 1994). The approach will include:

- Review of existing project information, including the Planning and Scoping Documents;
- Collection and review of reports and baseline socio-economic data on the area (IDPs, Spatial Development Frameworks etc, See Box 1);
- Site visit and interviews with key stakeholders in the area including local land owners and authorities, local community leaders and councillors, local resident associations and residents, local businesses, community workers etc;
- Identification and assessment of the key social issues and opportunities;
- Preparation of Draft Social Impact Assessment (SIA) Report, including identification of mitigation/optimization and management measures to be implemented; and
- Finalisation of the SIA Report.

As indicated above, the detailed public consultation process will be undertaken during the EIA Phase of the project.

Box 1: Typical social and economic baseline information

- Social and economic characteristics of the affected area;
- Demographic profile of the area (population numbers, race, age, gender, income, education and employment levels etc);
- Policy and planning framework for the site and surrounds (see below);
- Social and economic trends (historic and current) in the affected area;
- Social and economic drivers, both current and historical, in the affected areas, including key economic sectors;
- Social context of how people run their lives and the key factors that affect them on a day-to-day basis (livelihood strategies);
- An understanding of social networks, intra- and inter-household, community and extend support systems affected by the proposed development;
- Institutional arrangements, structures and capacity of the local authorities;
- An understanding of the institutional, local leadership and other power relationships that may be affected by the development;
- Level of services (housing, water, electricity, schools, clinics, policing etc) and current state of infrastructure in the area;
- Social and economic initiatives and opportunities;
- Local, regional and national social and economic policies, programmes, and plans affecting the area;
- Individuals, communities, organisation's and institutions who are likely to be affected by the project/plan/policy, with specific emphasis on vulnerable individuals, communities, organisation's and institutions;
- Land uses and ownership patterns in the area;
- Use and access to natural resources and livelihood strategies, especially in rural areas; and,
- Cultural beliefs and value systems.

4.4 INFORMATION REQUIREMENTS

The following typical, generic project information is required in order to inform the Social Impact Assessment.

Construction phase

(Including all related infrastructure such as transmission lines, access roads, office and warehouse components)

- Comments received from I&APs during the public participation process, including comments reflected in the Final Scoping Report;
- A plan of the proposed lay-out(s) of the PV cells (including an indication of the phasing sequence on the site), supporting structures and infrastructure;
- Duration of the construction phase (months);
- Number of people employed during the construction phase;
- Breakdown of number of people employed in terms of skills categories (low skilled, semi-skilled and skilled);
- Estimate of the total wage bill for the construction phase and breakdown in % as per skills categories;
- Estimate of total capital expenditure for the construction phase;
- Indication of where construction workers will be housed (on site or in nearest town?);

- Opportunities for on-site skills development and training;
- Description of the typical activities associated with the construction phase, specifically on-site construction activities. This includes a description of how the components associated with a solar energy facility will be transported to and assembled on site;
- The size of the vehicles needed to transport the components and the routes that will be used to transport the large components to the site, and an estimate of the number of vehicle trips required; and
- Information on the nature of the agreements with the affected landowners and or communities, specifically with regard to compensation for damage to land, infrastructure etc.

Operational phase

- Estimate of operating budget per annum;
- Estimate of total number of people employed;
- Breakdown in terms of skills levels (see above);
- Estimate of annual wage bill;
- Typical activities associated with the operational phase;
- Information on opportunities for skills development and training;
- Typical lifespan of proposed solar energy plant;
- Information on the lease / rental agreements with local landowners and or communities, specifically with regard to issues relating to compensation for damage to infrastructure and loss of livestock etc. This information is required so as to indicate how local landowners and communities stand to benefit from the project; and
- Information on establishment of community trust etc.

ANNEXURE A

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AGRICULTURAL IMPACT ASSESSMENT
FOR PROPOSED BLACKWOOD SOLAR ENERGY FACILITY, FREE STATE PROVINCE

SCOPING PHASE REPORT

Report by
Johann Lanz

August 2013

1. INTRODUCTION

Blackwood Solar Energy Facility (Pty) Ltd is proposing to develop the Blackwood Solar Energy Facility 25 kilometres south-east of Kimberley in the Free Sate Province (see Figure 1). The facility will have a net generating capacity of up to 75 MW. The development will consist of arrays of photovoltaic panels supported by mounting structures, inverter stations, internal access roads, cabling, fencing, a gate house and security building, a control building/centre, a canteen and visitors centre, and a building for a workshop, storage/warehouse facility and offices, and an on-site substation with connection to the Eskom grid either via loop in/loop out of the 132kV power line which traverses the site, or construction of an overhead distribution power line of approximately 20km in length to the Boundary Substation.

The development is currently in the Scoping Phase of the Environmental Impact Assessment and this scoping report describes the soils and agricultural potential of the proposed site and the impacts that the development may have on agricultural resources and production. Johann Lanz was appointed by Savannah Environmental as an independent specialist to conduct the study on soils and agricultural potential as part of the EIA.

Figure 1. Location map of the proposed site (with red boundary) along the N8 south-east of Kimberley.

2. DESCRIPTION OF THE SOILS AND AGRICULTURAL CAPABILITY OF THE AFFECTED ENVIRONMENT

All the information on soils and agricultural potential in this report has been obtained from the AGIS online database, produced by the Institute of Soil, Climate and Water (Agricultural Research Council, undated).

The proposed site is on a level plain with a gentle slope of approximately 1% at a south-easterly aspect across the site. The site is 1,468 hectares in extent but the actual development footprint will be smaller than that. The Acocks veld type classification for the entire site is False Karoo. The biome classification is Savanna and vegetation type is Kimberley thorn bushveld. The geology of the site is shale of the Ecca group of the Karoo Supergroup covered partially with quaternary wind-blown sand and calcrete. Dolerite intrusions occur.

Rainfall for the site is given as 395 mm per annum according to the South African Rain Atlas (Water Research Commission, undated). The average monthly distribution of rainfall is shown in Table 1. In terms of the relationship between rainfall and evaporation the site is classified as semi-arid, which is a limitation to agriculture.

Table 1. Average monthly rainfall for the site (28° 54' S 24° 57' E) in mm (Water Research Commission, undated)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Tot**
56	61	66	42	18	7	5	8	17	31	39	45	**395**

The land type classification is a nation-wide survey that groups areas of similar soil and terrain conditions into different land types. There are two land types across the site (see Figure 2). A summary detailing soil data for the different land types is provided in Table 2.

The land on site has a low to moderate susceptibility to water erosion, and is classified as class 5 water erosion hazard (on 8 class scale). It is classified as susceptible to wind erosion, with sands sub-dominant or present.

Land capability is the combination of soil suitability and climate factors. The entire site has a land capability classification, on the 8 category scale, of Class 5 – non-arable, moderate potential grazing land. The most important limitations are shallow soils and aridity.

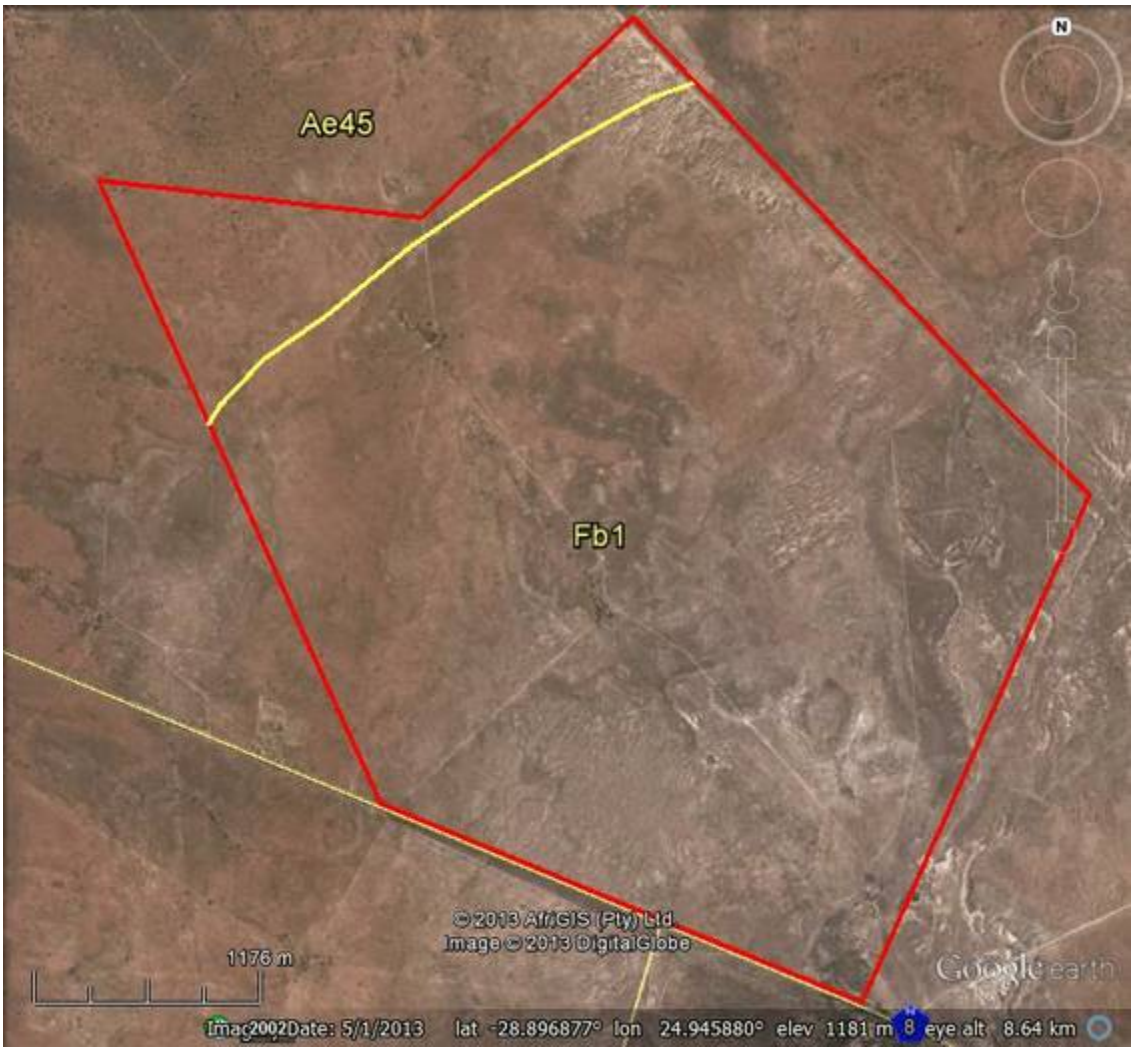

Figure 2. The proposed site within red boundary, showing the boundary between the two different land types in yellow.

The site is located within a cattle farming agricultural region. There is no cultivation or irrigation except for a very small patch of about 2 hectares adjacent to the farm yard. The grazing capacity is classified as between 14 and 21 hectares per large stock unit.

From an agricultural impact point of view, no sensitive areas (other than the 2 hectare cultivated area) were identified during scoping that should be avoided for inclusion in the development. Agricultural potential is fairly uniform across the site and there are therefore no preferred locations for the development within the site.

Table 2. Land type data for site. Erosion indicates the severity of the water erosion hazard on an 8 class system, with 8 being most severe.

Land type	Land capability class	Dominant soil forms	Depth (cm)	Clay % A horizon	Clay % B horizon	Depth limiting layer	Erosion hazard class	% of land type
Fb1	5	Mispah	10-30	12-25		R, ca	5	44
		Hutton	60-120	10-15	15-25	R, ca		20
		Hutton	60-120	6-12	8-15	R, ca		7
		Clovelly	60-120	6-12	8-15	R, ca		6
		Shortlands	45-90	18-30	35-50	R		5
Ae45	5	Hutton	45-90	6-12	8-15	R, ca	5	27
		Hutton	25-60	8-15	15-30	R		22
		Mispah	10-30	12-20		ca		14
		rock outcrop						9
		Sterkspruit	10-30	8-20	25-40	pr		9
		Mispah	10-30	10-18		R		8

Land capability class 5 = non-arable, moderate potential grazing land. Depth limiting layers: R = hard rock; ca = hardpan carbonate; pr = dense, prismatic clay layer.

3. POTENTIAL IMPACTS

The following have been identified as potential impacts on agricultural resources and productivity, the significance of which will be determined during the EIA Phase. All these impacts are local in extent, confined to the site, but include the site of the construction of new power lines within and beyond the site boundaries (if this option is chosen), but due to the very small footprint of power line construction, will be of very minor significance.

1. Loss of agricultural land use due to direct occupation by PV panels and other infrastructure, including roads, for the duration of the project (all phases). This will take affected part of the farm portion out of agricultural production.
2. Soil erosion due to alteration of the land surface run-off characteristics. Alteration of run-off characteristics may be caused by construction related land surface disturbance, vegetation removal, the establishment of hard standing areas and roads, and the presence of panel surfaces. Erosion will cause loss and deterioration of soil resources and may occur during all phases of the project.
3. Degradation of vegetation due to vehicle trampling, during construction phase.
4. Loss of topsoil due to poor topsoil management (burial, erosion, etc) during construction related soil profile disturbance (levelling, excavations, road surfacing etc.) and resultant decrease in that soil's agricultural suitability.
5. Generation of alternative land use income.
6. Cumulative impacts due to the regional loss of agricultural resources and

production as a result of other developments on agricultural land in the region.

4. THE POTENTIAL SIGNIFICANCE OF IMPACTS

The significance of agricultural impacts is influenced by the limited agricultural potential of the land which is suitable only for grazing. As a result, agricultural impacts are not likely to be of high significance. Mitigation measures can also be put in place to reduce the significance of certain of these impacts, such as erosion.

5. ASSESSMENT TO BE UNDERTAKEN IN THE EIA PHASE

The following assessments will be undertaken in the EIA phase:

4.1 More detailed assessment of soil conditions

The EIA phase assessment will include a field investigation of soils and agricultural conditions across the site. This field investigation will be aimed at ground proofing the existing land type information and understanding the specific soil conditions on site. It will not be based on a grid spacing of test pits but will comprise a reconnaissance type of soil mapping exercise based on an assessment of surface conditions, topography, and hand augered samples in strategic places, if necessary. Such a soil investigation is considered adequate for the purposes of this study. A more detailed soil investigation is not considered likely to add anything significant to the assessment of agricultural soil suitability for the purposes of determining the impact of the development on agricultural resources and productivity.

4.2 Assessment of erosion and erosion potential on site

The field investigation will involve a visual assessment of erosion and erosion potential on site, taking into account the specifics of the proposed development layout.

4.4 Assessment of specific on-site agricultural activities

The EIA phase will gather more detail on agricultural activity on the site and identify any locally important soil and agricultural issues. This will be done through interviews with farmers and agricultural role players in the area.

4.5 Terms of reference for EIA study

The terms of reference for the EIA study will include the requirements for an agricultural study as described under point 4 of section C of the National Department of Agriculture, Forestry and Fisheries document: *Regulations for the evaluation and review of*

*applications pertaining to renewable energy on agricultural land***,** dated September 2011.

The above requirements together with requirements for an EIA specialist report may be summarised as:

- Identify and assess all potential impacts (direct, indirect and cumulative) and economic consequences of the proposed development on soils and agricultural potential.
- Describe and map soil types (soil forms) and characteristics (soil depth, soil colour, limiting factors, and clay content of the top and sub soil layers).
- Map soil survey points.
- Describe the topography of the site.
- Do basic climate analysis and identify suitable crops and their water requirements.
- Summarise available water sources for agriculture.
- Describe historical and current land use, agricultural infrastructure, as well as possible alternative land use options.
- Describe the erosion, vegetation and degradation status of the land.
- Determine and map, if there is variation, the agricultural potential across the site.
- Provide recommended mitigation measures, monitoring requirements, and rehabilitation guidelines for all identified impacts.

5. REFERENCES

Agricultural Research Council. Undated. AGIS Agricultural Geo-Referenced Information System available at http://www.agis.agric.za/.

Water Research Commission. Undated. South African Rain Atlas available at http://134.76.173.220/rainfall/index.html.

ESTABLISHMENT OF THE PROPOSED

BLACKWOOD SOLAR ENERGY FACILITY

FREE STATE

AN INITIATIVE OF BLACKWOOD

SOLAR ENERGY FACILITY (Pty) Ltd

DEA: 14/12/16/3/3/2/281.

EIA: Visual Scoping Phase

For

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On behalf of

BLACKWOOD

SOLAR ENERGY FACILITY (Pty) Ltd

August 2013

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ESTABLISHMENT OF THE PROPOSED

BLACKWOOD SOLAR ENERGY FACILITY

FREE STATE

EIA: Visual Scoping Phase

CONTENTS:

FIGURES

Abbreviations used in the Report:
Asl : above sea level. m: metres

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EXECUTIVE SUMMARY

Visual Scoping Phase

Blackwood Solar Energy Facility (Pty) Ltd proposes to construct a commercial photovoltaic (PV) facility with a net generating capacity of up to 75 megawatt (MW), and associated infrastructure, on a site in the Free State, about 25km south east of Kimberley.

Alternatives were identified for assessment, and all stages of the proposed project were considered, viz., the Construction Phase, Operational Phase and any Decommissioning Period.

This visual scoping study was a desk based study. Potential visual receptors were identified as far as practicable and the nature of the receiving environment was described.

The Visual Scoping Report concluded by identifying potential sensitive receptors, and also the potential environmental issues which have been listed and described.

The number of identified environmental issues as being potentially associated with the development in the foregoing paragraphs justifies proceeding to the EIA phase.

1.0 INTRODUCTION

1.1 Background

1.1.1 Brief

Savannah Environmental (Pty) Ltd has been appointed to undertake the required environmental process, i.e. the Scoping and the EIA, for the proposed Blackwood PV Facility as required in terms of the National Environmental Management Act (No. 107 of 1998), as amended, on behalf of the client.

Savannah Environmental (Pty) Ltd, (Savannah), has commissioned Karen Hansen, Landscape Architect, as an independent Visual Impact Assessment practitioner to provide this Visual Scoping Study for the development.

1.1.2 Project Overview

Blackwood Solar Energy Facility (Pty) Ltd proposes to construct a commercial photovoltaic (PV) facility with a generating capacity of up to 75 Megawatt (MW), and associated infrastructure, on a site in the Free State. The location of the site is the remainder of Portion 1 of Farm Pandamsfontein 1593 located within the Tokologo Local Municipality about 25km south east of Kimberley (grid reference: 28°53'54.00"S / 24°56'32.00"E). The site has been measured at 1467.8899ha.

1.1.3 Layout Issues

The proposed ground area supporting the development would be up to 300ha in extent which would allow for the final location of the development to be undertaken on the portion of the site considered optimally appropriate.

This study is the baseline assessment for the Scoping Phase. The associated infrastructure could include photovoltaic panels, buildings, roads, services, and a power line to connect into the existing grid.

1.2 Terms of Reference

1.2.1 Scope

The scope of the work in this specialist Study is as follows:

- A baseline assessment for the scoping phase. These initial assessments determine the sensitivity of the visual issues and determine the need for a full level 3 VIA.
- A written and illustrated report of the identification of key issues and concerns relating to potential visual impacts arising from the project; and the determination of the boundaries and parameters for the visual study.
- The use of mapping and photos as appropriate.

In terms of evaluation criteria, use the criteria specific for Visual Impact Assessments listed in the Department of Environmental Affairs and Development Planning guideline document: 'Guideline for involving Visual and Aesthetic Specialists in EIA processes'.

1.2.2 Methodology

The following sequence of work was employed in this Visual Scoping Report.

A desktop survey was made using 1:250,000 and 1:50,000 topographical survey maps to assess the site setting, to identify landform, landscape and habitation patterns as well as to assess the probable viewshed. Additional research was undertaken using aerial photography from Google Earth and terrain analysis software.

1.2.3 Determination of the Theoretical Viewshed

For this study, the specialist has determined that the maximum distance from the likely perimeters of the photovoltaic installation that would be assessed, could generally extend to 3.5km. It is however recommended that the visibility up to 5km be tested on site. This theoretical viewshed is arrived at from a combination of the type of infrastructure, its possible height, the extent of the site and the long open views in this locality. This should be ground truthed in the detailed assessment phase.

1.2.4 Assumptions and Limitations

The information and deductions in this report are based on information received from Savannah, and the specialists' findings.

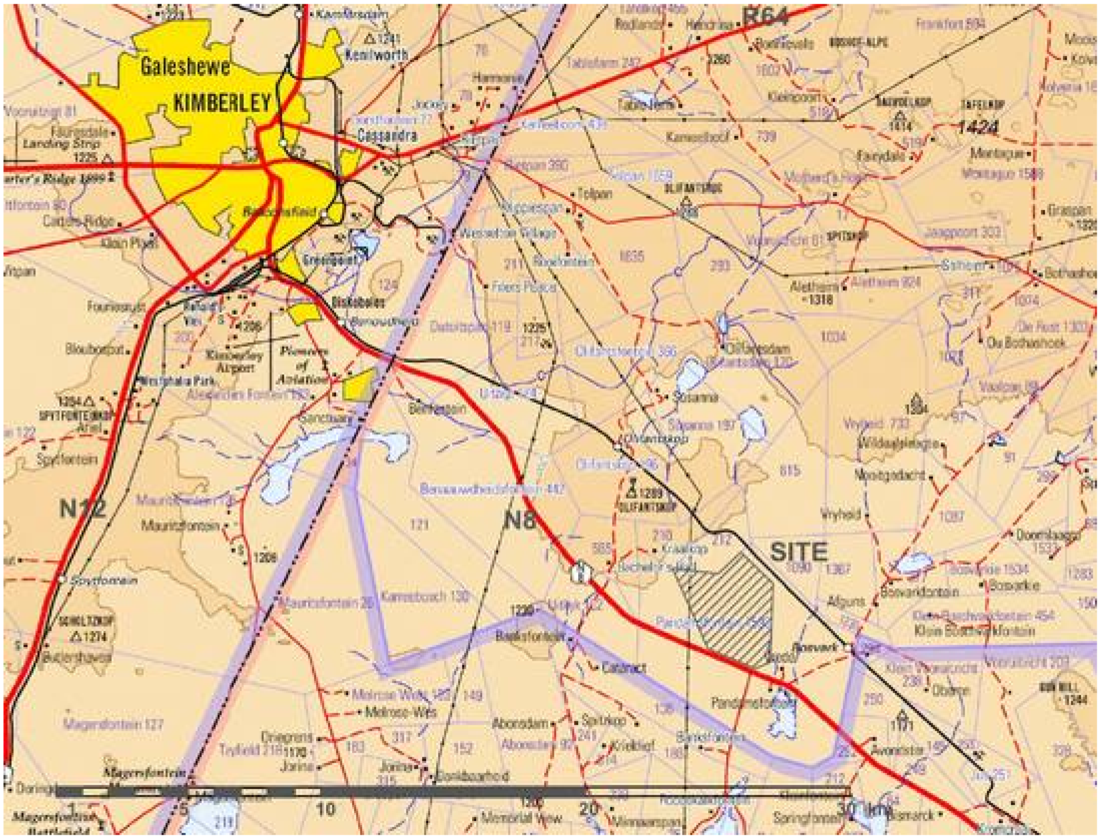

Fig 1.1. Location of the Proposed Site, Kimberley, and main roads in the area. Source 2824-2003-ED3-MD-199802-GEO 1:250,000. Chief Directorate Surveys and Mapping, Cape Town/Hansen

2.0 PROJECT CONTEXT

2.1 Solar Energy Facility, (SEF).

Sunlight can be converted directly into electricity using photo-voltaics (PV), which uses solar cells to convert sunlight into direct current (DC).

A PV system consists of units of cells containing the photovoltaic material, mechanical and electrical connections, mountings and ways of regulating and modifying the electrical output.

Several solar cells are combined into PV modules (solar panels), which are in turn connected together into an array. The electricity generated is fed into the electricity grid. This requires the conversion of direct current (DC) from the PV array into alternating current (AC) by a specialised, grid-controlled inverter. These solar inverters contain special circuitry (transformers, switching and control circuits) to precisely match the voltage and frequency of the grid and to disconnect from the grid if the grid voltage is turned off.

The advantages of electricity generation using solar energy are:

- Renewable source of power from the sun
- Free of pollutants, and noise, and generally low maintenance
- PV systems have a long life and durability. Cells can last 25-30 years and as the system is modular it can expand if demand increases.

2.2 The Proposed Development

2.2.1 Panels

- The solar arrays will be likely to be oriented towards the north
- The panels are expected to be approximately 1.0m by 2.0m in size, and approximately 350,000 in number
- The height of the arrays including mountings, would be about 3.5m
- They would be either fixed-tilt, single-axis tracker

2.2.2 Other infrastructure

- Inverters – there would be approximately 60 stations/mini sub-stations at a height of about 3m (typical for net 75 MW generating installation)
- Distribution transformers, main transformer and substation

2.2.3 Power Lines

- Overhead electricity distribution lines; loop in loop out of the existing 132kV HV line between Kimberley DS and Skietpan Switching Station which crosses the western part of the site, or

» A new direct connection from the new on-site substation to the Boundary substation. This would comprise one 132kV line and servitude over 20km. The power line would be about 32m high and the servitude would be 31-40m in width.
» Cabling through the site may be underground or above ground.

2.2.4 Buildings

» There would be several on the site, such as the control centre, offices, and warehouses

2.2.5 Roads and Access

» Existing roads to be used where practicable, otherwise 5m wide gravel roads would be constructed with shorter surfaced sections as required.
» A perimeter fence may be required.

2.2.6 Services

» Water will be required during both the construction and the operational periods. If available from a borehole, water will be piped or pumped to where it is needed; if provided by the Municipality, it will be trucked to the site.
» Sewerage during the construction period would be dealt with using a package plant; during the operational period using a septic tank.

2.2.7 Construction Period

» Total timeframe estimated at 21 months
» Temporary lay-down areas required estimated at 200m x 150m.

2.2.8 Operational Period

» Timeframe estimated at 20 years or more.

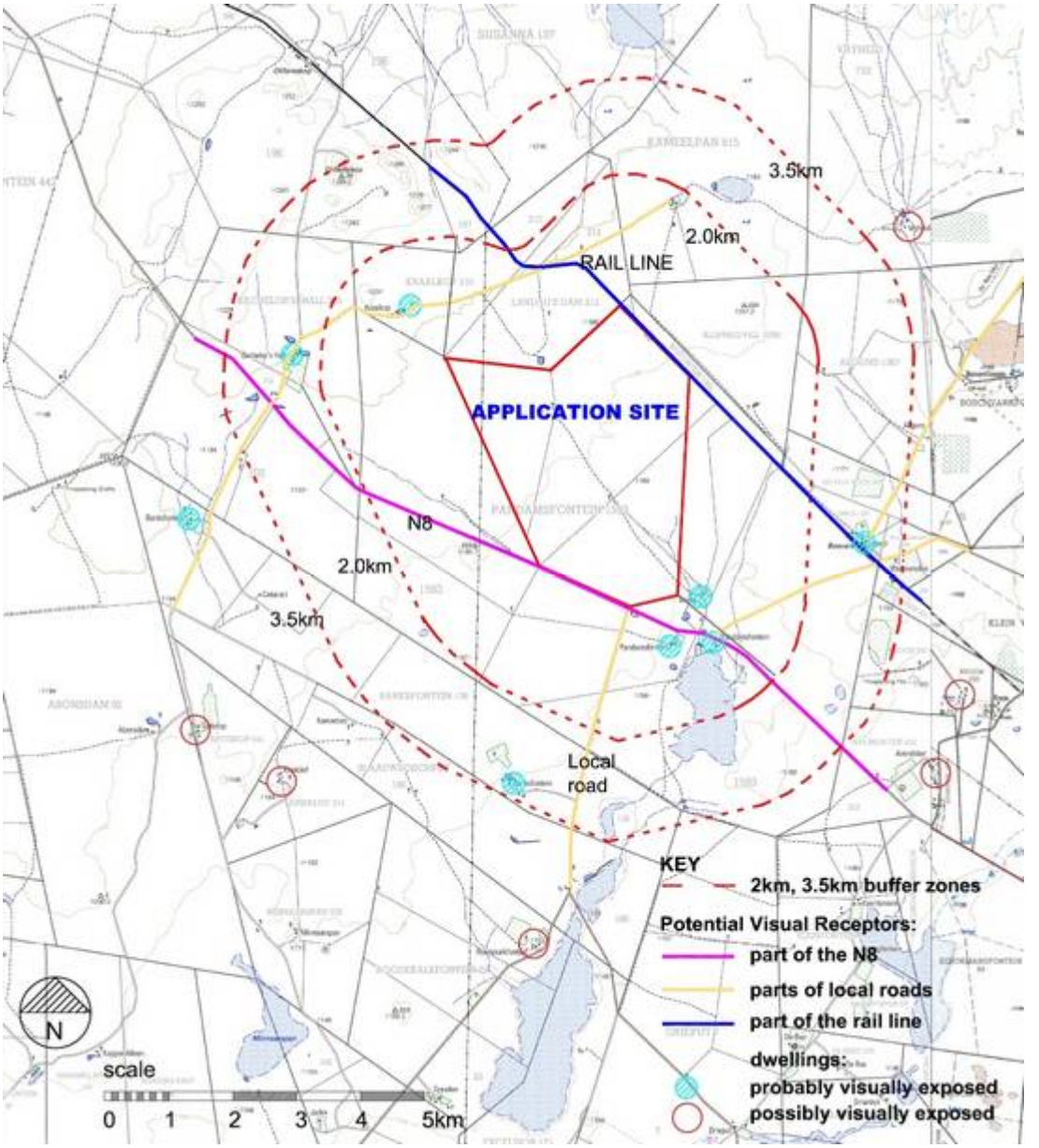

Figure 2.1 Potential Visual Receptors such as the farmsteads and the transport corridors within the 2km and 3.5km range rings. Source: 2824DD-1997-ED4-GEO; 2825CC_1986-ED2-GEO; 1:50,000. Chief Directorate Surveys and Mapping, Cape Town/Hansen

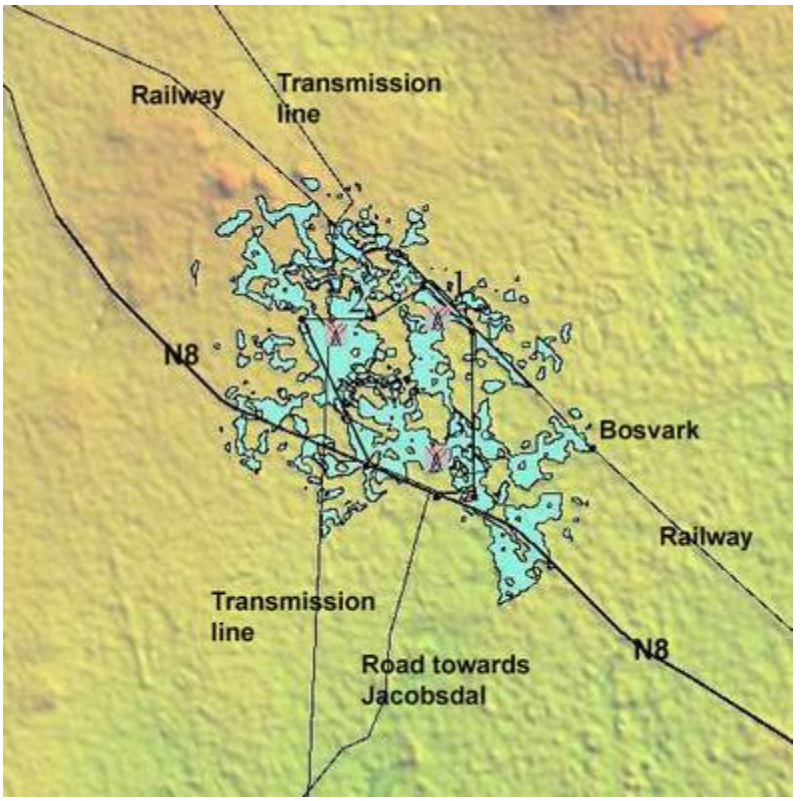

Figure 2.2 Potential Viewsheds generated on terrain analysis software and illustrating the view catchment areas at 3.5km distance from three stations on the site. The visual impact from each of these stations would be broken up by topography. Viewpoint 1 to the north of the site affects 12% of the area which could be affected in comparison with the other 2 viewpoints affecting 23%. Source: Hansen

3.0 VISUAL EXPOSURE/VISIBILITY

Preliminary viewshed analyses for the proposed facility, (and based on infrastructure height) are shown on the map above. This is based on terrain analysis only and does not take account of screening objects such as existing vegetation or buildings.

The viewshed analyses would be refined once a preliminary and/or final layout of the facility is completed and would be regenerated to account for the actual position of the infrastructure on the site, and its dimensions.

Receptors within 0 to 2.5km of the proposed facility would be likely to have a clear view, and would include farmsteads and road and railway users.

Receptors up to 5km distance would look over vacant natural land and would include farmsteads and road and rail users; visual exposure would reduce in intensity but the facility would be visible.

Receptors beyond 5km distance would be expected to experience a much reduced visual impact from the facility; the facility may not form the focus of the view.

Conclusion: receptors up to 2.5km away could experience a visual impact of high magnitude.

4.0 NATURE OF THE RECEIVING ENVIRONMENT

4.1 General

Landscape Character is the distinct and recognisable pattern of elements that occur consistently in a particular type of landscape, and how this pattern is perceived. It reflects particular combinations of geology, landform, soils, vegetation, river systems, land use and human settlement. It creates the definite sense of place of different areas of the landscape.

4.2 Location and Routes

The application site lies about 25km south-east of Kimberley and between the N8 and the Bloemfontein-Kimberley railway line. There is a railway station (Bosvark) located 2.7km away. The site may be accessed off the N8. There is an airport at Kimberley, 18kmaway; the proposed development may be visible to users from the air.

There are other minor roads and small centres of habitation in the broader region. There are a number of points of interest within a 20km radius that may imply that the local routes close to the site are accessed by tourists.

4.3 Topography

The site slopes from northwest, at about 1190m, down to south-east at about 1160m asl. The highest point locally is about 3.5km away to the north, at 1230m, 'Olifantskop'.

4.4 Rivers

The River Modder, (perennial), lies about 11km away to the south. There are pans in the area, but none are found on the site. There are seasonal watercourses locally.

4.5 Natural Vegetation

The site lies within the Savanna Biome, (source: SANBI). The dominant vegetation is grasses, with small trees. Fires can occur within this biome.

4.6 Agriculture

Agriculture is the primary land use on the site and in the immediate locality and may consist of small stock farming with some cattle and grasslands. Field sizes are large,

and mainly defined by fencing. There are some farmsteads, which are permanent dwellings, local to the site within 3 to 4km.

4.7 Other land uses

There is evidence of surface mining locally. Electricity power lines cross the site. Further land uses would be investigated on site during the EIA phase of the process.

4.8 Visual significance of the area

The visual signposts to signal the exact location of the application site are from its proximity of the N8 to the west and to the railway line to the east. The site could be held in view by users of the N8, by users of other local roads and by rail users. People living in farmsteads locally may become visually aware of the development.

The landscape character of the site, and locally is open grassland with few centres of habitation, transmission lines, and gravel roads. It has value for agriculture and some value for tourism. Views seem to be long and open in all compass directions.

The simplicity of the landscape forms and the long open views bring visual clarity to the landscape; that is, the visual clutter brought by the proposed development will alter existing landscape character.

Figure 3.1 View over the application site looking north, from the N8. Source Google Earth

5.0 ISSUES TO BE CONSIDERED IN THE IMPACT ASSESSMENT

5.1 Application Site

A solar array of up to 75W is proposed to be constructed over a 300ha area. Overhead transmission lines would be required to connect the proposed solar PV facility with Eskom's grid; determine the specification and location. The visual implications of any removal of vegetation from the site would be assessed, and also the provision of fencing. Also to be considered are any significant changes to site levels, the location(s) of access, and descriptions of any built form.

5.2 Construction phase

During the construction phase a construction camp/lay down area may be located on the site for the storage of components. There may be mess facilities and offices. Determine and assess these potential impacts. The components may be hauled by either road or rail, from their place of manufacture or from a port.

5.3 Operational Phase

Water supply infrastructure would be needed during the construction phase, and may be required to clean the panels and for dust suppression during the operational phase; this may be from a borehole or a municipal supply; may therefore require the construction of a pipeline or be trucked to the site.

5.4 Decommissioning phase

The PV site may be decommissioned at the end of the Power Purchase agreement period; the materials may be removed for recycling and the site abandoned, continue in use as a PV facility, or be developed for a different use; to be included in the impact assessment.

5.5 Alternatives

- Site layout alternatives: various locations for the development within the application site would be assessed to reduce visual impact.
- Technology alternatives: options in the design of the infrastructure such as:
  - Fixed panels which are static,
  - Single axis tracking, set to track the sun from east to west
  - Double axis tracking, set to track the full diurnal variation of the sun
  - Options in the design of the mounting systems.
- Location alternatives: for the power line.
- Cabling: may be underground or overhead.
- Activity alternatives: energy generation from the solar energy facility and the 'no go' alternative, where the site is not developed.

6.0 POTENTIAL VISUAL IMPACT

Potential visual impacts associated with the proposed project that should be addressed in the EIA phase are detailed below.

6.1 Table 1 Potential Receptors: sensitive receptors are those who could be considered to be negatively impacted upon by any perceived change in landscape character, and who would either hold the view for a noticeable length of time and/or who would hold the view frequently. Refer to Figure 2.1.

	Potential Receptor	Reason
6.1.1	Users of existing transport corridors including, in each case, travelling in each direction, i.e. N8 and railway line **sensitive receptors**	The development could be held in view for some time; changed landscape character; increased visual clutter
6.1.2	Other local roads, **sensitive receptors**	The development could be held in view for some time; changed landscape character; increased visual clutter
6.1.3	People living and working locally : **sensitive receptors**	Would be aware of different land use; changed landscape character
6.1.4	Local tourist facilities	Routes to and from these facilities, numbers/frequency not known

6.2 Table 2 Potential Environmental Issues of the Solar Facility and its Infrastructure

Environmental Issues: list

Rating, (**R**): qualifies the impact: Direct, (**D**), Indirect, (**I**), or Cumulative, (**C**)

Nature: description of what causes the effect

Extent, (**E**): rated: Local, (**L**), within 2km, or Regional, (**R**), graded 1 to 5.

Significance, (S):the potential significance of the identified issues based on the evaluation of the issues/impacts and rated Low, (**L**), Moderate, (**M**), High, (**H**).

	Environmental Issues	R	Nature	E	S
6.2.1	The distance of receptor to development is one of the determinants of the degree to which the development will be visible.	I	There are receptors within 5km.	R 2	M
6.2.2	The development will be visible to people living, working and travelling within up to 5km distant.	D	Sensitive receptors	R 3	M
6.2.3	This development is considered to be industrial and to introduce a somewhat different element into an agricultural area in terms of its scale and function.	D	Significant views will be obtained by the receptors. Factors affecting visibility: proximity, duration, extent.	R 2	M
6.2.4	Arrays of solar panels mounted to a height of 3.5m.	D	New industrial element in the landscape. Large man-made structures superimposed on a rural landscape.	R 4	M-H
6.2.5	New substation, buildings fencing, etc.	D	May create visual clutter.	L 2	M
6.2.6	Cladding materials, colours, massing, heights of buildings.	D	Location, grouping and heights of buildings.	L 2	M-L
6.2.7	Location of road access.	D	Visible access point(s)	L 2	M
6.4.8	Septic tank.	D	Depending on location on site may have visual impact.	L 1	
6.2.9	Water supply to site.	D	May have visual impact	L 1	L
6.2.10	Elements beyond the site, mainly topographical, that can provide shielding/ backgrounding of the development for some receptor groups.	I	Olifantskop, to the north west of the site, may offer shielding/backgrounding.	R 2	M

	Environmental Issues	R	Nature	E	S
6.2.11	The site is visually exposed, little screening on- or off-site.	C	Operational/ maintenance periods.	R 3	M
6.2.12	Effect of the removal and control of vegetation height within a PV installation.	D	Adds to visual exposure Changes character of site.	R 4	M
6.2.13	The duration of the construction period.	D	Visual impact of construction traffic, deliveries, lay down areas, accommodation, offices, and working times.	L 4	M
6.2.14	The duration of the operational period, up to and beyond 20 years.	D	Maintenance crews, inspections, maintenance operations.	R 3	M
6.2.15	A decommissioning period	D	Decommissioning may affect visual impact	L 4	M

6.3 Potential Environmental Issues of the Power Lines.
The determinants of the degree of visual impact are set out below

Generated power from the SEF will either be fed to the local substation on site or to the substation at Boundary, about 20km away. In order to determine and compare the degree of visual impact from each alternative the following factors will be examined:

- The type of upright – timber, lattice, or monopole
- The location of the route and its proximity to sensitive receptors.
- Servitude, (31 to 40m wide) from site to Boundary substation 20km long
- Changes of direction
- Any backgrounding opportunities
- Any opportunities for the new route to run in parallel with an existing route

Proposed preferred route: in parallel with the existing line which is aligned north-south and crosses through the north-west corner of the site, up to where it turns west to track towards Kimberley. At that point it could change direction to the east and to Boundary substation.

Proposed alternative route:

To leave the site on a route as described above and cross the railway line. To then not traverse north-west, but north-north-east to meet with a line at Aletheim, and then to run in parallel with that line which goes straight to the Boundary substation.

6.4 Alternatives (ref para. 2.3.5)
A comparison of the identified feasible alternatives and nomination of a preferred alternative for consideration in the EIA phase

6.4.1 Site layout alternatives for SEF:
Desk top assessment of the zone of visual influence indicates that there is little difference in the degree of impact for sensitive receptors, see Figure 2.2. However the north of the site appears to be more distant for most receptors, and the east of the site could benefit from more shielding due to its lower gradients.
Those issues could imply that the north and east of the site would be more favourable in terms of visual impact index. Layout should be ground truthed for final layer of evaluation.

6.4.2Technology alternatives for SEF:
- Fixed PV
- Single axis tracking
- Double axis tracking

Elements within a development which move, have a higher visual impact index than those that are static, and therefore Fixed PV could be deemed to have a lesser visual impact index.

6.4.3 Technology alternatives for mounting systems:
- Ground screws or hammered pile foundations
- Concrete foundations

The visual impact index for these mounting systems would be evaluated; concrete foundations could impact upon flora systems and could then have a marginally greater, indirect, visual impact.

6.4.4 Location alternatives for the power line:
- On site
- New power line to Boundary Substation

Comparison between the two options may show that the short connection to the local substation may have a lesser impact than the connection to Boundary substation.

6.4.5 Cabling:
- Underground

» Overhead

Overhead cabling could have a higher visual impact index than underground cabling, if those trenching works were reinstated to a defined standard.

6.4.6 No-Go Alternative

The site may be developed for the same or a different purpose in the future

7.0 CONCLUSIONS

7.1 Identification of potentially significant environmental impacts

The number of issues identified to be associated with the proposed development in the foregoing paragraphs justifies proceeding to the EIA phase.

The potentially significant impacts to be assessed within the EIA phase are:

» The potential visibility of the development from the surrounding terrain, transport corridors, places of habitation and labour
» The receiving environment and the proposed project in terms of landscape types, landscape character and land use patterns
» The sense of place, spatial and temporal boundaries

» The view catchment area, view corridors, viewpoints and receptors
» The relative visibility or visual intrusion of the proposed project
» The relative compatibility or conflict of the project with the surrounding land uses in terms of visibility
» The ability of the landscape to absorb the development
» The significant and sensitive receptors

» The technical specifications of the infrastructure elements
» The potential negative visual impact during the construction phase
» The potential visual impacts during the life of the project
» Potential lighting impacts at night
» Compare the of opportunities and constraints of the alternatives
» Consider mitigation measures to reduce the impacts
» Assess cumulative impacts
» Assessment of the expected community response

7.2 Methodology for Assessing the Potential Environmental Impacts

» Consider the potentially significant impacts listed above
» Graphics and Images: use mapping and photo-montage techniques as appropriate
» Assessment criteria: use the criteria specific for Visual Impact Assessments

listed in the Department of Environmental Affairs and Development Planning guideline document "Guideline for involving visual and aesthetic specialists in EIA processes" outlined in Addendum 1, and

» The norms and standards Project Specific Information, Assessment of Impacts, of the document: 'Specialist Input for Blackwood Solar Energy Facility' prepared by Savannah Environmental (Pty) Ltd. outlined in Addendum 1.

7.2.1 Determine Visual Distance/Observer Proximity to the Facility

In order to refine the visual exposure of the facility on surrounding areas / receptors, the principle of reduced impact over distance is applied in order to determine the core area of visual influence for the PV structures.

7.2.2 Determine Viewer Incidence/Viewer Perception

The number of observers and their perception of a structure determine the concept of visual impact. If there are no observers, then there would be no visual impact. If the visual perception of the structure is favourable to all the observers, then the visual impact would be positive.

It is therefore necessary to identify areas of high viewer incidence and to classify certain areas according to the observer's visual sensitivity towards the proposed facility and its related infrastructure.

7.2.3 Determine the Visual Absorption Capacity of the Landscape

This is the capacity of the receiving environment to absorb or screen the potential visual impact of the proposed facility. The VAC is primarily a function of the vegetation, and will be high if the vegetation is tall, dense and continuous. Conversely, low growing sparse and patchy vegetation will have a low VAC.

The VAC would also be high where the environment can readily absorb the structure in terms of texture, colour, form and light / shade characteristics of the structure. On the other hand, the VAC for a structure contrasting markedly with one or more of the characteristics of the environment would be low.

The VAC also generally increases with distance, where discernible detail in visual characteristics of both environment and structure decreases.

7.2.4 Determine the Visual Impact Index

The results of the above analyses are merged in order to determine where the areas of likely visual impact would occur. These areas are further analysed in terms of the previously mentioned issues (related to the visual impact) and in order to judge the severity of each impact.

The above exercise should be undertaken for the core solar energy facility as well as the ancillary infrastructure, as these structures (e.g. the substation and power line) are envisaged to have varying levels of visual impact at a more localised scale.

The site-specific issues (as mentioned earlier in the report) and potential sensitive visual receptors should be measured against this visual impact index and be addressed individually in terms of nature, extent, duration, probability, severity and significance of visual impact, as well as suggested mitigation measures.

Addendum 1 : Visual Impact Assessments : Definitions and Ratings

Visual Impact Assessments : Definitions and Ratings

Referred to are criteria specific to visual impact assessments referred to in the DEA&DP guideline document and which are as follows:

Viewshed

The viewshed refers to the theoretical outer-most extent of the area from which an object may be seen. Visibility can be obscured in part or in whole by objects within the viewshed such as existing buildings, trees, or landform.

Rating – not rated, a description given

Visibility of the Site

A description of the actual places within the view shed from which the site can be seen; significant views are discussed

Rating: not rated, a description given

The Extent of the Visual Impact

Rates the impact in terms of the geographical area that will be influenced by the visual impact

Ratings :

- no impact: no visual impact
- limited: visual impact is small, generally confined to the site
- local: the site and the immediate surrounding area, (1-5km)
- sub-regional: a greater area is influenced, (5-10km)
- regional: the influence extends to an entire region
- national: the influence has national importance and extends beyond boundaries

Visual exposure

Visual exposure refers to the visibility of the project site in terms of the capacity of the surrounding landscape to offer screening. This is determined by the topography, tree cover, buildings, etc.

Ratings:

- no exposure: the site is hidden by topography, planting, etc
- low: the site is largely hidden
- medium: the site is partially hidden
- high: there is little in the surrounding landscape that can shield the development from view

Zones of visual influence

Describes the areas visually influenced by the proposed development, and assesses the amount of influence

Ratings:

- non-existent: the site cannot be seen from surrounding areas
- low: the development is largely shielded from view by topography, planting, etc
- moderate: the development is partially shielded
- high: the development strongly influences the view and acts as a visual focus

Visual Absorption Capacity

This refers to the ability of the surrounding area to visually absorb the development. In this assessment, high is a positive and low is a negative

Ratings:

- low: the area cannot visually absorb the development
- medium: the area can absorb the development to a degree but it will look somewhat out of place
- high: the area can easily visually absorb the development

Compatibility with Surrounding Landscape

This refers to the extent to which the proposed development and land usage is in line with the surrounding development and land usage.

Ratings:

- appropriate: the development will fit in well with the surrounding landscape
- moderately appropriate: the development can blend in, but to a lesser degree and only with care
- inappropriate: the development introduces new elements into the landscape that do not fit in.

Intensity or Magnitude, of Visual Impact

This refers to the degree to which the visual nature of the landscape will be altered.

Ratings:

- low: the impact is noticeable but does not act as a strong focus in the landscape
- moderate: the landscapes visual nature is altered in a way that is noticeable
- high: the visual impact of the development intrudes into the landscape in a noticeable way

Duration of visual Impact

The duration of the impact upon its surroundings

Ratings:

- temporary: one year or less
- short term: one to five years
- medium term: five to fifteen years
- long term: more than fifteen years

Significance of the Visual Impact

This rating combines the other ratings and looks at the overall impact

Ratings:

- very low: the visual impacts will be limited to the site itself
- low: the impacts will be local, and/or in the short term
- moderate: the impacts will be experienced locally and may lead to permanent change in the local landscape
- high: these impacts will be experienced over a wide area, or sub regionally and will be irreversible

Potential Cumulative Visual Impacts

Looks at the accretion of similar developments over time

Ratings: not rated, a description given

Report Format: Environmental Impact Assessment Report

For each project, the EIA report must include:

» an indication of the methodology used in determining the significance of potential environmental impacts
» a description of all environmental issues that were identified during the environmental impact assessment process
» an assessment of the significance of direct, indirect and cumulative impacts in terms of the following criteria:
  * the *nature* of the impact, which shall include a description of what causes the effect, what will be affected and how it will be affected
  * the *extent* of the impact, indicating whether the impact will be local (limited to the immediate area or site of development), regional, national or international
  * the *duration* of the impact, indicating whether the lifetime of the impact will be of a short-term duration (0–5 years), medium-term (5–15 years), long-term (> 15 years, where the impact will cease after the operational life of the activity) or permanent
  * the *probability* of the impact, describing the likelihood of the impact actually occurring, indicated as improbable (low likelihood), probable (distinct possibility) , highly probable (most likely), or definite (impact will occur regardless of any preventative measures)
  * the *severity/beneficial scale*, indicating whether the impact will be very severe/beneficial (a permanent change which cannot be mitigated/permanent and significant benefit, with no real alternative to achieving this benefit), severe/beneficial (long-term impact that could be mitigated/long-term benefit), moderately severe/beneficial (medium- to long-term impact that could be mitigated/ medium- to long-term benefit), slight or have no effect
  * the *significance*, which shall be determined through a synthesis of the characteristics described above 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
» a description and comparative assessment of all alternatives identified during the environmental impact assessment process
» recommendations regarding practical mitigation measures for potentially significant impacts, for inclusion in the Environmental Management Programme (EMP)
» an indication of the extent to which the issue could be addressed by the adoption of mitigation measures

» a description of any assumptions, uncertainties and gaps in knowledge
» an environmental impact statement which contains:
  * a summary of the key findings of the environmental impact assessment;
  * an assessment of the positive and negative implications of the proposed activity (one alternative only in EIA phase);
  * a comparative assessment of the positive and negative implications of identified alternatives

Assessment of Impacts

Direct, indirect and cumulative impacts of the issues identified through the scoping study, as well as all other issues identified in the EIA phase must 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**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
» The **duration**, wherein 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 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 of 1–5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 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 and can be assessed as low, medium or high; and

» 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 calculated by combining the criteria in the following formula:

S=(E+D+M)P

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).

Assessment of impacts must be summarised in the following table format. The rating values as per the above criteria must also be included.

Example of Impact table summarising the significance of impacts (with and without mitigation)

Nature:		
	Without mitigation	**With mitigation**
Extent	High (3)	Low (1)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	36 (Medium)	24 (Low)

Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	Yes
Mitigation: Mitigation Measures		
Cumulative impacts: Cumulative Impacts		
Residual Impacts: Residual Impacts		

Measures for inclusion in the draft Environmental Management Programme must be laid out as detailed below:

OBJECTIVE: Description of the objective, which is necessary in order to meet the overall goals; these take into account the findings of the environmental impact assessment specialist studies

Project component/s	List of project components affecting the objective
Potential Impact	Brief description of potential environmental impact if objective is not met
Activity/risk source	Description of activities which could impact on achieving objective
Mitigation: Target/Objective	Description of the target; include quantitative measures and/or dates of completion

Mitigation: Action/control	**Responsibility**	**Timeframe**
List specific action(s) required to meet the mitigation target/objective described above	Who is responsible for the measures	Time periods for implementation of measures

Performance Indicator	Description of key indicator(s) that track progress/indicate the effectiveness of the management plan.
Monitoring	Mechanisms for monitoring compliance; the key monitoring actions required to check whether the objectives are being achieved, taking into consideration responsibility, frequency, methods and reporting

Addendum 2 : Declaration of Interest

In terms of Chapter 5 of the National Environmental Management Act of 1998

I hereby declare that I have no conflicts of interest related to the work of this project. Specifically I declare that I have no personal or financial interests in the property and/or the development being assessed in this report and that I have no personal or financial connections to the relevant property owners, developers, planners, financiers, or consultants of the development. I declare that the opinions expressed in this report are our own, and a true reflection of our professional expertise.

Karen Hansen: signed

Date: 27th August 2013

Addendum 3: CV

Karen Hansen, Independent Consultant Landscape Architect

Qualifications

Chartered Membership of the Landscape Institute, UK, in 1982, registered nr. 11994.
Strathclyde University, Scotland, 1995, course in Environmental Impact Assessment covering the legislative background to, and practice of, Environmental Impact Assessment, with particular reference to Visual Impact Studies.

Experience in South Africa

2011 onward: Independent Consultant Landscape Architect specialising in, *inter alia*, Visual Assessments
2010 to **2011**: Consultant Landscape Architect to Viridian Consulting (Pty) Ltd.
2006 to **2010**: Senior Landscape Architect with Viridian Consulting, (Pty) Ltd., Somerset West, undertaking a number of landscape design projects as well as environmental studies.

Experience in UK

2000 to **2006**: Landscape Architect and Team Leader with Glasgow City Council. Master planning, design, implementation of the Heritage Lottery funded urban parks and urban dual carriageways.
1992 to **2000**: Partner at Kirklee Landscape Architects, Glasgow, Scotland, undertaking a number of landscape design projects as well as environmental studies.

Selected Environmental Studies:

Alternative Energy
Visual Scoping Study for Wind Turbines and Wind Measuring Masts in N and W Cape
Visual Impact Assessment, baseline studies, for Wind Measuring Masts, Vredendal, Worcester, and De Aar.
Visual Impact Assessments, level 3, for the establishment of Alternative Energy sites: Wind Farms, Photovoltaic installations and Concentrating Solar Power Installations in six centres in the Western and the Northern Cape, (De Aar, Vredendal, Worcester, Bitterfontein/Namaqualand, Springbok, Copperton/Prieska).
Visual Impact Assessment, Baseline Study, Photovoltaic Installation in Vredendal, W Cape.
Visual Impact Assessment, level 3, for a Wind Farm near Koekenaap, W Cape.
Visual Impact Assessment, level 3, for a Wind Farm at Copperton, N Cape.
Visual Impact Assessment, level 3, Matzikamma Solar Park, Vredendal, W Cape.
Visual Scoping Study, Photovoltaic Installation, Aggeneys, N Cape.
Visual Impact Assessment, level 3, Two Wind Farms, Eastern Plateau, De Aar, N Cape.
Visual Impact Assessment, level 3, Three Photovoltaic Installations, at Paarde Valley, Badenhorst Dam Farm, Annex du Plessis Farm, at De Aar, N Cape.
Visual Impact Assessment, level 3, Photo-voltaic installation, Hoekplaas Farm, Copperton, N Cape.
Visual Impact Assessment, level 3, Photo-voltaic installation, Klipgats Pan, Copperton, N Cape.

Visual Impact Assessment, level 3, Photo-voltaic installation, Struisbult Farm, Copperton, N Cape.
Visual Impact Assessment, level 3, Wind Farm at Gouda, W Cape.

Transmission Lines
Visual Impact Assessment, level 2, De Wijnlanden Residential Estate, Stellenbosch.
Visual Impact Assessment, level 3, Maanhaarberg, and the Eastern Plateau, De Aar.

Transport corridors
Visual Impact Assessment, level 3, as well as design and Implementation of landscape works for major new road, 'Western Distributor Road', Glenrothes, Fife, Scotland.

Forestry/Greenbelt
Visual Impact Assessment, level 2, study of landscape aspects of felling and restocking of several areas of existing coniferous woodlands and change to native woodland species in catchment area for West of Scotland Water at Loch Katrine, Strathclyde, Scotland.
Visual Impact Assessment, level 3, for Central Scotland Countryside Trust, part of the process to determine future access and tree planting policy in the Greenbelt surrounding Falkirk, Scotland.

Residential
Visual Impact Assessment, level 2, of proposed coastal golf and housing estate in Prestwick, Scotland.
Visual Impact Assessment, level 3, for residential development at L' Avenir Winery, Stellenbosch Visual Impact Assessment, level 3, for proposed residential development over 3,460ha at St Helena Bay, W Cape, a core project of the St Helena SDI.
Visual Impact Assessment, level 3, for Phase 2 of De Zalze Golf Estate, Stellenbosch.
Visual Statement for security estate in residential suburb, Somerset West, W Cape
Visual Impact Assessment, level 3, for Haasendal II, Kuilsriver, Cape Town.

Mixed uses/Retail
Visual Impact Assessment, level 3, for Mixed Use Development at Mandalay, Khayelitsha, Cape Town.
Visual Impact Assessment, level 3, for change of use to Mixed Use Development for Crammix Brickworks, Cape Town.
Visual Impact Assessment, level 3, for a new Retail Mall, Philippi, Cape Town.
Visual Impact Assessment, level 3, for Suider-Paarl Business Park, Paarl, W Cape.

Industry
Visual Scoping Study for Scrap Metal Yard at Blackheath, Cape Town.
Visual Impact Assessment, level 3, Meerlust Wine Estate, Proposed Bottling Plant.
Visual Impact Assessment, level 3, for Agri-Industrial uses at Klapmuts, Paarl.

Education
Visual Impact Assessment, level 3, University of Cape Town Middle Campus, Rondebosch, for Urbanscapes, MLH Architects and UCT; to assess impacts derived from change of use of multi-level piazza to new lecture theatre and administration buildings

Tourism
Visual baseline study for tourism development at Kogel Bay Tourist Resort, Western Cape as part of the Development Framework Policy document.
Visual Impact Assessment, level 2, of hotel in airport context at Edinburgh Airport, Scotland.

Mining
Visual baseline studies for abandoned open cast mines for British Coal Opencast, at Knockshinnoch Nature Reserve, Ayrshire, and others, for recreational uses.
Visual Impact Assessment, Baseline Study, Palmiet Quarry Extension, Grabouw.

Karen Hansen has no business, financial, personal or other interest other than fair remuneration for work performed in connection with these studies and there are no circumstances that may compromise her objectivity in pursuing and serving the interests of the public.