

**SOCIAL IMPACT ASSESSMENT  
FOR  
WATERLOO 75 MW SOLAR ENERGY  
FACILITY  
NORTH WEST PROVINCE**

**JULY 2012**

**Prepared for**

**BOPHIRIMA SOLAR ENERGY (PTY) LTD**

**By**

**Tony Barbour and Schalk van der Merwe**

---

**Tony Barbour**

**ENVIRONMENTAL CONSULTING AND RESEARCH**

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

---

# **EXECUTIVE SUMMARY**

## **INTRODUCTION AND LOCATION**

Environamics was appointed by Bophirima Solar Energy (Pty) Ltd (hereafter Bophirima Solar) as the lead consultant to manage the Environmental Impact Assessment (EIA) process for the establishment of the proposed 75 MW Waterloo Solar Energy Facility (SEF) and associated infrastructure, on a site located approximately 5 km to the south-east of the town of Vryburg in the North West Province of South Africa.

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

## **PROJECT DESCRIPTION**

The basic infrastructure associated with proposed Waterloo 75 MW SEF facility would include:

- Photovoltaic (PV) Panel Arrays: Multiple panels will be required to form the solar PV arrays which will comprise the PV facility. The PV panels will be tilted at a fixed northern angle in order to capture the most sun.
- Wiring to Central Inverters: Sections of the PV array would be wired to central inverters which have a rated power of 500kW each;
- Connection to the grid: It is understood that the generated power would be evacuated into the Eskom 132/22 kV Bophirima substation on adjacent Woodhouse farm (currently under construction, but at same site as current 88/22kv Woodhouse substation). It is further understood that Eskom plans to construct a 400 kV line across Waterloo farm;
- Supporting Infrastructure: A control facility with basic services such as water and electricity will be constructed on the site and will have an approximate footprint 400m<sup>2</sup> or less. Other supporting infrastructure includes voltage and current regulators and protection circuitry.

Based on the information from other SEF projects the construction phase for a 75 MW SEF is expected to extend over a period of 18-24 months and create approximately 400 employment opportunities. The operational phase will employ approximately 53 people full time for a period of up to 20 years or more. The capital expenditure on completion is anticipated to be in the region of R 1.5 billion for the 75 MW facility.

## **APPROACH TO THE STUDY**

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

- Describing and obtaining an understanding of the proposed intervention (type, scale, location), the communities likely to be affected and determining the need and scope of the SIA;
- Collecting baseline data on the current social environment and historical social trends

- Identifying and collecting data on the Social Impact Assessment variables and social change processes related to the proposed intervention. This requires consultation with affected individuals and communities;
- Assessing and documenting the significance of social impacts associated with the proposed intervention; and
- Identifying alternatives and mitigation measures.

In this regard the study involved:

- Review of demographic data from the 2001 Census Survey;
- Review of relevant planning and policy frameworks for the area;
- Site specific information collected during the site visit to the area and interviews with key stakeholders;
- Review of information from similar projects; and
- Identification of social issues associated with the proposed project.

Due to the requirements for the generation of solar energy, no alternative sites were identified within the area. As such, the SIA does not assess any additional site alternatives for the project.

## **SUMMARY OF KEY FINDINGS**

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

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

### **Fit with planning**

The following key policy and planning documents were reviewed:

- 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);
- North West Province Growth and Development Strategy (2004-2014);
- Dr Ruth S Mompoti District Municipality Integrated Development Plan (IDP) 2012-2017;
- Bophirima District Municipality Spatial Development Framework (2007);
- Naledi Local Municipality IDP 2012-2017.

The findings of the review indicated that solar energy was strongly supported at a national and local level. At a national level the White Paper on Energy Policy (1998) notes:

- Renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future;
- The support for renewable energy policy is guided by a rationale that South Africa has a very attractive range of renewable resources, particularly *solar* and wind and

that renewable applications are in fact the least cost energy service in many cases; more so when social and environmental costs are taken into account.

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

At a provincial and local level the review found that high unemployment and poverty levels in the study area, coupled to low education and skills levels constitute the most urgent social development challenges in the study area. The findings of the SIA indicate that the proposed SEF has the potential to support local economic development and create employment opportunities. The proposed development therefore supports a number of key objectives contained in the NLM IDP.

In summary, the findings of the review of the relevant policies and documents pertaining to the energy sector therefore indicate that solar energy and the establishment of solar energy plants are supported at a national, provincial, and local level. It is therefore the opinion of the authors that the establishment of a SEF in the area is supported by national, provincial and local policies and planning documents.

### **Construction phase**

The key social issues associated with the construction phase include:

#### **Potential positive impacts**

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

The construction phase is expected to extend over a period of 18-24 months and create approximately ~ 400 employment opportunities. It is anticipated that approximately 55% (220) of the employment opportunities will be available to low skilled workers (construction labourers, security staff etc.), 30% (120) to semi-skilled workers (drivers, equipment operators etc.) and 15% (60) for skilled personnel (engineers, land surveyors, project managers etc.). The majority of the employment opportunities, specifically the low and semi-skilled opportunities, are likely to be available to local residents in the area, specifically residents from Vryburg and Huhudi. The majority of the beneficiaries are likely to be historically disadvantaged (HD) members of the community. This would represent a significant positive social benefit in an area with limited employment opportunities. However, in the absence of specific commitments from the developer to employ local contractors the potential for meaningful skills to local employment targets the benefits for members from the local communities may be limited. In addition, the low education and skills levels in the area may also hamper potential opportunities for local communities.

The capital expenditure associated with the construction phase will be in the region of R1.5 billion (2012 rand value). The total wage bill for the 18-24 month construction phase would be in the region of R 73.8-98.4 million (2012 rand value). A percentage of the wage bill will be spent in the local economy which will create opportunities for local businesses in Vryburg. The sector of the local economy that is most likely to benefit from the proposed development is the local service industry. The potential opportunities for the local service sector would be linked to accommodation, catering, cleaning, transport and security, etc. associated with the construction workers on the site. The benefits to the local economy will however be confined to the construction period (18-24 months).

### Potential negative impacts

- Impacts associated with the presence of construction workers on site and in the area;
- Influx of job seekers to the area;
- Loss of farm labour to the construction phase;
- Increased risk of stock theft, poaching and damage to farm infrastructure associated with presence of construction workers on the site;
- Increased risk of veld fires;
- Impact of heavy vehicles, including damage to roads, safety, noise and dust;
- Potential loss of productive farmland associated with construction-related activities.

The significance of the potential negative impacts with mitigation was assessed to be of Low significance. The majority of the potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented. In addition, given that the majority of the low and semi-skilled construction workers can be sourced from the local area the potential risk to local family structures and social networks is regarded as low. However, the impact on individuals who are directly impacted on by construction workers (i.e. contract HIV/ AIDS) was assessed to be of Medium-High negative significance.

Table 1 summarises the significance of the impacts associated with the construction phase.

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

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

## **Operational phase**

The key social issues affecting the operational phase include:

### **Potential positive impacts**

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

The total number of permanent employment opportunities is estimated to be in the region of 53. Of this total ~ 75% (40 would low skilled workers, 15% (10 semi-skilled and ~5% (3 skilled). The annual wage bill for the operational phase will be ~ R4.68 million (2012 rand value). The majority of the beneficiaries are therefore likely to be historically disadvantaged (HD) members of the community. Given the location of the proposed facility the majority of permanent staff is likely to reside in Vryburg.

The establishment of a Community Trust also creates an opportunity to support local economic development in the area. Community Trusts provide an opportunity to generate a steady revenue stream that is guaranteed for a 20 year period. The revenue from the proposed SEF plant can be used to support a number of social and economic initiatives in the area, including:

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

The long term duration of the revenue stream associated with a SEF linked Community Trust also enables local municipalities and communities to undertake long term planning for the area. Experience has however also shown that Community Trusts can be mismanaged. This issue will need to be addressed in order to maximise the potential benefits associated with the establishment of a Community Trust.

Due the number of other renewable energy projects proposed in the vicinity of the Vryburg and the NLM as a whole, it is recommended that the NLM investigate the establishment of a single, renewable energy linked Development Trust whereby all potential renewable energy producers would contribute to the Trust. The motivation for the establishment of a larger, local municipality or district municipality trust would be to maximize the potential benefits to the broader region by creating a single fund that can be used to promote and support local, socio-economic development in the region as a whole. The option of establishing a municipal level fund should be investigated by the NLM in consultation with other renewable energy companies.

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

### **Potential negative impacts**

- Influx of job seekers to the area;
- Loss of farm workers to jobs associated with the operational phase;
- Loss of productive agricultural land;

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

The significance of the potential negative impacts with mitigation was assessed to be of Low significance. All of the potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented.

The visual impacts on landscape character associated with large renewable energy facilities, such as SEFs, are highlighted in the research undertaken by Warren and Birnie (2009). In the South African context, the majority of South Africans have a strong connection with and affinity for the large, undisturbed open spaces that are characteristic of the South African landscape. The impact of large, solar energy plants on the landscape is therefore likely to be a key issue in South Africa, specifically given South African's strong attachment to the land and the growing number of solar energy applications. However, in the case of the proposed Waterloo SEF the impact on the areas sense of place with mitigation is likely to be low.

The significance of the impacts associated with the operational phase are summarised in Table 2.

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

<b>Impact</b>	<b>Significance No Mitigation</b>	<b>Significance With Mitigation</b>
<b>Creation of employment and business opportunities</b>	Medium (Positive impact)	High (Positive impact)
<b>Establishment of Community Trust</b>	Medium (Positive impact)	High (Positive impact)
<b>Promotion of renewable energy projects</b>	Medium (Positive impact)	Medium (Positive impact)
<b>Influx of job seekers</b>	Low (Negative impact for community as a whole)	Low (Negative impact for community as a whole)
<b>Loss of farm labour</b>	Low (Negative)	Low (Negative)
<b>Impact on agricultural land</b>	Low (Negative impact)	Low (Negative impact)
<b>Visual impact and impact on sense of place</b>	Medium (Negative impact)	Low (Negative impact)
<b>Impact on tourism</b>	Low (Positive and Negative)	Low (Positive and Negative)

### **Cumulative Impacts**

Two other SEFs are located in relative close proximity to the proposed Waterloo SEF, namely the 19.5MW SEF on a northern portion of the farm Waterloo 992 (NEAS Reference No.: DEA/EIA/0001105/2012; DEA Reference No.: 14/12/16/3/3/1/506) and the 75MW SEF on a portion of the Remaining Extent of the farm Rosendal 673 (NEAS Ref: DEA/EIA/0001359/2012; DEA Ref: 14/12/16/3/3/2/390). Due to their proximity the potential for cumulative impacts associated with combined visibility (whether two or more solar facilities will be visible from one location) and sequential visibility (e.g. the effect of seeing two or more solar facilities along a single journey, e.g. road or walking

trail) does exist. However, the visual character of the area has been negatively impacted by overgrazing and poor management. The visibility of the proposed SEFs will also be mitigated by the low-scale nature of SEFs. In addition, the sites are / can be screened from the N18. The potential cumulative impacts associated with combined visibility (whether two or more wind farms (solar facilities) will be visible from one location) and sequential visibility (e.g. the effect of seeing two or more wind farms (solar facilities) along a single journey, e.g. road or walking trail) are therefore likely to be low.

However, the potential impact of solar facilities on the landscape is an issue that does need to be considered, specifically given South African's strong attachment to the land and the growing number of solar plant applications. With regard to the area, a number of SEFs have been proposed in the NWP. The North West Environmental Authorities should therefore be aware of the potential cumulative impacts when evaluating applications.

In addition to the potential negative impacts, the proposed Waterloo SEF also has the potential to result in significant positive cumulative impacts, specifically the establishment of a number of renewable energy facilities in the NLM and NWP will create a number of socio-economic opportunities for the region, which, in turn, will result in a positive social benefit. The positive cumulative impacts include creation of employment, skills development and training opportunities, creation of downstream business opportunities.

### **Transmission lines**

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

### **No-Development Option**

The No-Development option would represent a lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy. Given South Africa's position as one of the highest per capita producer of carbon emissions in the world, this would represent a High negative social cost. The no-development option also represents a lost opportunity in terms of the employment and business opportunities (construction and operational phase) associated with the proposed Waterloo SEF, and the benefits associated with the establishment of a Community Trust. This also represents a negative social cost.

However, at a provincial and national level, it should be noted that the Waterloo SEF development proposal is not unique. In that regard, a significant number of renewable energy development, including SEFs, are currently proposed in the NWP and South Africa. Foregoing the proposed Waterloo SEF development would therefore not necessarily compromise the development of renewable energy facilities in the NWP or South Africa. However, the socio-economic benefits the local communities in Vryburg would be forfeited.

### **Decommissioning phase**

Typically, the major social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income. This has implications for the households who are directly affected, the communities within which they live, and the relevant local authorities. However, in the case of the SEFs decommissioning phase is likely to involve the disassembly and replacement of the existing components with more



modern technology. This is likely to take place in the 20-25 years post commissioning. The decommissioning phase is therefore likely to create additional, construction type jobs, as opposed to the jobs losses typically associated with decommissioning.

Given the relatively large number of people employed during the operational phase (~150), the decommissioning of the facility does have the potential to have a negative social impact on the local community. However, the potential impacts associated with the decommissioning phase can also be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be Low (negative).

Bophirima Solar should also investigate the option of establishing an Environmental Rehabilitation Trust Fund to cover the costs of decommissioning and rehabilitation of disturbed areas. The Trust Fund should be funded by a percentage of the revenue generated from the sale of energy to the national grid over the 20-25 year operational life of the facility. The rationale for the establishment of a Rehabilitation Trust Fund is linked to the experiences with the mining sector in South Africa and failure of many mining companies to allocate sufficient funds during the operational phase to cover the costs of rehabilitation and closure.

## **CONCLUSIONS AND RECOMMENDATIONS**

The findings of the SIA indicate that the development of the proposed Waterloo SEF will create employment and business opportunities for locals during both the construction and operational phase of the project. The establishment of a Community Trust will also benefit the local community. The enhancement measures listed in the report should be implemented in order to maximise the potential benefits. In addition, the proposed establishment of a number of renewable energy facilities in the NLM and NWP will create socio-economic opportunities, which, in turn, will result in a positive social benefit. The significance of this impact is rated as High Positive.

Due the number of other renewable energy projects proposed in the vicinity of the Vryburg and the NLM as a whole, it is recommended that the NLM investigate the establishment of a single, renewable energy linked Development Trust whereby all potential renewable energy producers would contribute to the Trust. The motivation for the establishment of a larger, local municipality or district municipality trust would be to maximize the potential benefits to the broader region by creating a single fund that can be used to promote and support local, socio-economic development in the region as a whole. The option of establishing a municipal level fund should be investigated by the NLM in consultation with other renewable energy companies.

The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the challenges created by climate change, represents a positive social benefit for society as a whole. The establishment of the proposed Waterloo SEF is therefore supported by the findings of the SIA.

However, the potential impacts associated with large, solar energy facilities on an areas sense of place and landscape cannot be ignored. These impacts are an issue that will need to be addressed by the relevant environmental authorities, specifically given the large number of applications for solar facilities in the area.

## **IMPACT STATEMENT**

The findings of the SIA undertaken for the proposed Waterloo SEF indicate that the development will create employment and business opportunities for locals during both the construction and operational phase of the project. The establishment of a Community Trust will also benefit the area. In addition, the visual integrity of the site has been impacted by the existing power lines on the site. It is therefore recommended that the facility as proposed be supported, subject to the implementation of the recommended mitigation measures and management actions contained in the report.

# TABLE OF CONTENTS

---

SECTION 1: INTRODUCTION.....	1
1.1 INTRODUCTION .....	1
1.2 TERMS OF REFERENCE.....	1
1.3 PROJECT DESCRIPTION.....	2
1.4 PROJECT LOCATION AND SURROUNDING LAND USES .....	5
1.5 ASSUMPTIONS AND LIMITATIONS .....	6
1.5.1 Assumptions.....	6
1.5.2 Limitations .....	6
1.6 APPROACH TO STUDY.....	6
1.7 SPECIALIST DETAILS.....	7
1.8 DECLARATION OF INDEPENDENCE.....	7
1.9 REPORT STUCTURE .....	7
SECTION 2: POLICY AND PLANNING ENVIRONMENT.....	8
2.1 INTRODUCTION .....	8
2.2 NATIONAL LEVEL ENERGY POLICY .....	8
2.2.1 National Energy Act (Act No 34 of 2008).....	8
2.2.2 White Paper on the Energy Policy of the Republic of South Africa.....	8
2.2.3 White Paper on Renewable Energy.....	9
2.2.4 National Integrated Resource Plan for Electricity (2010-2030).....	10
2.3 PROVINCIAL AND LOCAL LEVEL POLICY AND PLANNING .....	12
2.3.1 North West Provincial Growth and Development Strategy (2004-2014) ..	12
2.3.2 Dr Ruth S Mompoti District Municipality Draft Integrated Development Plan.....	15
2.3.3 Bophirima DM Spatial Development Framework (2007).....	16
2.3.4 Naledi Local Municipality 2012-2017 IDP.....	17
2.3.5 Dr Ruth S Mompoti District Municipality Draft Integrated Development Plan.....	20
2.3.6 BophirimaDM Spatial Development Framework (2007).....	21
2.3.7 Naledi Local Municipality 2012-2017 IDP.....	21
SECTION 3: OVERVIEW OF STUDY AREA .....	24
3.1 INTRODUCTION .....	24
3.2 ADMINISTRATIVE CONTEXT.....	24
3.3 STUDY AREA ACCESS .....	25
3.4 STUDY AREA SETTLEMENT AND LAND USES.....	26
3.4.1 Regional context .....	26
3.4.2 Vryburg .....	29
3.4.3 Waterloo Farm .....	32
3.4.4 Surrounding land uses .....	33
3.4.5 Potentially sensitive receptors .....	35
3.5 DEMOGRAPHIC PROFILE.....	36
3.6 ECONOMIC PROFILE .....	38
3.6.1 Dr Ruth S Mompoti DM.....	38
3.6.2 Naledi Local Municipality.....	38
SECTION 4: INDENTIFICATION OF KEY ISSUES.....	39
4.1 INTRODUCTION .....	39
4.2 ASSESMENT OF POLICY AND PLANNING FIT.....	39
4.3 CONSTRUCTION PHASE SOCIAL IMPACTS.....	40
4.3.1 Creation of local employment, training, and business opportunities.....	41
4.3.2 Impact of construction workers on local communities .....	43
4.3.3 Influx of job seekers .....	46

4.3.4	Increased risk to livestock and farm infrastructure .....	47
4.3.5	Increased risk of grass fires .....	49
4.3.6	Impacts associated with construction vehicles .....	50
4.3.7	Impacts associated with loss of farmland .....	51
4.4	OPERATIONAL PHASE SOCIAL IMPACTS .....	53
4.4.1	Creation of employment and business opportunities and support for local economic development.....	53
4.4.2	Benefits associated with the establishment of a Community Trust.....	55
4.4.3	Development of infrastructure for the generation of clean, renewable energy .....	56
4.4.4	Influx of job seekers to the area .....	58
4.4.5	Loss of farm labour .....	59
4.4.6	Impact on productive agricultural land.....	60
4.4.7	Impact on sense of place and rural character of the landscape .....	61
4.4.8	Potential impacts on tourism .....	62
4.5	ASSESSMENT POWER LINE OPTIONS .....	63
4.6	ASSESSMENT OF DECOMMISSIONING PHASE .....	64
4.7	CUMULATIVE IMPACT ON SENSE OF PLACE .....	65
4.8	CUMULATIVE IMPACT ON LOCAL ECONOMY.....	67
4.9	ASSESSMENT OF NO-DEVELOPMENT OPTION .....	68
	SECTION 5: KEY FINDINGS AND RECOMMENDATIONS .....	70
5.1	INTRODUCTION .....	70
5.2	SUMMARY OF KEY FINDINGS .....	70
5.2.1	Policy and planning issues .....	70
5.1.1	Construction phase impacts .....	71
5.2.2	Operational phase .....	73
5.2.3	Assessment of cumulative impacts.....	74
5.2.4	Transmission line options .....	75
5.2.5	Assessment of no-development option.....	75
5.2.6	Decommissioning phase .....	75
5.3	CONCLUSIONS AND RECOMMENDATIONS.....	76
5.4	IMPACT STATEMENT .....	77
	ANNEXURE A .....	78
	ANNEXURE B .....	79

## ACRONYMS

ABET	Adult Basic Education and Training
DEA&DP	Department of Environmental Affairs and Development Planning (Western Cape)
DEA	Department of Environmental Affairs (National)
DM	District Municipality
DRSMDM	Dr Ruth S Mompati 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
Mtoe	Million tonnes of oil equivalent
MW	Megawatt
NWP	North West Province
NLM	Naledi Local Municipality
NSDP	National Spatial Development Perspective
NWPPGDS	North West Province Provincial Growth and Development Strategy
PSDF	Provincial Spatial Development Framework
PV	Photovoltaic
SDF	Spatial Development Framework
SEF	Solar Energy Facility
SIA	Social Impact Assessment

---

# SECTION 1: INTRODUCTION

---

## 1.1 INTRODUCTION

Environamics was appointed by Bophirima Solar Energy (Pty) Ltd (hereafter Bophirima Solar) as the lead consultant to manage the Environmental Impact Assessment (EIA) process for the establishment of the proposed 75 MW Waterloo Solar Energy Facility (SEF) and associated infrastructure, on a site located approximately 5 km to the south-east of the town of Vryburg in the North West Province of South Africa.

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



**Figure 1.1: Location of Waterloo SEF site (red star) in regional context**

## 1.2 TERMS OF REFERENCE

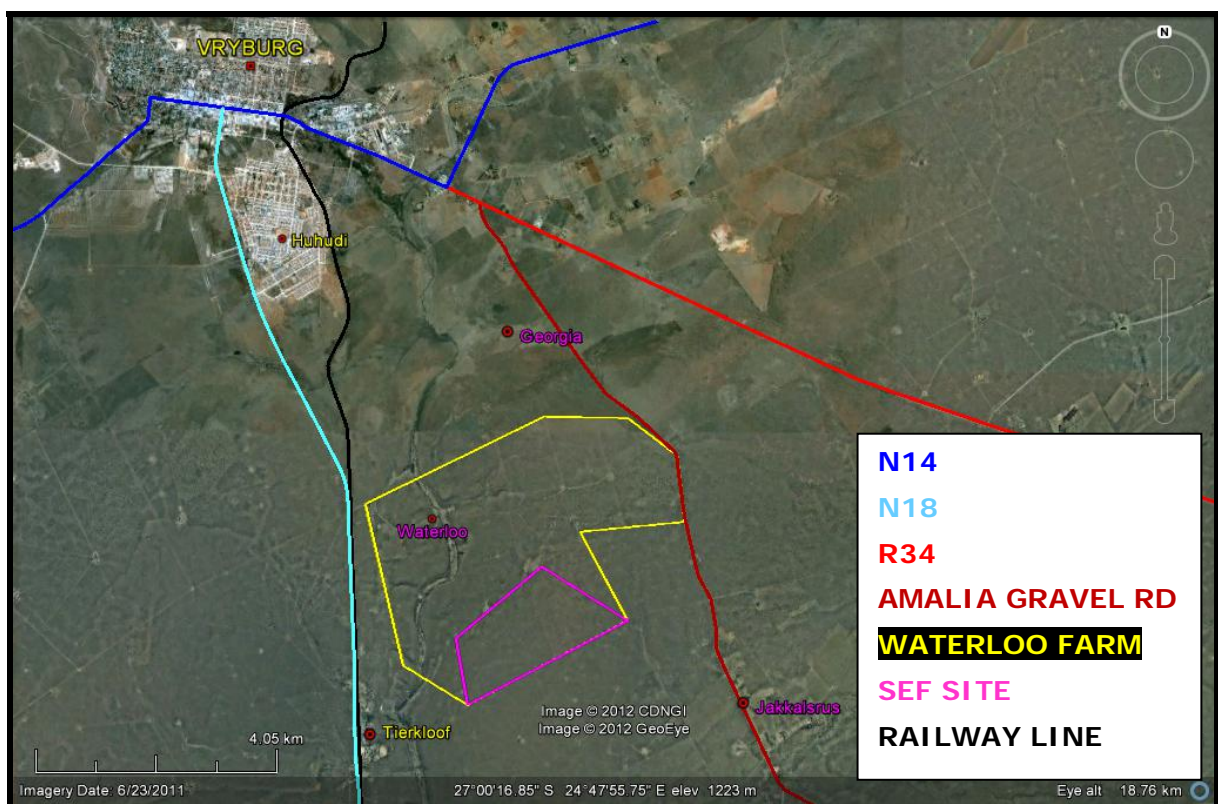
The terms of reference for the SIA require:

- A description of the environment that may be affected by the activity and the manner in which the environment may be affected by the proposed facility;

- A description and assessment of the potential social issues associated with the proposed facility;
- Identification of enhancement and mitigation aimed at maximising opportunities and avoiding and or reducing negative impacts.

### 1.3 PROJECT DESCRIPTION

Bophirima Energy has identified an area of ~ 150 ha on the farm Waterloo 992 (~1 000 ha) for the establishment of the proposed 75 MW Waterloo SEF (Figure 1.2). The energy will be fed into the Eskom grid, and the project is therefore an Independent Power Producer (IPP) project. The energy will 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. Construction is proposed in a single phase.



**Figure 1.2: Location of Waterloo SEF on Waterloo Farm**

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 (Figure 1.3):

#### 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.

### **Transformer**

The aim of the photovoltaic plant is to inject the generated electricity to the electrical grid. This requires a transformation system that raises the voltage of alternating current generated into the voltage of the electricity distribution network, 220 kV, as in the case of the power grid in Spain. For this function the necessary instrument is the electric transformer. Thus, this element will vary the voltage and current of AC input, with constant frequency and power, for ideal machines. It should be noted that in reality the power output will decrease due to different losses<sup>1</sup>.

### **Support Structure**

The PV panels will be attached to a support structure approximately 3.4 meters off the ground set at an angle so to receive the maximum amount of solar radiation. The angle of the panel is dependent on the latitude of the proposed facility and the angles may be adjusted to optimise for summer or winter solar radiation characteristics.

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



**Figure 1.3: Illustration of photovoltaic panels**

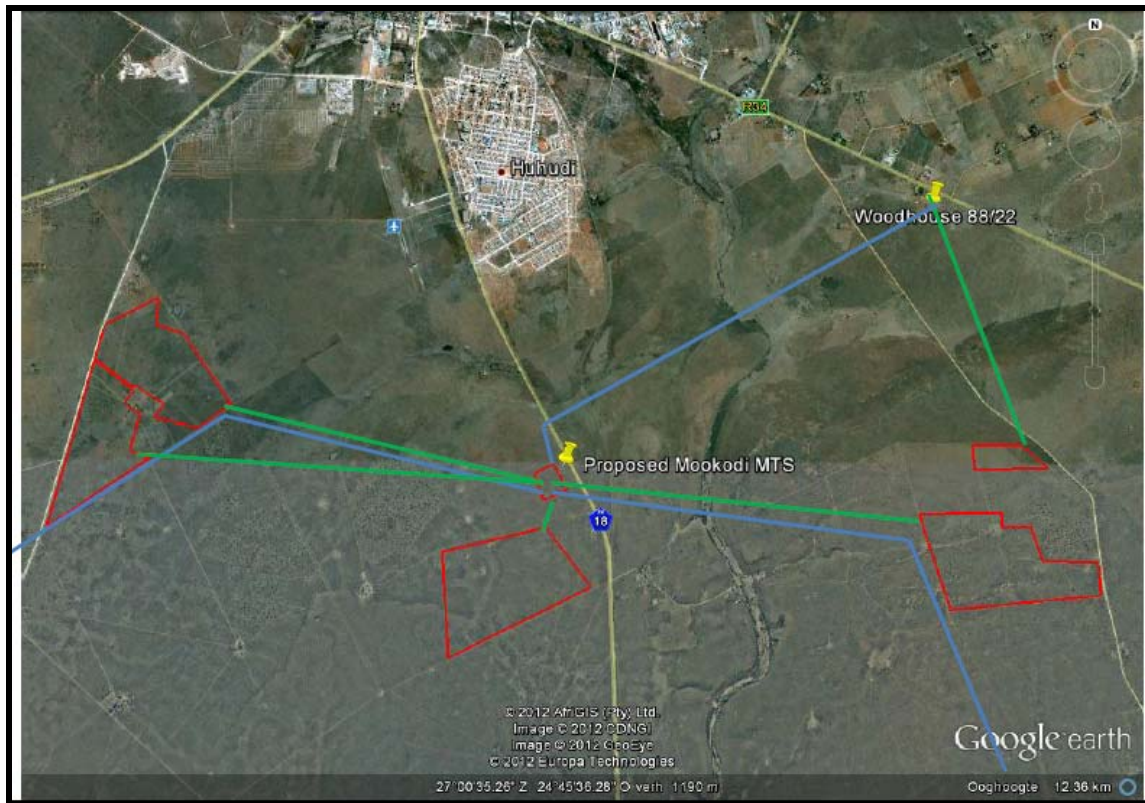
---

<sup>1</sup>[http://upcommons.upc.edu/pfc/bitstream/2099.1/14163/1/MASTER%20THESIS\\_Analysis%20of%20the%20implementation%20of%20a%20photov%20%281%29.pdf](http://upcommons.upc.edu/pfc/bitstream/2099.1/14163/1/MASTER%20THESIS_Analysis%20of%20the%20implementation%20of%20a%20photov%20%281%29.pdf)



The basic infrastructure associated with proposed Waterloo facility would include:

- PV Panel Arrays: Multiple panels will be required to form the solar PV arrays which will comprise the PV facility. The PV panels will be tilted at a fixed northern angle in order to capture the most sun.
- Wiring to Central Inverters: Sections of the PV array would be wired to central inverters which have a rated power of 500kW each;
- Connection to the grid: It is understood that the generated power would be evacuated into the Eskom 132/22 kV Bophirima substation on adjacent Woodhouse farm (currently under construction, but at same site as current 88/22kv Woodhouse substation). It is further understood that Eskom plans to construct a 400 kV line across Waterloo farm (Figure 1.4);
- Supporting Infrastructure: A control facility with basic services such as water and electricity will be constructed on the site and will have an approximate footprint 400m<sup>2</sup> or less. Other supporting infrastructure includes voltage and current regulators and protection circuitry.



**Figure 1.4: Location of proposed power lines**

Based on the information from other SEF projects the construction phase for a 75 MW SEF is expected to extend over a period of 18-24 months and create approximately 400 employment opportunities. The operational phase will employ approximately 53 people full time for a period of up to 20 years. The capital expenditure on completion is anticipated to be in the region of R 1.1 - 1.5 billion for a 75 MW facility.

#### 1.4 PROJECT LOCATION AND SURROUNDING LAND USES

The proposed Waterloo SEF site is located in the western North West Province (NWP), in the northern central interior of South Africa, approximately 130 km south of the Botswana border, in an important agricultural region traditionally known as the Bophirima – South Africa’s leading beef producing area (Figure 1.5). The sizeable town of Vryburg (~50 000), including the extensive Huhudi township, is located ~5 km north-west of the Waterloo SEF site. Vryburg is the seat of the Naledi Local Municipality as well as the Dr. Ruth S. Mompoti District Municipality, and serves as regional/ agricultural service centre. Vryburg is located at the intersection of two national roads, namely the N14 (Namibia-Gauteng route) and the N18 (Kimberley to Mahikeng and the Botswana border). Land uses in the immediate vicinity of the proposed SEF site are essentially comprised of grazing (cattle) and rural residential. The area is traditionally known as the Bophirima– South Africa’s leading beef producing area.



**Figure 1.5: Location of Naledi Local Municipality within the North West Province (Source Wikipedia)**

## **1.5 ASSUMPTIONS AND LIMITATIONS**

### **1.5.1 Assumptions**

#### **Identification of area for the Photovoltaic Solar Energy Facility**

The identification of the proposed site was informed by technical information relating to local climatic and infrastructure conditions in the area, specifically annual rates of solar radiation, local topography, grid lines 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 and proximity to Eskom grid lines.

### **1.5.2 Limitations**

#### **Demographic data**

Some of the demographic data used in the study is based on the findings of the 2001 Census<sup>2</sup>, and sources based projections on the Census 2001 data, for example the 2007 Community Survey. While this data does provide useful information on the demographic profile of the affected area, the actual data is dated and should be treated with care.

In addition, there is no longer any access to Census 2001 data at Ward level via the Municipal Demarcation Board. As such, the social baseline for the proposed project area will be described at Local Municipal level only.

## **1.6 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.

---

<sup>2</sup> The last comprehensive national census was conducted in 2001. Census 2001 provided demographic and socio-economic data from National to Municipal Ward level. An interim Community Survey (sample based) was undertaken in 2007, but provided information only on provincial and municipal levels. The next comprehensive national census was undertaken in 2011, but the results are not yet available.

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 demographic data from the 2001 Census Survey and other available sources;
- A review of relevant planning and policy frameworks for the area;
- A review of information from similar studies;
- A literature review of social issues associated with solar energy facilities; and
- Interviews with key stakeholders and interested and affected parties.

The identification of potential social issues associated with the proposed SEF is based on a review of relevant documentation, experience with similar projects in the South Africa and interviews on site. Annexure A contains a list of the people interviewed and secondary information reviewed. Annexure B contains the methodology used to undertake the assessment and assign significance ratings.

## **1.7 SPECIALIST DETAILS**

Tony Barbour, the lead author of this report is an independent specialist with 23 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 WEFs.

Schalk van der Merwe, the co-author of this report, has an MPhil in Environmental Management from the University of Cape Town and has worked closely with Tony Barbour on a number of SIAs over the last nine years, including on a number of SEF projects.

## **1.8 DECLARATION OF INDEPENDENCE**

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

## **1.9 REPORT STRUCTURE**

The report is divided into five sections, namely:

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

---

## **SECTION 2: POLICY AND PLANNING ENVIRONMENT**

---

### **2.1 INTRODUCTION**

Section 2 provides an overview of the policy and planning environment affecting the proposed Waterloo 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);
- North West Province Growth and Development Strategy (2004-2014);
- Dr Ruth S Mompoti District Municipality Integrated Development Plan (IDP) 2012-2017;
- Bophirima District Municipality Spatial Development Framework (2007);
- Naledi Local Municipality IDP 2012-2017.

### **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 SEF, is supported by the White Paper on Energy Policy for South Africa (December 1998). In this regard the document notes:

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

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

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

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

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

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

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

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

Disadvantages include:

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

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

### **2.2.3 White Paper on Renewable Energy**

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

The White Paper notes that while South Africa is well-endowed with renewable energy resources that have the potential to become sustainable alternatives to fossil fuels, these have thus far remained largely untapped. As signatory to the Kyoto Protocol<sup>3</sup>,

---

<sup>3</sup> 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

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 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%).

---

entered into force on 16 February 2005. As of November 2009, 187 states have signed and ratified the protocol (Wikipedia)

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 <sup>1</sup>	0	0	0	0	400	0	300
2015	500 <sup>1</sup>	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 <sup>4</sup>	100 <sup>4</sup>	300 <sup>4</sup>
2019	250	0	0	237 <sup>2</sup>	0	400 <sup>4</sup>	100 <sup>4</sup>	300 <sup>4</sup>
2020	250	0	0	237 <sup>2</sup>	0	400	100	300
2021	250	0	0	237 <sup>2</sup>	0	400	100	300
2022	250	0	1 143 <sup>2</sup>	0	805	400	100	300
2023	250	1 600	1 183 <sup>2</sup>	0	805	400	100	300
2024	250	1 600	283 <sup>2</sup>	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
<b>Total</b>	<b>6 250</b>	<b>9 600</b>	<b>2 609</b>	<b>2 370</b>	<b>3 910</b>	<b>8 400</b>	<b>1 000</b>	<b>8 400</b>

■ Firm commitment necessary now  
■ Final commitment in IRP 2012

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

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

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

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



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

### **General**

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

### **PV Solar energy**

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

### **Conclusions**

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

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

## **2.3 PROVINCIAL AND LOCAL LEVEL POLICY AND PLANNING**

### **2.3.1 North West Provincial Growth and Development Strategy (2004-2014)**

The NWP Provincial Growth and Development Strategy (PGDS) was drafted in 2004 and aims to provide a framework for the 10 year period up to 2014. The PGDS is aligned with amongst others, the United Nations endorsed Millennium Development Goals and Objectives 2015, and the 2003 National Spatial Perspective. The PGDS largely relies on Census 2001 for demographic and other statistical data, and is therefore relatively dated.

#### **Key challenges and goals**

The PGDS notes that the NWP is a medium-size province, covering ~10% of the total national surface area, accounting for ~ 8% of the national population, and contributing ~ 7% to the national economy. With the exception of the mining sector (~23.5% of provincial GDP in 2002), private sector activity in the NWP is very modest. Other development challenges include low population densities (largely rural province); inadequate infrastructure, and enormous service delivery backlogs; a predominantly

poor population with high levels of illiteracy and dependency; great inequalities between rich and poor, and disparities between urban and rural; and the HIV/Aids pandemic.

Both the primary immediate and long term objectives of the PGDS are therefore to address poverty and unemployment, while simultaneously improving the low level of expertise and skills. Two primary (macro) goals are set:

- Economic goal: an average economic growth rate of 6.6% per year would be required to halve unemployment by 2014. This would require a minimum combined private and public sector investment of ~R6.3 billion per year (2004 estimate);
- Poverty eradication goal: to clear all service delivery backlogs by 2014 – a task which would require ~ R 854 million per annum (2004 estimate).

Additional objectives include promoting equal and fair access to opportunities and assets; enhancing competitiveness, profitability and SMME development; and ensuring sustainable development through resource and environmental management in the NWP.

### **Economic development pillars**

The following cross-supporting economic development pillars support the NWP's economic growth and development strategy up to 2014:

- Growth and Investment;
- Agricultural and Rural Development;
- Mining and Energy;
- Manufacturing;
- Tourism;
- Construction and Infrastructure;
- SMMEs; and
- Training and Skills Development.

Land reform forms a key part of the Agriculture pillar. The mining and energy pillar focuses mainly on beneficiation, Mining Charter compliance, small-scale mining opportunities and addressing mine decommissioning impacts. Renewable energy and solar energy facilities are not addressed under this pillar or within the PGDS. With regard to the tourism pillar, the PGDS notes that the province faces a host of challenges, including infrastructural and transport connectivity. According to the PGDS, provincial government's objectives are to diversify its tourism industry through promoting cultural tourism and the entertainment and hospitality industries, to build human capital amongst tour operators, and to promote heritage sites as international tourism destinations. Sectoral growth targets, aimed at directing investment in the NWP while fostering employment creation, are outlined in the PGDS. The Transport and communication sector (seen as key to unlocking other sectors) is specifically singled out for growth. Deliberate provision is made for a more diversified future economy, in which tourism and manufacturing would play an increasingly important role.

SMME development is identified as key vehicle for meeting the dual challenges of growth and equitability, with an envisaged added tremendous potential for job creation, albeit currently often in the informal sector. Poor information dissemination, a general lack of access to funding, and a perceived apathy of big business with regard to small businesses are identified as key challenges faced by the sector. The PGDS envisages that 60-80% of all future economic activities in provincial agriculture, mining, manufacturing, trade and tourism should be SMME focused, but indicates that policy would ultimately be aligned with evolving national policy.

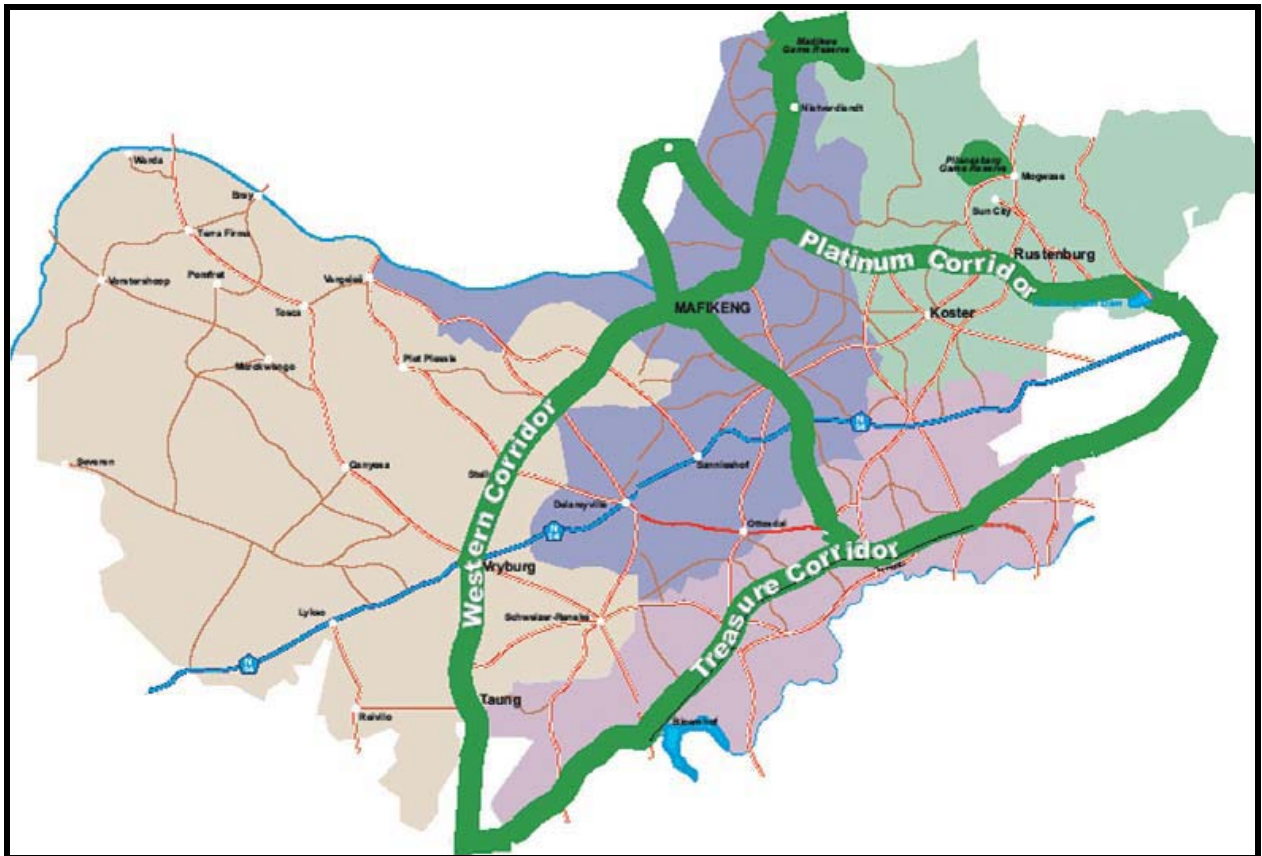
Skills development and training are identified as key enabling factors for labour market access. It is envisaged that skills development should constitute part of a broader, integrated effort at promoting job creation, and that the focus should be on growing skills and vocational training, mainly in the services and financial sectors. Companies would be encouraged to promote employee development through on-the-job learning and learnerships. The development of a focused Adult Basic Education and Training (ABET) strategy is envisaged to address high illiteracy levels, and to facilitate further education and training (FET). The need to investigate alternatives aimed at fast tracking ABET HIV/AIDS training is further identified as a life skills objective.

### **Spatial development strategy**

The PGDS spatial development plan is closely aligned with the NWP SDF and Zoning Plan (2003), which is, in turn, closely aligned with the NSDP, and the key principle that municipalities should be assessed in terms of their absolute potential and needs, and developed accordingly. The spatial strategy envisages that future settlement and economic development opportunities should be channeled into activity corridors and nodes that are adjacent to or link up with the main growth centers, further noting that development should focus on people and not places.

Potential benefits associated with the proximity of Gauteng Province are noted for the eastern and central DMs, while limited growth potential for the western DMs (e.g. Dr Ruth S Mompati DM) is further noted. The provincial strategy is based on promoting development corridors linking up with Gauteng, the East-West corridor (via the Platinum Corridor) which link Botswana/ Namibia to Mozambique (Maputo port) in an interlinked "diamond".

As indicated in Figure 2.1, the Vryburg study area is located along the Western Corridor – essentially the N18 from Warrenton, via Vryburg to Mahikeng, and beyond. The declared spatial development rationale of the Western Corridor is to strengthen a North-South initiative from SADCC through Botswana, southwards through the North West and Northern Cape. This corridor simultaneously links the Platinum Corridor with the Treasure corridor through the Mafikeng airport and industrial zone and the Taung irrigation scheme and promoting the development and growth in between (NWP, 2004: 11).



**Figure 2.1: Spatial development-linked initiatives in the NWP** (Source: NWP, 2004).

The PGDS sets growth targets for the economic sectors of each of its DMs for the period 2004-2014 (in order to cumulatively yield the NWP macro-economic growth target of 6.6% per year). Targets for the DRSMMDM (then the Bophirima DM) include Agriculture (6.9%), Mining (8.9%), Manufacturing (7.4%), Trade (6.1%), Finance (7.6%), Tourism (4.7%), Transport (10.7%), Construction (5.4%), and Utilities 4.7%. Table 1 of PGDS indicates that the DRSMMDM has the lowest Tourism development target of all the DMs in the province (NWP, 2004: 12). Table 2 indicates linked employment creation targets of 4 767 employment and 805 skills training opportunities per year for the DRSMMDM. Agriculture is earmarked to account for 43% of total new employment opportunities, and Community Services an additional 35%. Manufacturing is envisaged to account for a further 4.7%, and Tourism 2.9%.

### 2.3.2 Dr Ruth S Mompoti District Municipality Draft Integrated Development Plan

The DRSMMDM 2012-2017 IDP is the first of the new, third generation IDP cycle documents, as required in terms of the Municipal Systems Act (2000) for all South African municipalities. The document will serve as the basic developmental framework and the basis for annual reviews of municipal performance for the period up to 2017. The IDP is explicitly aligned with the requirements of the Municipal Systems Act and the

developmental objectives outlined in the 12 National Priority Outcomes, and the 2009-2014 national Medium Term Strategic Framework (MTSF)<sup>4</sup>, including:

- Halving poverty and unemployment by 2014;
- Ensuring a more equitable distribution of the benefits of economic growth and reduce inequality;
- Improving the nation's health profile and skills base and ensure universal access to basic services;
- Improving the safety of citizens by reducing incidents of crime and corruption;
- Building a nation free of all forms of racism, sexism, tribalism and xenophobia.

Identified key intervention priority areas include:

- More inclusive economic growth, decent work and sustainable livelihoods;
- Developing economic and social infrastructure;
- Rural development, food security and land reform;
- Improving access to quality education;
- Improved health care;
- Fighting crime and corruption;
- Sustainable resource management and use.

A situation analysis of the DM indicates, amongst others, the following key developmental challenges:

- The DRSMMDM is endowed with mineral wealth, but the sector remains a small contributor to GDP;
- The DM's largely African population generally suffers from low education, low income and high unemployment levels, and many have minimal access to water and sanitation;
- A mainly youthful African population, with a correspondingly small labour force cohort, and hence high levels of youthful dependency;
- High functional illiteracy amongst the African population group;
- Great dependency upon government as employer in the DM, and therefore the crucial need to develop the private sector (mainly in agriculture and mining), and develop the Small Medium Micro Enterprise (SMME) sector both in the formal and informal sectors;
- A high municipal disease burden, with nearly a 100% increase in deaths in the 1998-2008 period. HIV and TB are key causes of increased mortality.

Renewable energy and SEFs are not directly addressed, but the IDP does indicate the transition to a low carbon economy as a DM goal, and recommends that the DM speeds up and expands renewable energy (generation) (DRSMMDM, 2012: 114).

### **2.3.3 Bophirima DM Spatial Development Framework (2007)**

The DRSMMDM (then Bophirima DM) SDF was adopted in 2007. Much of the statistical information contained in the document is dated (e.g. Census 2001). The SDF is currently being reviewed and updated, but public Draft documents are not available yet (Kubeka, pers. comm).

---

<sup>4</sup> Republic of South Africa: Minister in the Presidency: Planning (2009). *Medium Term Strategic Framework. – A Framework to guide Governments Programme in the Electoral Mandate Period 2009-2014.*

The SDF is explicitly aligned with the key principles of the PGDS and the NSDP. The SDF notes that the relationship between the PGDS, IDPs and the NSDP should focus on highlighting development need and potential in the DM (a process which was still underway at the time the SDF was finalised). With regard to the Development Corridors identified in the PGDS, the SDF notes that the DRSMMDM is affected by two of the three provincial corridors, namely the Western and Treasure Corridors. With regard to the Western Corridor (aligned across Naledi LM), the development focus is on beef (and other meat) production and beneficiation in the Vryburg/ Naledi area, irrigation and related industries in the Greater Taung LM, and tourism/ conservation (focusing mainly on the Molopo-Kagisano LM).

The SDF is further based on the Bophirima Growth and Development Strategy (GDS) (2006), which indicated that Vryburg should be developed as a Secondary Regional Centre; Taung, Schweizer-Reneke, Bloemhof and Christiana as Tertiary Regional Centres, and Stella and Morokweng as Local Service Centres. It further indicated that the Naledi, Greater Taung, Mamusa and Lekwa-Teemane LMs fall within the Extensive Agricultural Development Zone (envisaged mixed, cattle, game, wheat, maize farming), and that investment should focus on agriculture and downstream activities. The GDS further indicated that the DM's Cattle/ Game Farming Zone is located primarily within the Kagisano-Molopo LM (then still two LMs) north west of Naledi, closer to the Botswana border. It nevertheless recommends potential development of a hunting-based sector in Vryburg. Tourism development is mainly to be focused on the Bloemhof Dam, the Taung heritage site and game viewing opportunities throughout the DM (but mainly Molopo-Kagisano LM).

The Naledi LM is identified as the most economically diverse municipality in the DM, and also as dominating the DM economy in the majority of the economic sectors and activities. Vryburg is identified as the hub and undisputable leader town in the NLM and the DM. The SDF notes that agriculture forms the backbone of the Naledi economy, and that the NLM Area has a national comparative advantage in terms of beef production. The SDF indicates that no tribal lands are located in the NLM, and that virtually all land is privately owned. Four land reform projects (out of a DM total of 36) were located in Naledi LM in 2007. The strategic assessment for Naledi indicates key opportunities linked to the Western Corridor; a declining economy despite being most diverse economy in district and having comparative advantages; limited in-migration, which is nevertheless putting increased pressure on infrastructure and housing (BDM, 2007: 51).

The SDF does not contain any detailed spatial plans. The development and siting of renewable energy facilities, including SEFs, are not addressed in the SDF. The DRSMMDM planner has indicated that the DM has received virtually no commercial solar (or wind) applications up to now (Kubeka, pers. comm).

#### **2.3.4 Naledi Local Municipality 2012-2017 IDP**

The Naledi 2012-2017 IDP is the first of the new, third 5-year IDP cycle. The document also includes a municipal turnaround strategy ("Municipal Plan") in response to the NLM's current financial unviability, and consequent inability to fully meet its developmental and service delivery obligations. The 2012-2017 IDP is aligned with key national and provincial developmental policy, including the 12 National Outcomes, National Priority Outcomes 2011-2016, and the NWP PGDS.

The IDP is informed by a SWOT analysis of the Naledi LM. Key identified NLM Strengths include: a strong agricultural sector in a high capacity beef grazing area; the most diverse and dominant economy in the DRSMMDM; strategic location with regard to the

N14 transport corridor; identification of the NLM as Priority Two investment area in the NWP Spatial Development Framework. Key Weaknesses include: municipal financial viability<sup>5</sup>; growing unemployment; generally declining economy; lack of industrial development in Vryburg; infrastructural neglect and service backlogs; and lack of a proper Land Use Management System. Key Opportunities include: capitalizing on Vryburg's status as Secondary Regional Centre and the NLM's strategic location; local economic development (LED) opportunities linked to establishing Vryburg as regional beef beneficiation centre, tourism, and game farming. Key Threats include: increasing urbanization of rural part of NLM population; environmental degradation; high unemployment and poverty levels; large housing backlogs; lack of capital to provide and maintain services infrastructure.

A summary of the 9 NLM Ward Plans indicates that key identified community needs are mainly linked to roads (1), housing (2), municipal services (3), security, and employment/ LED. The IDP notes that the NLM has been suffering from chronic water shortages since 2009; that the waste water treatment plant exceeds capacity by 40%, that many municipal roads are in a bad state (including within Vryburg and Huhudi); and that illegal dumping is a serious and widespread issue in the NLM. The Ward 4 plan indicates housing, roads, sanitation, area lighting and storm water as key priorities – largely a reflection of the fact that the Ward 4 is mainly comprised of people living in the Huhudi informal settlement.

On the basis of the above SWOT analysis and input from Ward Plans, 7 Municipal Priorities are identified for the NLM 2012-2017 cycle, namely:

- (1) Achieving financial viability;
- (2) Water and sanitation;
- (3) Housing;
- (4) Roads;
- (5) Waste management,
- (6) LED; and
- (7) Sports and municipal facilities management.

The IDP does not explicitly deal with renewable energy development, but does indicate that a 10MW SEF has been approved at Broederspruit, and that development of 50 MW (*sic*) SEF is currently being proposed near Vryburg. As may be seen below, the Naledi LED however identifies carbon-footprint reduction, including supporting alternative energies, as LED programmes for the NLM.

### **Local Economic Development**

Section 4.2 of the IDP provides an overview of the Naledi Local Economic Development (Strategy). The LED is specifically aligned with National Priority Outcomes 4 (“decent employment through inclusive economic growth”); 5 (a skilled and capable economic work force to support an inclusive growth path”) and 7 (vibrant, equitable rural communities and food security for all). Key NLM roles are defined as creating an enabling environment for investment, supporting skills development and BEE, and promoting sustainable rural agrarian reform.

Key identified LED objectives include:

---

<sup>5</sup> The IDP indicates that the NLM currently owes ~R106 m to its creditors, and is owed ~R155 m in terms of rates and taxes, etc (NLM, 2012: 21).

- Promoting and maintaining Vryburg's identity as regional centre (the DM's "city");
- Improving job creation for local communities;
- Protecting locally-based SMME's, expertise, labour, investment and strategic advantages;
- Preserving local heritage, identity and brands.

Four LED thrusts are identified, namely:

- Local resource development and diversification;
- Maximize strategic regional location advantages;
- Sustainable town revitalization and integration;
- Community-orientated business support and development.

Key programmes linked to these thrusts include:

- Supporting the beef industry and development of local beneficiation;
- Tourism growth and development, including with regard to cattle/ game farm stays;
- Sectoral diversification, including with regard to promoting, logistics, warehousing and distribution;
- Raising Vryburg's status within regional hierarchy, including through projects like revitalizing the Vryburg aerodrome;
- Carbon-footprint reduction, including supporting alternative energies;
- Education, skills development and mentorship;
- SMME/ business development support (NLM, 2012: 117-126).

### **Naledi SDF**

The most recent approved Naledi SDF was compiled in 2007. As noted in the 2012-2007 IDP, the 2007 SDF is outdated, and lacks spatial guidance in the form of maps and spatial development plans. The SDF is currently under review, and in early Draft stage. The NLM planner has indicated that the Vryburg urban edge is currently in the process of being demarcated, but that no urban-edge or land use related maps were available for the Vryburg area. The development of a municipal landfill site on the northern portion of Rosendal Farm west of the N18 was confirmed, but the planner was unable to provide specific details with regard to location. The planner indicated that a further SEF application had recently also been received on Klondike Farm, located to the west of Rosendal (Manamela, pers. comm). The affected farmers decided not to support the proposed projects.

The PGDS sets growth targets for the economic sectors of each of its DMs for the period 2004-2014 (in order to cumulatively yield the NWP macro-economic growth target of 6.6% per year). Targets for the DRSMMDM (then the BophirimaDM) include Agriculture (6.9%), Mining (8.9%), Manufacturing (7.4%), Trade (6.1%), Finance (7.6%), Tourism (4.7%), Transport (10.7%), Construction (5.4%), and Utilities 4.7%. Table 1 of PGDS indicates that the DRSMMDM has the lowest Tourism development target of all the DMs in the province (NWP, 2004: 12). Table 2 indicates linked employment creation targets of 4 767 employment and 805 skills training opportunities per year for the DRSMMDM. Agriculture is earmarked to account for 43% of total new employment opportunities, and Community Services an additional 35%. Manufacturing is envisaged to account for a further 4.7%, and Tourism 2.9%.



### 2.3.5 Dr Ruth S Mompoti District Municipality Draft Integrated Development Plan

The DRSMMDM 2012-2017 IDP is the first of the new, third generation IDP cycle documents, as required in terms of the Municipal Systems Act (2000) for all South African municipalities. The document will serve as the basic developmental framework and the basis for annual reviews of municipal performance for the period up to 2017. The IDP is explicitly aligned with the requirements of the Municipal Systems Act and the developmental objectives outlined in the 12 National Priority Outcomes, and the 2009-2014 national Medium Term Strategic Framework (MTSF)<sup>6</sup>, including:

- Halving poverty and unemployment by 2014;
- Ensuring a more equitable distribution of the benefits of economic growth and reduce inequality;
- Improving the nation's health profile and skills base and ensure universal access to basic services;
- Improving the safety of citizens by reducing incidents of crime and corruption;
- Building a nation free of all forms of racism, sexism, tribalism and xenophobia.

Identified key intervention priority areas include:

- More inclusive economic growth, decent work and sustainable livelihoods;
- Developing economic and social infrastructure;
- Rural development, food security and land reform;
- Improving access to quality education;
- Improved health care;
- Fighting crime and corruption;
- Sustainable resource management and use.

A situation analysis of the DM indicates, amongst others, the following key developmental challenges:

- The DRSMMDM is endowed with mineral wealth, but the sector remains a small contributor to GDP;
- The DM's largely African population generally suffers from low education, low income and high unemployment levels, and many have minimal access to water and sanitation;
- A mainly youthful African population, with a correspondingly small labour force cohort, and hence high levels of youthful dependency;
- High functional illiteracy amongst the African population group;
- Great dependency upon government as employer in the DM, and therefore the crucial need to develop the private sector (mainly in agriculture and mining), and develop the Small Medium Micro Enterprise (SMME) sector both in the formal and informal sectors;
- A high municipal disease burden, with nearly a 100% increase in deaths in the 1998-2008 period. HIV and TB are key causes of increased mortality.

Renewable energy and SEFs are not directly addressed, but the IDP does indicate the transition to a low carbon economy as a DM goal, and recommends that the DM speeds up and expands renewable energy (generation) (DRSMMDM, 2012: 114).

---

<sup>6</sup> Republic of South Africa: Minister in the Presidency: Planning (2009). *Medium Term Strategic Framework. – A Framework to guide Governments Programme in the Electoral Mandate Period 2009-2014.*

### **2.3.6 BophirimaDM Spatial Development Framework (2007)**

The DRSMMDM (then BophirimaDM) SDF was adopted in 2007. Much of the statistical information contained in the document is dated (e.g. Census 2001). The SDF is currently being reviewed and updated, but public Draft documents are not available yet (Kubeka, pers. comm).

The SDF is explicitly aligned with the key principles of the PGDS and the NSDP. The SDF notes that the relationship between the PGDS, IDPs and the NSDP should focus on highlighting development need and potential in the DM (a process which was still underway at the time the SDF was finalised). With regard to the Development Corridors identified in the PGDS, the SDF notes that the DRSMMDM is affected by two of the three provincial corridors, namely the Western and Treasure Corridors. With regard to the Western Corridor (aligned across Naledi LM), the development focus is on beef (and other meat) production and beneficiation in the Vryburg/ Naledi area, irrigation and related industries in the Greater Taung LM, and tourism/ conservation (focusing mainly on the Molopo-Kagisano LM).

The SDF is further based on the BophirimaGrowth and Development Strategy (GDS) (2006), which indicated that Vryburg should be developed as a Secondary Regional Centre; Taung, Schweizer-Reneke, Bloemhof and Christiana as Tertiary Regional Centres, and Stella and Morokweng as Local Service Centres. It further indicated that the Naledi, Greater Taung, Mamusa and Lekwa-Teemane LMs fall within the Extensive Agricultural Development Zone (envisaged mixed, cattle, game, wheat, maize farming), and that investment should focus on agriculture and downstream activities. The GDS further indicated that the DM's Cattle/ Game Farming Zone is located primarily within the Kagisano-Molopo LM (then still two LMs) north west of Naledi, closer to the Botswana border. It nevertheless recommends potential development of a hunting-based sector in Vryburg. Tourism development is mainly to be focused on the Bloemhof Dam, the Taung heritage site and game viewing opportunities throughout the DM (but mainly Molopo-Kagisano LM).

The Naledi LM is identified as the most economically diverse municipality in the DM, and also as dominating the DM economy in the majority of the economic sectors and activities. Vryburg is identified as the hub and undisputable leader town in the NLM and the DM. The SDF notes that agriculture forms the backbone of the Naledi economy, and that the NLM Area has a national comparative advantage in terms of beef production. The SDF indicates that no tribal lands are located in the NLM, and that virtually all land is privately owned. Four land reform projects (out of a DM total of 36) were located in Naledi LM in 2007. The strategic assessment for Naledi indicates key opportunities linked to the Western Corridor; a declining economy despite being most diverse economy in district and having comparative advantages; limited in-migration, which is nevertheless putting increased pressure on infrastructure and housing (BDM, 2007: 51).

The SDF does not contain any detailed spatial plans. The development and siting of renewable energy facilities, including SEFs, are not addressed in the SDF. The DRSMMDM planner has indicated that the DM has received virtually no commercial solar (or wind) applications up to now (Kubeka, pers. comm).

### **2.3.7 Naledi Local Municipality 2012-2017 IDP**

The Naledi 2012-2017 IDP is the first of the new, third 5-year IDP cycle. The document also includes a municipal turnaround strategy ("Municipal Plan") in response to the NLM's current financial unviability, and consequent inability to fully meet its

developmental and service delivery obligations. The 2012-2017 IDP is aligned with key national and provincial developmental policy, including the 12 National Outcomes, National Priority Outcomes 2011-2016, and the NWP PGDS.

The IDP is informed by a SWOT analysis of the Naledi LM. Key identified NLM Strengths include: a strong agricultural sector in a high capacity beef grazing area; the most diverse and dominant economy in the DRSMMDM; strategic location with regard to the N14 transport corridor; identification of the NLM as Priority Two investment area in the NWP Spatial Development Framework. Key Weaknesses include: municipal financial viability<sup>7</sup>; growing unemployment; generally declining economy; lack of industrial development in Vryburg; infrastructural neglect and service backlogs; and lack of a proper Land Use Management System. Key Opportunities include: capitalizing on Vryburg's status as Secondary Regional Centre and the NLM's strategic location; local economic development (LED) opportunities linked to establishing Vryburg as regional beef beneficiation centre, tourism, and game farming. Key Threats include: increasing urbanization of rural part of NLM population; environmental degradation; high unemployment and poverty levels; large housing backlogs; lack of capital to provide and maintain services infrastructure.

A summary of the 9 NLM Ward Plans indicates that key identified community needs are mainly linked to roads (1), housing (2), municipal services (3), security, and employment/ LED. The IDP notes that the NLM has been suffering from chronic water shortages since 2009; that the waste water treatment plant exceeds capacity by 40%, that many municipal roads are in a bad state (including within Vryburg and Huhudi); and that illegal dumping is a serious and widespread issue in the NLM. The Ward 4 plan indicates housing, roads, sanitation, area lighting and storm water as key priorities – largely a reflection of the fact that the Ward 4 is mainly comprised of people living in the Huhudi informal settlement.

On the basis of the above SWOT analysis and input from Ward Plans, 7 Municipal Priorities are identified for the NLM 2012-2017 cycle, namely:

- (1) Achieving financial viability;
- (2) Water and sanitation;
- (3) Housing;
- (4) Roads;
- (5) Waste management,
- (6) LED; and
- (7) Sports and municipal facilities management.

The IDP does not explicitly deal with renewable energy development, but does indicate that a 10MW SEF has been approved at Broederspruit, and that development of 50 MW (*sic*) SEF is currently being proposed near Vryburg. As may be seen below, the Naledi LED however identifies carbon-footprint reduction, including supporting alternative energies, as LED programmes for the NLM.

### **Local Economic Development**

Section 4.2 of the IDP provides an overview of the Naledi Local Economic Development (Strategy). The LED is specifically aligned with National Priority Outcomes 4 (“decent employment through inclusive economic growth”); 5 (a skilled and capable economic

---

<sup>7</sup> The IDP indicates that the NLM currently owes ~R106 m to its creditors, and is owed ~R155 m in terms of rates and taxes, etc (NLM, 2012: 21).

work force to support an inclusive growth path”) and 7 (vibrant, equitable rural communities and food security for all). Key NLM roles are defined as creating an enabling environment for investment, supporting skills development and BEE, and promoting sustainable rural agrarian reform.

Key identified LED objectives include:

- Promoting and maintaining Vryburg’s identity as regional centre (the DM’s “city”);
- Improving job creation for local communities;
- Protecting locally-based SMME’s, expertise, labour, investment and strategic advantages;
- Preserving local heritage, identity and brands.

Four LED thrusts are identified, namely:

- Local resource development and diversification;
- Maximize strategic regional location advantages;
- Sustainable town revitalization and integration;
- Community-orientated business support and development.

Key programmes linked to these thrusts include:

- Supporting the beef industry and development of local beneficiation;
- Tourism growth and development, including with regard to cattle/ game farm stays;
- Sectoral diversification, including with regard to promoting, logistics, warehousing and distribution;
- Raising Vryburg’s status within regional hierarchy, including through projects like revitalizing the Vryburg aerodrome;
- Carbon-footprint reduction, including supporting alternative energies;
- Education, skills development and mentorship;
- SMME/ business development support (NLM, 2012: 117-126).

### **Naledi SDF**

The most recent approved Naledi SDF was compiled in 2007. As noted in the 2012-2007 IDP, the 2007 SDF is outdated, and lacks spatial guidance in the form of maps and spatial development plans. The SDF is currently under review, and in early Draft stage. The NLM planner has indicated that the Vryburg urban edge is currently in the process of being demarcated, but that no urban-edge or land use related maps were available for the Vryburg area. The development of a municipal landfill site on the northern portion of Rosendal Farm west of the N18 was confirmed, but the planner was unable to provide specific details with regard to location. The planner indicated that a further SEF application had recently also been received on Klondike Farm, located to the west of Rosendal (Manamela, pers. comm). However, the farmers had decided not to participate in the proposed projects.

---

## SECTION 3: OVERVIEW OF STUDY AREA

---

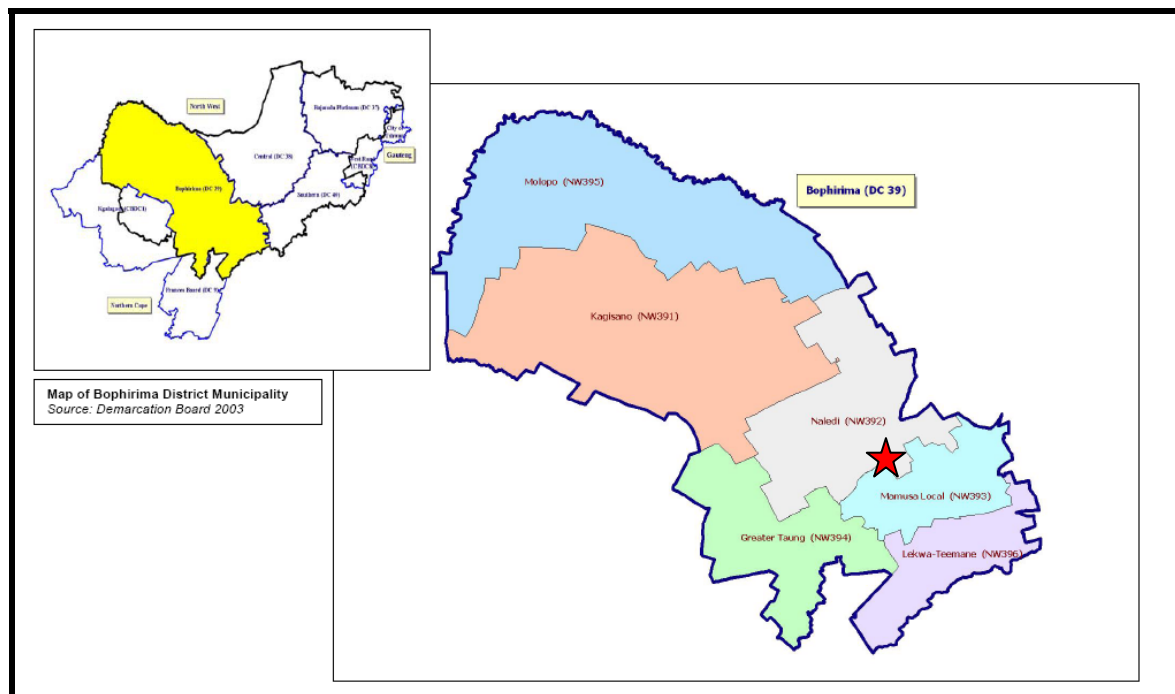
### 3.1 INTRODUCTION

Section 3 provides a baseline description of the study area with regard to:

- The administrative context;
- Road access;
- Land use and settlement patterns;
- The demographic context;
- The economic context.

### 3.2 ADMINISTRATIVE CONTEXT

The proposed Waterloo SEF site is located ~5 km south east of the large town of Vryburg in the Naledi Local Municipality, in the western part of South Africa's central interior North West Province (NWP), approximately 130 km south of the Botswana border (Figure 3.1.).



**Figure 3.1: Location of Naledi LM within Dr Ruth S Mompoti DM and North West Province** (Source: Dr Ruth S Mompoti District Municipality, 2010).

The NWP is comprised of 4 district municipalities (DMs), and 19 Local Municipalities (LMs). The Naledi Local Municipality (NLM) is located in the central Dr Ruth S Mompoti District Municipality (DRSMDM), the westernmost of the NWP's four DMs. The DRSMDM (DC39), until recently known as the Bophirima DM, is the largest of the NWP's 4 DMs, covering ~ 43 000 km<sup>2</sup> (~41% of the NWP area), but has the lowest population share

(~500 000, or ~15% of NWP total) and population density (~10 people per ha). After the 2011 amalgamation of the Molopo and Kagisano LMs, the DRSMDM is now comprised of five LMs. Towns in the DRSMDM include Vryburg, Schweizer-Reneke, Bloemhof, Taung, Kgobadi, Reivilo, Ganyesa and Stella.

The Naledi LM (NW392)<sup>8</sup>, centred on the large town of Vryburg, constitutes the economic heart of the DRSMDM. The NLM is centrally located within the DM, and borders onto the Mamusa LM (Schweizer-Reneke) to the south, the Greater Taung LM (Taung) to the south and west, and the Kagisano-Molopo LM (Ganyesa) to the west and north. To the east the NLM borders onto the Ratlou and Tswaing LMs of the Ngaka Modiri Molema DM of the NWP (Mahikeng, also seat of the NWP provincial government). Naledi is the second largest (7 264 km<sup>2</sup> = ~15% of the DM area) of the 5 LMs, and the third most populous, accounting for ~17% of DM population in 2007 (NLM density of ~8 people/ha, greatly skewed towards the Black African group). Vryburg is the seat of both the NLM and the DRSMDM. The only other significant town in the NLM is Stella, located ~50 km north of Vryburg.

The NLM is comprised of 9 wards. The Waterloo site is located in the Ward 4 area. Ward 4 is comprised of Huhudi informal settlement and farms located to the south of Vryburg. Huhudi informal settlement comprises the vast bulk of the Ward 4 population.

### 3.3 STUDY AREA ACCESS

Vryburg is at the intersection of four major tarred routes, radiating from the town like spokes from a cartwheel. These include two important national roads, namely the N14 (Namibia-Gauteng route) and the N18 (Kimberley/ Warrenton to Mahikeng and the Botswana border). In addition, the R34 links Vryburg to Schweizer-Reneke, Bloemhof and Hoopstad (Free State), and the R378 links Vryburg to Ganyesa, Tosca, and the Botswana border. Municipal roads within the NLM are generally in a bad condition, with ~80% of the NLM's 41 km tarred roads in need of maintenance, and the 18 km of its gravel roads needing upgrading. The N18 is maintained by SANRAL, and is in a good condition. None of the roads in the study area are designated scenic drives.

The Waterloo SEF site is located in relative proximity to both the N18 and the Amalia gravel road off the R34 to the south and south-east of Vryburg, respectively (Figure 3.2). Private farm roads across Waterloo provide indirect access to the site off the N18, but Waterloo currently does not have any access off the Amalia gravel road. Waterloo Farm does border onto the Amalia gravel road, and an entrance road to the SEF would be feasible. The Amalia gravel road is a proclaimed (public) road, and provides primary access to a number of farms located between Vryburg and the small farming town of Amalia (near Schweizer-Reneke).

The majority of NLM/ Vryburg/ Huhudi residents are reliant on walking, cycling, lifts or public transport. A taxi/ bus rank is located in Vryburg. Huhudi is mainly serviced by private taxis. An upgrade/ revamp of the rank is currently envisaged (NLM; 2012). Buses and minibus taxis also service the local area around Vryburg, including stops along major roads such as the N18, e.g. Tiger Kloof School (on Tierkloof Farm) to the south of Waterloo Farm.

---

<sup>8</sup> Not to be confused with the Naledi Local Municipality [FS164] in the Xhariep DM in the Free State Province.

The development property is flanked by the Kimberley-Mahikeng railway line (Figure 3.2). In as far as could be established, the rail carries freight only, and most of the local sidings have been closed down. The Vryburg Aerodrome is located to the west of the N18, to the north of Rosendal Farm. There are currently plans to revive the facility (NLM, 2012).

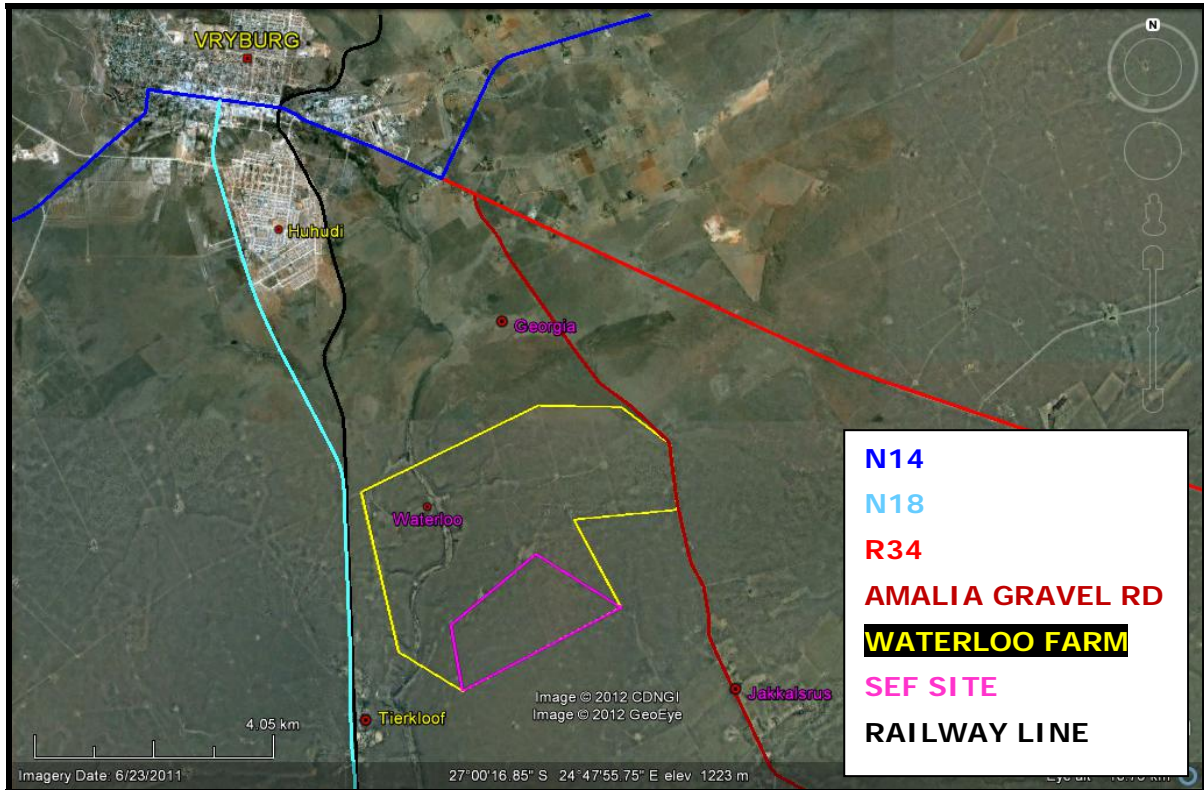


Figure 3.2: Road network in relation to proposed Waterloo SEF site

### 3.4 STUDY AREA SETTLEMENT AND LAND USES

#### 3.4.1 Regional context

The study area is located in the central DRSMMDM, in a region historically known as Stellaland or Bophirima. The region is extensive, largely rural and agrarian in nature, and traditionally renowned as the premier beef producing region of South Africa. The region has strong historical and cultural ties with adjacent Botswana, and the transnational Kalahari region. The spatial economy is strongly centralized on the NLM and on Vryburg (the only 2<sup>nd</sup> order settlement in the region). The region is currently plagued by chronic economic underperformance, financially unviable municipalities, large service backlogs, neglected infrastructure (e.g. roads), and significant unemployment and widespread poverty amongst its largely Black, Tswana speaking population.

The DRSMMDM region largely consists of flat to undulating terrain, ranging from 980 - 1400 metres above mean sea level (mamsl), but a series of small dolomitic hills occurs in the central Vryburg-Taung-Schweizer Reineke triangle. The region has a summer rainfall regime, with average rainfall peaking in early and late summer. The region is semi-arid to arid, with most of it receiving 300-400 mm/ year, but decreasing to 200-300 mm/y in the extreme north-west (Kagisano-Molopo LM). The region is prone to

storm-induced flooding in summer. Average daily temperatures range from 12°C to 27°C. The summers are hot (December/ January averages up to 31°C, and the winters dry and relatively mild (average minimum temperature of 4°C in June/ July). The region is flanked by two major rivers, namely the Molopo to the north (Botswana border), and the Vaal to the south (Free State border). The Mamusa LM in the south is traversed by the only major other river in the region, namely the Harts. No major perennial rivers traverse the Naledi LM and Vryburg area. The region has good groundwater resources, but localised over-abstraction and aquifer pollution is problematic (BDM, 2007).

The region falls largely within the Savannah biome (from the north-west down into the south-east as far as Vryburg and Schweizer-Reineke), but the south-eastern portion (Schweizer-Reneke to Bloemhof) is located in the Grassland biome. The Savannah portion (including around Vryburg) is dominated by the Acacia thornveld veld type, but intrusions of *Tarchonantus-Grewia* dominated bushveld occur into the southern Naledi south of Vryburg (Photograph 3.1).

Acacia thornveld is characterized by medium to low Acacia spp., and a shrub level (Vaalbos predominates in the Vryburg area), interspersed with grass spp. and small succulents. The veld type is not threatened, and no biodiversity hotspot areas occur in the Vryburg study area (NWP, 2004b). The veld is categorized as sweetveld, for the natural preponderance of palatable grasses for stock and game. Sweetveld, a product of semi-arid conditions, has low comparatively low carrying capacities, and is prone to overgrazing. The occurrence of *A. mellifera* (Black thorn – a serious encroaching spp.) is a common indicator of overgrazing in the Vryburg region. Mesquite (*Prosopis* spp.) and prickly pear (*Opuntia* spp.) are common invasive aliens.

Human inhabitation of the region dates back to the early stone-age, and beyond – as testified to by the famous Taung hominid skull. The Taung skull – that of a hominid child (*Australopithecus africanus*) – was discovered by workers at the Buxton limestone quarry south west of Taung (~80 km from study site) in 1924, and famously described by Dr Raymond Dart. The Taung Skull site, along with a number of other sites in the NWP, Gauteng and Limpopo, currently form part of the spatially dispersed UNESCO World Heritage Site “Fossil Hominids, Sterkfontein, Swartkrans, Kromdraai and Environs” multiple-site listing<sup>9</sup>. In pre-colonial times, the region formed part of the grazing lands of the Khoi-Khoi and the Bathlaping Tswana.

---

<sup>9</sup> The listing was made in 1999; the Taung site was added in 2003. According to the listing, “the area contains essential elements that define the origin and evolution of humanity. Fossils found there have enabled the identification of several specimens of early hominids (4.5 - 2.5 million years), as well as evidence of the domestication of fire 1.8 - 1 million years ago” ([www.whc.unesco.org/en/list/915](http://www.whc.unesco.org/en/list/915)).





**Photograph 3.1: Thornveld on Waterloo Farm**

The early effects of colonialisation were felt by the movement of Oorlam groups such as the Koranna into the region by the early 1800's, later followed by White missionaries, hunters and livestock farmers, all probing and settling the north-western frontier during the course of the 19<sup>th</sup> century. The discovery of diamond fields near Kimberley during the 1870's accelerated economic development and social change in the entire region around Kimberley's hinterland, not least of which the eventual annexation of the Vryburg area by Great Britain. The area around Vryburg was an early bastion of Boer resistance to British annexation, and even briefly featured the short-lived, self-proclaimed Republic of Stellaland in the early 1880's. Vryburg eventually became an important stop on the Kimberley-Mafikeng-Rhodesia-Zambia railway line. During the Apartheid-era, land ownership was consolidated in the hands of mainly commercial (white) farmers, but portions (e.g. Tierkooft to the south of Waterloo) fell within the spatially fragmented Bantustan of Bophuthatswana. The region's proximity to the Botswana border saw it feature as a major beacon of anti-Apartheid resistance, including cross-border movement of political exiles. The rural parts of the region continue to suffer from the legacy of Apartheid and Bantustan neglect and skewed wealth distribution.

The region is commonly described as the "agricultural hinterland" of the NWP, and the Vryburg area as "the Texas of South Africa". Extensive livestock grazing on commercial farms is the predominant land use in the district, centered on Vryburg and the area to the north west of Vryburg. Some of the largest Hereford herds in the world are to be found in the Vryburg district. Currently only limited beneficiation takes place within the region, but Vryburg has been earmarked as key beef beneficiation growth/ development node. Soil cropping potential in the region is generally poor due to limited rainfall and shallow, erosion-prone soils, and largely limited to the south eastern portion of the DM with access to the Vaal/ Harts water scheme, where crops such as maize, peanuts, sunflowers and cotton are produced. The bulk of land, and virtually all productively used agricultural land, continues to be owned by white commercial farmers (BPD, 2007,

DCGTA, 2011, DRSMMDM, 2012). Despite significant investment in the emerging farmer sector throughout the DRSMMDM, land reform projects have largely failed to take off as sustainable, productive enterprises (Moncho, pers. comm).

The regional settlement pattern is fragmentary with small, low-intensity urban areas scattered throughout, surrounded by vast rural areas. Major settlements are on average more than 60 km apart. The DM can be roughly divided into two distinct settlement type patterns, with the more 'urban' type patterns in the south eastern half (including Vryburg), and dense, 'peri -urban' type settlements in the north-western half of the district. Almost 80% of the settlements in the DRRSM area are informal rural villages with small to very large populations. Vryburg accommodates a mix of land uses, varying from residential, retail, institutional to manufacturing and industrial. The other towns in the DM are mainly residential in character and function, with limited retail and services in the third order settlements (Schweizer-Reneke, etc) (DCGTA, 2011; DRSM, 2010, 2012).

Tourism does not currently play a large role in the district economy. Key attractions are mainly located in the south eastern part of the DM (Taung Skull site, Bloemhof Dam), and the Molopo Nature Reserve along the Botswana border in the north. No major attractions are located near Vryburg, and the local tourism industry mainly caters for passing travellers or people working on contracts in the area. Eco tourism, game viewing and hunting activities are currently concentrated in the Kagisano-Molopo LM, but the Naledi and Vryburg areas are suited for browsing and grazing game spp., and the potential for diversification into (hunting-orientated) game farming has been noted in policy documents, including the NLM IDP. No tourism bureau or information centre currently serves the DM, Naledi or Vryburg, and limited marketing and information is carried out by the NWP Tourism in Mahikeng. Policy documents note that the region lacks a brand identity and comprehensive tourism strategy. The lack of a tourism support infrastructure and bad municipal infrastructure have been noted as significant stumbling blocks in the 2007 DM SDF – a situation which appears to be unchanged.

### **3.4.2 Vryburg**

Vryburg is the hub of both the Dr Ruth Mompati DM and Naledi LM, and also the administrative seat of both. Vryburg is the regional leader town, and at the centre of the regional agriculture and (limited associated) agricultural beneficiation activities, and host of South Africa's third largest annual agricultural show. The town has a population of ~ 50 000 and accounts for the bulk (~70%) of the Naledi population. Vryburg is also located at the hub of the regional and trans-regional road network, mainly associated with the N14 Gauteng-Namibia corridor. Apart from Stella, it is the only other major town in the NLM. Stella, Taung, Schweizer-Reneke, Ganyesa and Reivillo are the nearest settlements, with Bloemhof, Christiana and Kuruman somewhat further afield.

The Apartheid-era spatial pattern of a white historic core (including residential suburbs and the central business district (CBD), and spatially distinct Huhudi (Black) and Colridge (Coloured) areas, has remained largely intact. The bulk of the town's population is located in Huhudi (Photograph 3.2). Huhudi is largely a dormitory suburb, located to the south of Vryburg and east of the N18. Huhudi has very limited retail and other infrastructure. Retail and services are mainly concentrated in the historic town, and mainly along the large central activity spine of Market Street (Photograph 3.3).



**Photograph 3.2: Southern built edge of Huhudi**



**Photograph 3.3: Market Street in Vryburg on a Friday afternoon**

Industrial activities are concentrated in the east of the town, along the Schweizer-Reneke road. The industrial area includes a grain silo complex which visually dominates the low, dispersed Vryburg skyline from many vantage points. The industrial area has

seen massive disinvestment since the late 1990's, with key operators like Pioneer Foods and SA Breweries closing down operations (Ramorogadi, pers. comm). Peri-urban land uses, including agricultural smallholdings and an existing landfill site are located to the east and south of the industrial area along the Schweizer-Reneke road. With the exception of Market Street, virtually all tarred roads in Vryburg are badly potholed and virtually unmarked.

As the largest town in the DM, Vryburg has absorbed much of the significant urbanization which has taken place in the DM over the past 1-2 decades. This trend is common to all arid areas in South Africa, and is related to factors such as the overall decline in rural employment opportunities, loss of tenure on farms as a result of Establishment of Security of Tenure Act (ESTA) legislation<sup>10</sup> on the one hand, and on the other, the national system of localizing subsidized housing opportunities and social grant payment centers in towns.

Huhudi has absorbed most of the newly-urbanized influx, with much of the growth spilling into Huhudi informal settlements, located to the south and south-east of the older, formal portion of Huhudi (Photograph 3.4). The bulk of the Huhudi informal settlements are located in the Ward 4 area, accounting in turn for the bulk of the Ward 4 population.



**Photograph 3.4: Informal settlement area in Huhudi close to N18**

According to the local Ward councilor, an estimated 3 600 informal structures are located in his Ward. The bulk of the informal community consists of low-skilled, newly-

<sup>10</sup> The Extension of Security of Tenure Act (Act 62 of 1997). The intention of the Act was to secure tenure for farm labourer families. In practice, implementation of the Act lead to eviction of farm workers not meeting the relevant qualifications. Urbanised farm workers are generally unprepared to compete in the semi-skilled and skilled urban job markets, and consequently unemployment and poverty levels are very high amongst these urban newcomers.



urbanized rural people, mainly Tswana-speaking farm workers who had lost tenure in the Vryburg and Kagisano-Molopo LM. According to the Ward Councilor, the majority of households are dependent on state grants, and unemployment (~60% or more) and crime levels are extremely high (Ramorogadi, pers. comm). Observations in the study area indicated that many local residents make use of firewood collected from the veld around Vryburg for cooking and heat fuel, including on Rosendal and Tierkloof Farms.

The formal part of Huhudi is largely provided by municipal services. Information contained in the 2009/ 2010 IDP indicates that 97% of formal dwellings were receiving municipal water, 94% had access to municipal sewage treatment, and that 100% had electricity and municipal refuse removal services (NLM, 2009). The informal part of Huhudi is partially served by *in situ* access to water and sanitation. Vryburg Extension 25, located across the N18, to the north of the Vryburg Aerodrome, was earmarked to provide ~3 000 housing opportunities (partly to accommodate informal area settlements), but the development has stalled due to the developer running out of funds (Kubeka, pers. comm).

Various interviewees have indicated that the rural area located to the south of Huhudi is subject to minor, but frequent crimes such as trespassing, theft of infrastructure and farm equipment, etc. Farmers in the area have indicated that illegal hunting (with dogs) and uncontrolled fires currently pose significant risks, with the latter indicated as a key concern. Due to the fact that mainly cattle are farmed in the area, stock theft is comparatively less problematic than in other parts of South Africa.

### **3.4.3 Waterloo Farm**

The proposed Waterloo SEF site is located in the north eastern corner of Waterloo Farm (Figure 3.3). Waterloo Farm is ~980 ha in extent, and consists mainly of untransformed land, historically used for grazing by mainly cattle (Photograph 3.5). Small ploughed fields are located near the farmstead, but the soils are not suited to cropping (van Zyl, pers. Comm.). The western portion of Waterloo Farm is traversed by the non-perennial Tierkloof River. The N18 and Kimberley-Mahikeng railway line are located to the west of Waterloo farm, both ~4.5 km to the west of the proposed SEF site.

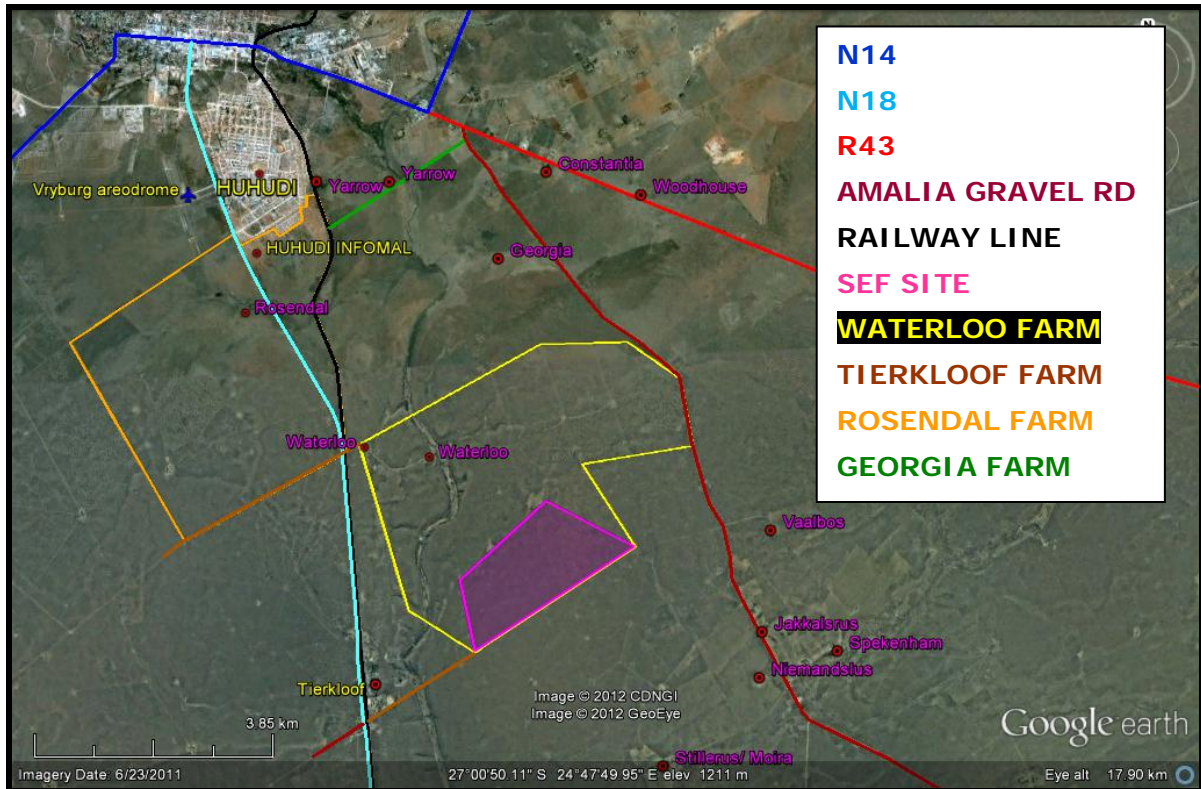
Two farmstead clusters and associated labourer's houses are located on Waterloo. The nearest cluster is located ~3.5 km from the proposed SEF site. The north western farmstead and a small surrounding area do not form part of Farm 922. The relevant portion is owned by Mr Van Vuuren. Mr van Vuuren lives on the farm, as do one farm labourer's family. Farm 922 is owned by the Chris van Zyl Trust. Dr van Zyl and his son reside on the farm. The farm forms part of a larger (multi-farm) beef farming operation on farms in the Vryburg area. Five farm labourer families reside on Waterloo Farm.



**Photograph 3.5: Cattle on Waterloo Farm, with farmstead in background**

#### **3.4.4 Surrounding land uses**

With the exception of the Amalia gravel road, the site is surrounded by agricultural land used for commercial cattle grazing in all directions. The site and Waterloo farm are however separated from urban Vryburg and the Vryburg agricultural smallholdings area by a single band of adjacent farms. A large educational institution (Tiger Kloof School) is furthermore located adjacent to the south-western portion of Waterloo Farm. The site's land use context may therefore be described as rural agricultural (natural grazing veld), but exposed to urban influences (peri-urban land uses, visual elements, people movement, etc), to the north, and with sensitive institutional land uses located to the south (but not in proximity to the site). Figure 3.3 provides an overview of the site in local context.



**Figure 3.3: The Waterloo SEF site and immediate surrounding area**

Agricultural smallholdings are located immediately to the south of the R34 east of the Vryburg urban edge, along the Amalia gravel road. Land uses include residential and small scale agriculture, including some small stock. The sense of place is peri-rural, with the existing Vryburg municipal landfill site and Industrial area located to the north-west nearby. The Amalia road is also traversed by existing power lines associated with the small Eskom Woodhouse substation (located in the triangle between the R43 and the Amalia road east of Georgia farm).

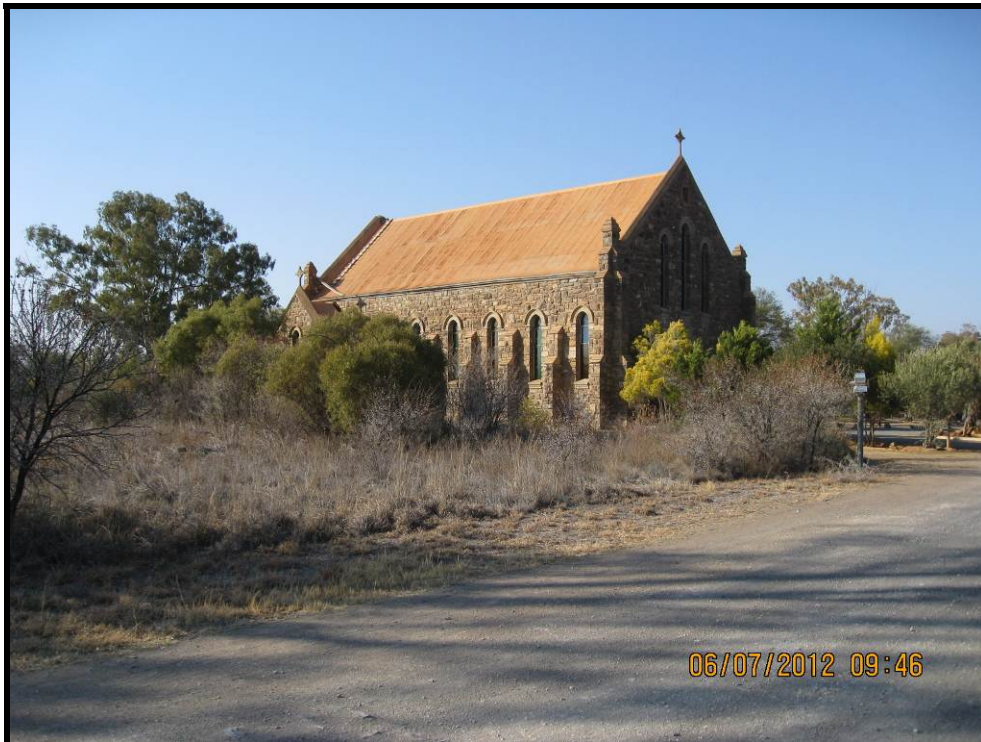
Georgia, Vaalbos and Jakkalsrus Farms all form part of productive cattle farming operations. The relevant owners reside on their properties. No labourers housing is associated with Georgia, but houses do occur on other properties along the Amalia road located to the east of the site. Inhabited farmsteads (e.g. Georgia and Vaalbos) are located ~3.5 km or more from the SEF site, and are further likely to be shielded by topography and vegetation.

The land located adjacent to the south of Waterloo 922, portions of Champions Kloof 731, is currently in the process of changing owners. The land has historically been used for cattle farming, but indications are that the new owner intends to establish a game farming operation. The site is located ~3 km from the property, and would likely be screened by vegetation.

Tiger Kloof Educational Facility is located on Tierkloof Farm, ~6 km south west of the proposed site. The Education Facility consists of a public school on private land. The school is 108 years old, and is largely housed in historic buildings (Photograph 3.6). The school currently caters for 656 learners in Grades R-12. Approximately 180 learners are boarders, the remainder travel in daily, mainly from Vryburg, and mainly by means of taxis. The bulk of the property is located to the west of the R18, and is comprised of the

commercial farming component of Tiger Kloof (Trust). Beef cattle are farmed on the property. The farm manager resides on the property.

Rosendal Farm (~1 000 ha) belongs to the NLM. The farm is currently rented out to commercial farmers for grazing purposes. A cluster of inhabited houses is located on the farm, west of the N18 near the urban edge (~6 km from the site). A mothballed small-scale poultry breeding facility is located west of the N18, just across the road from the access road to Waterloo. The area to the west of the N18 has been earmarked for a new municipal landfill site (location unclear). Site preparation for Eskom's new 400 kV Mookodi substation has just started. In addition, a 75 MW SEF is also currently proposed on Rosendal (Ncobo; Manamela, pers. comm). The portion of Rosendal to the east of the N18 and west of the railway line borders onto, and partly accommodates Huhudi informal settlement. The Vryburg Aerodrome is located to the north of Rosendal.



**Photograph 3.6: Historic chapel on Tiger Kloof**

### **3.4.5 Potentially sensitive receptors**

Due to the low profile of the SEF, its location relative to dwellings in the area and potential screening provided by the natural topography and vegetation, no significant sensitive receptors have been identified. Potential impacts from the proposed SEF related to potential glint/ reflection and navigational impacts on air traffic associated with the Vryburg Aerodrome may however need to be confirmed with the relevant aviation authorities.



### **3.5 DEMOGRAPHIC PROFILE**

Pending outcome of the Census 2011 results, focus below is mainly on municipal level, and specifically on information contained in the most recent 2012-2017 Naledi IDP and 2012-2017 DRSMMDM IDP. The information contained in both documents in turn relies mainly on dated (2007) estimates and projections.

#### **Population**

The DRSMMDM population was most recently estimated at 500 365 (~100 073 households) in 2007. Black Africans constituted the most prominent population group (94%), followed by Whites (3%) and Coloureds (3%) (DRSMMDM, 2012).

The Naledi population is currently estimated at 68 380 people (~16 338 households). The average NLM household size is estimated at 5 people. Black Africans constitute the most prominent population group (~81%), followed by Whites (~9%) and Coloureds (4.3%). The 2012-2017 NLM IDP notes that while Vryburg's population had increased as a result of urbanization, a number of 2007-2009 studies seem to suggest that the NLM population as a whole may be declining. According to Census 2001, Ward 4 accounted for ~16% (~9 200 people) of the NLM population. More recent figures could not be obtained, but given high growth in the Huhudi informal settlement, the absolute and proportional figures are likely higher at present. The Ward councillor has suggested an informal structure figure of 3 600. Assuming an average household size, a rough estimate of 18 000 people for Huhudi informal settlement may be arrived at.

The Naledi LM area has traditionally been a key migrant worker recruitment area, especially from within the national mining sector. This is currently still reflected by a ~52% to 48% split between females and males in the NLM, and indicative of the out-migration of males, specifically of within the economically active age group. The NLM IDP further notes an in-migration of Chinese and Pakistani entrepreneurs into Vryburg and the NLM, and an associated trend to employ mainly immigrant Black labour (Mozambiqueans, Malawians, etc.) over local labour (NLM, 2012).

#### **Age distribution**

Approximately 44% of the DRSMMDM population in 2009 is of school going age, or younger (0-19), while only 5.5% is retired (65 and older). The 2012-2017 IDP notes that the number of youthful dependents has significant implications in terms of both lowered household income and perpetuating the poverty cycle (DRSMMDM, 2011; 2012).

The NLM reflects the DM's high youthful dependence rate. Approximately 49.5% of the NLM population is of school going age, or younger (0-19), while only 4% is retired (65 and older). African youth (0-34) constitutes ~ 60% of the NLM population. The 2012-2017 IDP also notes that the number of youthful dependents has significant implications in terms of household income and poverty (NLM, 2012).

#### **Education levels**

A large portion of the DRSMMDM population has no education at all (~30%) and ~ 33% have only some Primary education. Only ~1.8% have a tertiary qualification. The IDP indicates a clear causal link between education and poverty levels in the DM (DRSMMDM, 2011; 2012).

The NLM education profile is slightly better than that for the DM. Approximately 18% of the NLM adult population had no formal schooling, and 66% had some schooling, but less than Grade 12. Only 6.5% of the NLM population has tertiary qualifications, including diplomas. The NLM education profile is distinctly racially stratified, with the African group generally the least skilled and educated, and the White group the best. The functional illiteracy rate amongst the NLM Black population group is estimated at ~52.8%. The IDP notes that training and retaining of trained people are key to attracting investment in the NLM (NLM, 2012).

### **Employment levels**

The vast bulk of the NLM economically active population cohort is comprised of Black Africans (~90%). The unemployment rates amongst the Black population group is ~29% (males) and 38.5% (females). Only 3.5% of the White group was unemployed, but a ~43% for the Coloured group. The 2012-2017 IDP notes that males continue to dominate in the labour market, with a large number of women of economically active age confined to domestic activities (DRSMDM, 2012).

The NLM unemployment rate is estimated at 47%. The bulk of the NLM economically active population cohort is comprised of Black Africans (78%), but the majority of this group however lacks skills and is not functionally literate. The population group with the highest overall unemployment was the Coloured group (~45%). The 2012-2017 IDP notes that, despite the preponderance of females in the NLM, males continue to dominate amongst the economically active group (NLM, 2012).

### **Household income**

The majority of household heads in the DRSMDM earn between R500 to R3 500 per month. Approximately 77% of Black household heads earn R3200/ month or less. Whites and Asians generally fall in the higher income categories (DRSMDM, 2012).

The NLM IDP notes that, as a result of reinforcing factors of unemployment, lack of skills, illiteracy and poverty, average Naledi household income levels are generally low, with ~53% of household heads earning less than R3 500/ month. While race and poverty still largely coincide, the IDP notes that a good spread of Africans in the R3 200 – R50 000/ month bracket, mainly linked to state and local government employment opportunities (NLM, 2012).

The urgent need to develop and apply an indigent policy has been noted for both the DRSMDM and NLM.

### **Sectoral employment**

The key employment sectors in the DRSMDM are Community Services (~29.8%), Agriculture (~28%), Private households (~17%), and Trade (~9%). The IDP notes that the challenge would be to develop the DM's other sectors, mainly envisaged by supporting SMMEs establishment and to facilitate their growth, as SMMEs usually have a large labor absorptive capacity than larger firms (DRSMDM, 2012).

The key employment sectors in the NLM are Agriculture and hunting (~37%), Community Services (~21%), Private households (~18%), and Trade (~10.5%). Manufacturing provides less than 2% of employment opportunities. The Agriculture subsector is largely responsible for the uptake of lower skilled portion of the Black part of the labour force. The NLM informal economy is sizeable. Approximately half of those employed in the sector so as street traders, retailers and marketers (NLM, 2012).

## **3.6 ECONOMIC PROFILE**

### **3.6.1 Dr Ruth S Mompati DM**

The 2009 DRSMMDM GDP was estimated at ~R7.698 billion. The main GDP generating sectors were Agriculture and hunting (21%), Finance and Insurance (8%), Administration (8%), and Transport (5%). Manufacturing (food, beverages and tobacco) accounted for ~1% (DRSMMDM, 2012).

The DRSMMDM economy is low-keyed, with the exception of the agricultural sector in the Naledi and Mamusa Local Municipal areas. The NLM (and Vryburg town) dominate the economy in the majority of the economic sector and activities. The major economic activities in DM are livestock farming (mainly beef), limited manufacturing, and retail trade and financial institutions. Irrigation agriculture exists in Greater Taung LM, dry land farming in Mamusa, and retail trade and alluvial diamonds in Mamusa and Lekwa-Teemane Local Municipalities. The DM's average annual GDP growth rate is low with growth only occurring in isolated instances in the agricultural, mining, provision of electricity, trade and services sectors. Long distances and low marketing and service standards currently inhibit the tourism potential of the DM. Game and eco-tourism is mainly focused in the north (Kagisano-Molopo LM) (BDM,2007; NWP, 2004). Due to various reasons, economic growth and employment creation have fallen far short of growth targets envisaged in the PGDS for the DM (see Section 3. 3.1).

### **3.6.2 Naledi Local Municipality**

As indicated above and in Section 3.3, Naledi is located at the economic hub of the DM, surrounded by prime grazing land. In terms of beef production, the NLM enjoys a national comparative advantage. Other key advantages include the NLM and Vryburg's strategic location along the N14 and N18. Tourism potential and infrastructure is limited, and cater mainly for passing travelers.

The 2012-2017 NLM IDP notes that Vryburg and Naledi are at the hub of the economically most underperforming district in the North West (NLM, 2012: 23). The 2009 Naledi GDP was estimated at ~R1.945 billion. The main sectors of the NLM economy in terms of GDP generation were Agriculture and hunting (21%), Finance and Insurance (8%), Administration (8%), and Transport (5%). Manufacturing (food, beverages and tobacco) accounts for ~1%. Beef production development centered on Vryburg currently constitutes the anchoring economic strategy. Construction and manufacturing (agricultural, especially beef processing) have been identified as further potential growth areas in the 2012-2017 IDP, specifically in order to absorb the large group of unemployed youth (NLM, 2012).

---

## SECTION 4: INDENTIFICATION OF KEY ISSUES

---

### 4.1 INTRODUCTION

Section 4 provides an assessment of the key social issues identified during the study. The identification of key issues was based on:

- The Social Scoping Report prepared for the Scoping phase (Barbour and van der Merwe, 2012);
- Review of project related information, including other specialist studies;
- Interviews with key interested and affected parties;
- Experience/ familiarity of the authors with the area and local conditions;
- Experience with similar projects;

The assessment section is divided into the following sections:

- Assessment of compatibility with relevant policy and planning context (“planning fit”);
- Assessment of social issues associated with the construction phase;
- Assessment of social issues associated with the operational phase;
- Assessment of social issues associated with the decommissioning phase.
- Assessment of the “no development” alternative;
- Assessment of cumulative impacts.

### 4.2 ASSEMENT OF POLICY AND PLANNING FIT

As indicated in Section 1.6, legislative and policy context plays an important role in identifying and assessing the potential social impacts associated with a proposed development. In this regard a key component of the SIA process is to assess the proposed development in terms of its fit with key planning and policy documents.

The review of the relevant planning and policy documents was undertaken as a part of the SIA. 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);
- North West Province Growth and Development Strategy (2004-2014);
- Dr Ruth S Mompati District Municipality Integrated Development Plan (IDP) 2012-2017;
- Bophirima District Municipality Spatial Development Framework (2007);
- Naledi Local Municipality IDP 2012-2017.

The findings of the review indicated that solar energy was strongly supported at a national and local level. At a national level the While Paper on Energy Policy (1998) notes:

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

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

At a provincial and local level the review found that high unemployment and poverty levels in the study area, coupled to low education and skills levels constitute the most urgent social development challenges in the study area. The NLM has been described as the chronically most underperforming municipal economy in the most underperforming DM in the NWP. Vryburg, and especially the Ward 4 area, has absorbed a large group of former farmer laborers, currently living in Huhudi informal settlement. The majority of households subsist on grants. Functional literacy rates and life skills levels are low, and unemployment levels may be as high as 60%. The findings of the SIA indicate that the proposed SEF has the potential to support local economic development and create employment opportunities (see below). The proposed development therefore supports a number of key objectives contained in the NLM IDP.

In terms of spatial fit, there is limited guidance currently available with regard to the Vryburg area. The NLM planner indicated that the Vryburg urban edge is currently in the process of being demarcated. However, no urban-edge or land use related maps were available for Vryburg and surrounds. No municipal or NWP guidance is currently available with regard to the siting of SEFs. As indicated in Section 2, the site is located in an area that is only suitable for grazing. No residential receptors are located within 3 km from the site, and no designated scenic drives are located in the NLM. The area to the north of the site is in the transition zone to urban Vryburg/ Huhudi, and associated urban and service infrastructure. The development of a municipal landfill site and the Eskom 400 kV Mookodi substation on Rosendal Farm west of the N18 has also been confirmed, further contributing to the peri-urban sense of place in the area south of Vryburg. The SEF would be able to link into the envisaged Eskom power line network linking into Mookodi, and little to insignificant additional power line infrastructure would therefore be required. Based on these factors the site is compatible with the general surrounding land uses in the area.

The findings of the review of the relevant policies and documents pertaining to the energy sector therefore indicate that solar energy and the establishment of solar energy plants are supported at a national, provincial, and local level. It is therefore the opinion of the authors that the establishment of a SEF in the area is supported by national, provincial and local policies and planning documents.

#### **4.3 CONSTRUCTION PHASE SOCIAL IMPACTS**

The key social issues associated with the construction phase are the following:

##### **Potential positive impacts**

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

## Potential negative impacts

- Impacts associated with the presence of construction workers on local communities;
- Impacts related to the potential influx of job-seekers;
- Increased risks to livestock and farming infrastructure associated with the construction related activities and presence of construction workers on the Waterloo site;
- Increased risk of grass fires associated with construction related activities;
- Noise, dust and safety impacts of construction related activities and vehicles;
- Impact on productive farmland.

Annexure C contains the management plan for addressing social impacts.

### 4.3.1 Creation of local employment, training, and business opportunities

Based on the information from other SEF projects the construction phase for a 75 MW SEF is expected to extend over a period of 18-24 months and create approximately 400 employment opportunities during peak construction. The work associated with the construction phase will be undertaken by contractors and will include the establishment of the SEF and the associated components, including, access roads, substation, services and power line. It is anticipated that approximately 55% (220) of the employment opportunities will be available to low skilled workers (construction labourers, security staff etc.), 30% (120) for semi-skilled workers (drivers, equipment operators etc.) and 15% (60) for skilled personnel (engineers, land surveyors, project managers etc.). Members from the local communities are likely to be in a position to qualify for the majority of the low skilled and some of the semi-skilled employment opportunities. The majority of these employment opportunities are also likely to accrue to Historically Disadvantaged (HD) members from the local Vryburg community, specifically residents of Huhudi. Given high local unemployment levels and limited job opportunities in the area, this will represent a significant, if localised, social benefit. The remainder of the semi-skilled and majority of the skilled employment opportunities are likely to be associated with the contractors appointed to construct the SEF and associated infrastructure. However, in the absence of specific commitments from the developer to maximise local employment targets the potential opportunities for local employment will be limited.

The capital expenditure associated with the construction of a 75 MW SEF will be in the region of R R1.1 - 1.5 billion. In terms of business opportunities for local companies, expenditure during the construction phase will create business opportunities for the regional and local economy. However, given the technical nature of the project and high import content associated with SEFs opportunities for the local economy in Vryburg will be limited. However, opportunities are likely to exist for local contractors and engineering companies in Vryburg. Implementing the enhancement measures listed below can enhance these opportunities.

The total wage bill for the 18-24 month construction phase will be in the region of R 73.8 – R98.4 million. This is based on a monthly wage of R 5000 for low-skilled workers, R 10 000 for semi-skilled workers and R 30 000 for skilled workers over a 18-24 month construction phase. A percentage of the wage bill will be spent in the local economy and will create opportunities for local businesses in Vryburg. The sector of the local economy that is most likely to benefit from the proposed development is the local service industry. The potential opportunities for the local service sector would be linked to accommodation, catering, cleaning, transport and security, etc. associated with the

construction workers on the site. The benefits to the local economy will however be confined to the construction period (18-24 months).

The implementation of the proposed enhancement measures listed below would also enable the establishment of the proposed SEF to support co-operation between the public and private sectors which would support local economic development in the NLM.

In terms of training and skills development, the medium term duration of the construction phase will make it possible to implement an effective training and skills development programme. However, the majority of benefits are also likely to accrue to personnel employed by the relevant contractors.

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

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

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

	<b>Without Mitigation</b>	<b>With Enhancement</b>
<b>Extent</b>	Local – Regional (3)	Local – Regional (4)
<b>Duration</b>	Short term (2)	Short term (2)
<b>Magnitude</b>	Moderate (6)	High (8)
<b>Probability</b>	Highly probable (4)	Highly probable (4)
<b>Significance</b>	Medium (44)	Medium (56)
<b>Status</b>	Positive	Positive
<b>Reversibility</b>	N/A	N/A
<b>Irreplaceable loss of resources?</b>	N/A	N/A
<b>Can impact be enhanced?</b>	Yes	

**Enhancement:** See below

**Cumulative impacts:** Opportunity to up-grade and improve skills levels in the area.

**Residual impacts:** Improved pool of skills and experience in the local area.

**Assessment of No Go option**

There is no impact, as the current status quo will be maintained. The potential employment and economic benefits associated with the construction of the proposed SEF would however be forgone. The potential opportunity costs in terms of local capital expenditure, employment, skills development and opportunities for local business are therefore regarded as a negative. Potential opportunity costs would be greatest with regards to local employment provision and opportunities for the local service sector.

**Recommended enhancement measures**

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

### **Employment**

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

### **Business**

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

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

#### **4.3.2 Impact of construction workers on local communities**

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

- An increase in alcohol and drug use;
- An increase in crime levels;
- The loss of girlfriends and/or wives to construction workers;



- An increase in teenage and unwanted pregnancies;
- An increase in prostitution;
- An increase in sexually transmitted diseases (STDs), including HIV.

The potential risk to local residents in Vyrburg and surrounds will be mitigated by a commitment from Bophirima Solar's to the implementation of a local employment policy, specifically for the low and semi-skilled employment opportunities associated with the construction phase. Employing members from the local community to fill the low-skilled job categories will reduce the risk and mitigate the potential impacts on the local communities. These workers will be from the local community and form part of the local family and social network and, as such, the potential impact will be low. The use of local residents to fill the low skilled job categories will also reduce the need to provide accommodation for construction workers in Vyrburg. In this regard no construction personnel will be accommodated on the site. The findings of the SIA indicate that unemployment levels in Vryburg, specifically in Huhudi and Colridge, are high. The majority of low and semi-skilled workers are therefore likely to come from these two areas.

While the risks associated with construction workers at a community level will be low, at an individual and family level they may be significant, especially in the case of contracting a sexually transmitted disease or an unplanned pregnancy. However, given the nature of construction projects it is not possible to totally avoid these potential impacts at an individual or family level.

**Table 4.2: Assessment of impact of the presence of construction workers in the area on local communities**

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

	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (2) (Rated as 2 due to potential severity of impact on local communities)	Local (1) (Rated as 1 due to potential severity of impact on local communities)
<b>Duration</b>	Short term for community as a whole (2) Long term-permanent for individuals who may be affected by STDs etc. (5)	Short term for community as a whole (2) Long term-permanent for individuals who may be affected by STDs etc. (5)
<b>Magnitude</b>	Low for the community as a whole (4) High-Very High for specific individuals who may be affected by STDs etc. (10)	Low for community as a whole (4) High-Very High for specific individuals who may be affected by STDs etc. (10)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Low for the community as a whole (24) Moderate-High for specific individuals who may be affected by STDs etc. (51)	Low for the community as a whole (21) Moderate-High for specific individuals who may be affected by STDs etc. (48)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	No in case of HIV and AIDS	No in case of HIV and AIDS
<b>Irreplaceable</b>	Yes, if people contract HIV/AIDS.	

**loss of resources?** Human capital plays a critical role in communities that rely on farming for their livelihoods

**Can impact be mitigated?** Yes, to some degree. However, the risk cannot be eliminated

**Mitigation:** See below

**Cumulative impacts:** Impacts on family and community relations that may, in some cases, persist for a long period of time. Also in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.

**Residual impacts:** See cumulative impacts.

### **Assessment of No Go option**

There is no impact as the current status quo would be maintained. The potential positive impacts on the local economy associated with the additional spending by construction workers in the local economy will also be lost.

### **Recommended mitigation measures**

The potential risks associated with construction workers can be mitigated. The detailed mitigation measures should be outlined in the Environmental Management Plan (EMP) for the Construction Phase. Aspects that should be covered include:

- Where possible, Bophirima Solar should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically for semi and low-skilled job categories;
- Bophirima Solar should consider the option of establishing a Monitoring Forum (MF) in order to monitor the construction phase and the implementation of the recommended mitigation measures. The MF should be established before the construction phase commences, and should include key stakeholders, including representatives from local communities, local NLM Councillors, farmers and the contractor(s). The MF should also be briefed on the potential risks to the local community associated with construction workers;
- Bophirima Solar and the contractor(s) should, in consultation with representatives from the MF, develop a code of conduct for the construction phase. The code should identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code should be dismissed. All dismissals must comply with the South African labour legislation;
- Bophirima Solar and the contractor should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase;
- The movement of construction workers on and off the site should be closely managed and monitored by the contractors. In this regard the contractors should be responsible for making the necessary arrangements for transporting workers to and from site over weekends or after hours;
- The contractors should make the necessary arrangements for allowing workers from outside the area to return home over weekends and/ or on a regular basis. This would reduce the risk posed to local family structures and social networks;
- It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.

### 4.3.3 Influx of job seekers

Large construction projects tend to attract people to the area in the hope that they will secure a job, even if it is a temporary job. These job seekers can in turn become “economically stranded” in the area or decide to stay on irrespective of finding a job or not. While the proposed Waterloo SEF on its own does not constitute a large construction project, the proposed establishment of a number of other SEF in the area may attract job seekers to the area. As in the case of construction workers employed on the project, the actual presence of job seekers in the area does not in itself constitute a social impact. However, the manner in which they conduct themselves can impact on the local community.

The two main areas of concern are associated with the influx of job seekers:

- Impacts on existing social networks and community structures;
- Competition for housing, specifically low cost housing;
- Competition for scarce jobs;
- Increase in incidences of crime. The concern is that these job seekers may not leave town immediately and, in some cases, may stay indefinitely.

These issues are similar to the concerns associated with the presence of construction workers and are discussed in Section 4.4.2. However, in some instances the potential impact on the community may be greater given that they are unlikely to have accommodation and may decide to stay on in the area. In addition, they will not have a reliable source of income. The risk of crime associated with the influx of job seekers is therefore likely to be greater.

Experience from other projects has also shown that the families of job seekers may also accompany individual job seekers or follow them at a later date. In many cases the families of the job seekers that become “economically stranded” and the construction workers that decided to stay in the area, subsequently moved to the area. The influx of job seekers to the area and their families can also place pressure on the existing services in the area, specifically low income housing. In addition to the pressure on local services the influx of construction workers and job seekers can also result in competition for scarce employment opportunities. Further secondary impacts included increase in crime levels, especially property crime, as a result of the increased number of unemployed people. These impacts can result in increased tensions and conflicts between local residents and job seekers from outside the area.

The findings of the SIA indicate that potential for economically motivated in-migration and subsequent labour stranding in Vryburg is likely to be low. The majority of job seekers from outside of Vryburg are likely to come from nearby towns in the area. Due to the proximity of these towns to Vryburg the risk of labour stranding is likely to be low. The risks associated with the influx of job seekers are therefore likely to be low.

**Table 4.3: Assessment of impact of job seekers on local communities**

**Nature:** Potential impacts on family structures, social networks and community services associated with the influx of job seekers

	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (2)	Local (1)
<b>Duration</b>	Permanent (5)	Permanent (5)

	(For job seekers that stay on the town)	(For job seekers that stay on the town)
<b>Magnitude</b>	Minor (2)	Minor (2)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Low (27)	Low (24)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	No in case of HIV and AIDS	No in case of HIV and AIDS
<b>Irreplaceable loss of resources?</b>	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods	
<b>Can impact be mitigated?</b>	Yes, to some degree. However, the risk cannot be eliminated	

**Mitigation:** See below

**Cumulative impacts:** Impacts on family and community relations that may, in some cases, persist for a long period of time. Also in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.

**Residual impacts:** See cumulative impacts.

### **Recommended mitigation measures**

It is impossible to stop people from coming to the area in search of a job. However, as indicated above, Bophirima Solar should ensure that the employment criteria favour local residents in the area. In addition:

- Bophirima Solar, in consultation with the NLM, should investigate the option of establishing a MF to monitor and identify potential problems that may arise due to the influx of job seekers to the area. The MF should also include the other proponents of solar energy projects in the area;
- Bophirima Solar should implement a “locals first” policy, specifically with regard to unskilled and low skilled opportunities;
- Bophirima Solar should implement a policy that no employment will be available at the gate.

#### **4.3.4 Increased risk to livestock and farm infrastructure**

The presence on and movement of construction workers on and off the site poses a potential threat to farm infrastructure, such as fences and gates, which may be damaged. Stock losses may also result from gates being left open and/or fences being damaged. Veld fires pose a potential risk to pasture, while plastic waste may pose a risk to livestock if ingested. A key concern raised was the potential impact associated with trespassing on adjacent properties, specifically the potential threat posed by trespassing on Georgia and other small holdings in the area. This potential threat is linked to workers from Huhudi accessing the site across these properties. This would also pose a potential threat to the safety and security of local landowners in the area. Given the location of Rosendal Farm the likelihood of workers accessing the site over Georgia Farm is limited. In this regard the N18, which runs along the eastern boundary of Rosendal Farm, provides direct access to the site from Vryburg and Huhudi. The potential risks can also be effectively mitigated by managing the movement of construction workers during the construction phase.

**Table 4.4: Assessment of impact of stock theft and damage to farm infrastructure**

**Nature:** Potential loss of livestock, poaching and damage to farm infrastructure associated with the presence of construction workers on site

	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (3)	Local (2)
<b>Duration</b>	Short term (2)	Short term (2)
<b>Magnitude</b>	Low (4)	Low (4)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Low (27)	Low (24)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes, compensation paid for stock losses etc.	Yes, compensation paid for stock losses etc.
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impact be mitigated?</b>	Yes	Yes

**Mitigation:** See below

**Cumulative impacts:** No, provided losses are compensated for.

**Residual impacts:** See cumulative impacts.

**Assessment of No-Go option**

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

**Recommended mitigation measures**

Key mitigation measures include:

- Bophirima Solar should enter into an agreement with the local farmers in the area whereby damages to farm property etc. during the construction phase will be compensated for. The agreement should be signed before the construction phase commences;
- Bophirima Solar should consider the option of establishing a MF (see above) that includes local farmers and develop a Code of Conduct for construction workers. This committee should be established prior to commencement of the construction phase. The Code of Conduct should be signed by the proponent and the contractors before the contractors move onto site;
- Bophirima Solar should hold contractors liable for compensating farmers and communities in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. This should be contained in the Code of Conduct to be signed between the proponent, the contractors and neighbouring landowners. The agreement should also cover losses and costs associated with fires caused by construction workers or construction related activities (see below);

- The Environmental Management Plan (EMP) must outline procedures for managing and storing waste on site, specifically plastic waste that poses a threat to livestock if ingested;
- Contractors appointed by Bophirima Solar should provide daily transport to and from the site. This would reduce the potential risk of trespassing on adjacent properties, specifically in the case of workers from Huhudi;
- Contractors appointed by Bophirima Solar must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms.
- Contractors appointed by Bophirima Solar must ensure that construction workers who are found guilty of stealing livestock and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation;
- The housing of construction workers on the site should be strictly limited to security personnel.

#### 4.3.5 Increased risk of grass fires

The presence of construction workers and construction-related activities on the site poses an increased risk of grass fires that could in turn pose a threat to livestock, crops, wildlife and farmsteads in the area. In the process, farm infrastructure may also be damaged or destroyed and human lives threatened.

- The potential risk of grass fires is heightened by the windy conditions in the area, specifically during the dry, windy winter months from May to September;
- The risk of fire related damage is also exacerbated by the dominant role that beef farming plays in the area and the impact that a fire could have on grazing.

**Table 4.5: Assessment of impact of increased risk of grass fires**

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

	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (4) (Rated as 4 due to potential severity of impact on local farmers)	Local (2)
<b>Duration</b>	Short term (2)	short term (2)
<b>Magnitude</b>	Moderate due to reliance on agriculture for maintaining livelihoods (6)	Low (4)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Medium (36)	Low (24)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes, compensation paid for stock and crop losses etc.	
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impact be mitigated?</b>	Yes	

**Mitigation:** See below

**Cumulative impacts:** No, provided losses are compensated for.

**Residual impacts:** See cumulative impacts.

### **Assessment of No-Go option**

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

### **Recommended mitigation measures**

The mitigation measures include:

- Bophirima Solar should enter into an agreement with the local farmers in the area whereby damages to farm property etc. during the construction phase will be compensated for. The agreement should be signed before the construction phase commences;
- Contractor should ensure that open fires on the site for cooking or heating are not allowed except in designated areas;
- Contractor to ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced. Measures to reduce the risk of fires include avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high risk dry, windy summer months;
- Contractor to provide adequate fire fighting equipment on-site;
- Contractor to provide fire-fighting training to selected construction staff;
- No construction staff, with the exception of security staff, to be accommodated on site over night;
- As per the conditions of the Code of Conduct, in the advent of a fire being caused by construction workers and or construction activities, the appointed contractors must compensate farmers for any damage caused to their farms. The contractor should also compensate the fire fighting costs borne by farmers and local authorities.

#### **4.3.6 Impacts associated with construction vehicles**

The movement of heavy construction vehicles during the construction phase has the potential to damage roads and create noise, dust, and safety impacts for other road users and local communities in the area. As indicated above, the Waterloo SEF site is located in relative proximity to both the N18 and the Amalia gravel road off the R34 to the south and south-east of Vryburg, respectively. Private farm roads across Waterloo provide indirect access to the site off the N18, but Waterloo currently does not have any access off the Amalia gravel road. Waterloo Farm does border onto the Amalia gravel road, and an entrance road to the SEF from Amalia road would be feasible. The Amalia road is a proclaimed (public) road also provides primary access to a number of farms located between Vryburg and the small farming town of Amalia (near Schweizer-Reneke).

The findings of the SIA indicate that the Amalia Road is not heavily utilized. The social impacts associated with the movement of construction related traffic along the road are therefore likely to be low. In addition, unlike wind energy projects, the transportation requirements for SEF's do not involve large, abnormal loads. However, the surface of the road is likely to be prone to damage by heavy vehicles, especially during the rainy season. The contractor should be required to ensure that damage to the road is repaired before the handover of the project.

#### **Table 4.6: Assessment of the impacts associated with construction vehicles**

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

	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (2)	Local (1)
<b>Duration</b>	Short Term (2)	Short Term (2)
<b>Magnitude</b>	Low (4)	Minor (2)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Low (24)	Low (15)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes	
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impact be mitigated?</b>	Yes	

**Mitigation:** See below

**Cumulative impacts:** If damage to roads is not repaired then this will affect the farming activities in the area and result in higher maintenance costs for vehicles of local farmers and other road users. The costs will be borne by road users who were not responsible for the damage.

**Residual impacts:** See cumulative impacts

### **Assessment of No-Go option**

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

### **Recommended mitigation measures**

The potential impacts associated with heavy vehicles can be effectively mitigated. The mitigation measures include:

- The contractor must ensure that damage caused by construction related traffic to the internal access roads is repaired before the completion of the construction phase. The costs associated with the repair must be borne by the contractor;
- Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers;
- All vehicles must be road-worthy and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.

#### **4.3.7 Impacts associated with loss of farmland**

The activities associated with the construction phase have the potential to result in the loss of land available for grazing and other agricultural activities. As indicated above the only agricultural use for the land is grazing. As indicated above the only agricultural use for the land is grazing. In addition, stock theft does pose a risk to farming due to the proximity of the site to Vryburg and Huhudi. The farm owner has entered into a 20 year lease agreement with Bophirima Solar for the use of the land for the proposed SEF. The impact on farm income due to the loss of grazing will be more than offset by the income from Bophirima Solar. The impact of the proposed SEF on the economic potential of the farm will therefore be low.



In addition, the final disturbance footprint can also be reduced by careful site design and placement of components. The impact on farmland associated with the construction phase can therefore be mitigated by minimising the footprint of the construction related activities and ensuring that disturbed areas are fully rehabilitated on completion of the construction phase. Recommended mitigation measures are outlined below.

**Table 4.7: Assessment of impact on farmland due to construction related activities**

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

	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (1)	Local (1)
<b>Duration</b>	Long term-permanent if disturbed areas are not effectively rehabilitated (5)	Short term if damaged areas are rehabilitated (2)
<b>Magnitude</b>	Minor (2)	Minor (2)
<b>Probability</b>	Probable (3)	Highly Probable (4)
<b>Significance</b>	Low (24)	Low (20)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes, disturbed areas can be rehabilitated	Yes, disturbed areas can be rehabilitated
<b>Irreplaceable loss of resources?</b>	Yes, loss of farmland. However, disturbed areas can be rehabilitated	Yes, loss of farmland. However, disturbed areas can be rehabilitated
<b>Can impact be mitigated?</b>	Yes, however, loss of farmland cannot be avoided	Yes, however, loss of farmland cannot be avoided

**Mitigation:** See below

**Cumulative impacts:** Overall loss of farmland could affect the livelihoods of the affected farmers, their families, and the workers on the farms and their families. However, disturbed areas can be rehabilitated.

**Residual impacts:** See cumulative impacts.

### **Assessment of No-Go option**

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

### **Recommended mitigation measures**

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

- The footprint associated with the construction related activities (access roads, construction platforms, workshop etc.) should be minimised;
- An Environmental Control Officer (ECO) should be appointed to monitor the establishment phase of the construction phase;
- All areas disturbed by construction related activities, such as access roads on the site, construction platforms, workshop area etc., should be rehabilitated at the end of the construction phase;

- The implementation of a rehabilitation programme should be included in the terms of reference for the contractor/s appointed. The specifications for the rehabilitation programme should be drawn up the Environmental Consultants appointed to undertake the EIA;
- The implementation of the Rehabilitation Programme should be monitored by the ECO.

#### **4.4 OPERATIONAL PHASE SOCIAL IMPACTS**

The following key social issues are of relevance to the operational phase:

##### **Potential positive impacts**

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

##### **Potential negative impacts**

- Influx of job seekers to the area;
- Loss of farm labour;
- Impact on productive farmland;
- The visual impacts and associated impact on sense of place;
- Potential impact on tourism.

Annexure C contains the management plan for addressing social impacts.

##### **4.4.1 Creation of employment and business opportunities and support for local economic development**

Based on information from estimated global employment ratios per MW of solar PV installed (viz. 0.7 direct long term opportunities/ MW), the proposed Waterloo SEF would create ~ 53 employment opportunities for over a 20 year period. Of this total approximately 40 will be low skilled, 10 semi-skilled and 3 high skilled positions. The annual wage bill for the operational phase would be ~ R 4.86 million. The majority of the employment opportunities associated with the operational phase are likely to benefit HD members of the community. However, given that the solar energy sector in South Africa is relatively new, the skilled positions may need to be filled by people from other parts of South Africa or even overseas.

It will also be possible to increase the number of local employment opportunities through the implementation of a skills development and training programme linked to the operational phase. Such a programme would support the strategic goals of promoting local employment and skills development contained in the NLM IDP.

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

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

**Table 4.8: Impact assessment of employment and business creation opportunities**

**Nature:** Creation of employment and business opportunities associated with the operational phase

	<b>Without Mitigation</b>	<b>With Enhancement</b>
<b>Extent</b>	Local and Regional (2)	Local and Regional (3)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	Low (4)	Moderate (6)
<b>Probability</b>	Probable (3)	Definite (5)
<b>Significance</b>	Medium (30)	High (65)
<b>Status</b>	Positive	Positive
<b>Reversibility</b>	N/A	
<b>Irreplaceable loss of resources?</b>	No	
<b>Can impact be enhanced?</b>	Yes	

**Enhancement:** See below

**Cumulative impacts:** Creation of permanent employment and skills and development opportunities for members from the local community and creation of additional business and economic opportunities in the area

**Residual impacts:** See cumulative impacts

**Assessment of No-Go option**

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

**Recommended enhancement measures**

The enhancement measures listed in Section 4.4.1, i.e. to enhance local employment and business opportunities during the construction phase, also apply to the operational phase. In addition:

- Bophirima Solar should implement a training and skills development programme for locals during the first 5 years of the operational phase. The aim of the programme should be to maximise the number of South African's and locals employed during the operational phase of the project;
- Bophirima Solar, in consultation with the NLM, should investigate the options for the establishment of a Community Development Trust (see below).

**Assessment of No-Go option**

There is no impact, as the current status quo will be maintained. The potential employment and economic benefits associated with the proposed SEF would however be

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

#### **4.4.2 Benefits associated with the establishment of a Community Trust**

In terms of the Request for Proposal document prepared by the Department of Energy all bidders for operating licences for renewable energy projects must demonstrate how the proposed development will benefit the local community. This can be achieved by establishing a Community Trust which is funded by revenue generated from the sale for energy.

Community Trusts provide an opportunity to generate a steady revenue stream that is guaranteed for a 20 year period. This revenue can be used to fund development initiatives in the area and support the local community. The long term duration of the revenue stream also allows local municipalities and communities to undertake long term planning for the area. The revenue from the proposed SEF plant can be used to support a number of social and economic initiatives in the area, including:

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

In addition, the establishment of a SEF plant is not likely to have a significant impact on the current agricultural land uses that underpin the local economic activities in the area. The loss of this relatively small area will not impact on the current and future farming activities. Experience has however also shown that Community Trusts can be mismanaged. This issue will need to be addressed in order to maximise the potential benefits associated with the establishment of a Community Trust.

Due the number of other renewable energy projects proposed in the vicinity of the Vryburg and the NLM as a whole, it is recommended that the NLM investigate the establishment of a single, renewable energy linked Development Trust whereby all potential renewable energy producers would contribute to the Trust. The motivation for the establishment of a larger, local municipality or district municipality trust would be to maximize the potential benefits to the broader region by creating a single fund that can be used to promote and support local, socio-economic development in the region as a whole.

The option of establishing a municipal level fund should be investigated by the NLM in consultation with other renewable energy companies.

**Table 4.9: Assessment of benefits associated with establishment of a community trust**

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

	<b>Without Mitigation</b>	<b>With Enhancement<sup>11</sup></b>
<b>Extent</b>	Local (2)	Local and Regional (4)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	Low (4)	Moderate (6)
<b>Probability</b>	Probable (3)	Definite (5)
<b>Significance</b>	Medium (30)	High (70)
<b>Status</b>	Positive	Positive
<b>Reversibility</b>	N/A	
<b>Irreplaceable loss of resources?</b>	No	
<b>Can impact be enhanced?</b>	Yes	

**Enhancement:** See below

**Cumulative impacts:** Promotion of social and economic development and improvement in the overall well-being of the community

**Residual impacts:** See cumulative impacts

#### **Assessment of No-Go option**

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

#### **Recommended enhancement measures**

In order to maximise the benefits and minimise the potential for corruption and misappropriation of funds the following measures should be implemented:

- Clear criteria for identifying and funding community projects and initiatives in the area should be identified. The criteria should be aimed at maximising the benefits for the community as a whole and not individuals within the community;
- Strict financial management controls, including annual audits, should be instituted to manage the funds generated for the Community Trust from the SEF plant;
- The option of establishing a west coast district level fund should be investigated by the WCDM in consultation with each of the local municipalities within the region.

#### **4.4.3 Development of infrastructure for the generation of clean, renewable energy**

South Africa currently relies on coal-powered energy to meet more than 90% of its energy needs. Much of the coal used has a high sulphur content. As a result South Africa is the nineteenth largest per capita producer of carbon emissions in the world, and

<sup>11</sup> Enhancement assumes effective management of the community trust

Eskom, as an energy utility, has been identified as the world's second largest producer carbon emissions.

The overall contribution to South Africa's total energy requirements of the proposed SEF is relatively small. However, the 75 MW produced will help to offset the total carbon emissions associated with energy generation in South Africa. Given South Africa's reliance on Eskom as a power utility, the benefits associated with an IPP based on renewable energy are regarded as an important contribution.

**Table 4.10: Implementation of clean, renewable energy infrastructure**

**Nature:** Promotion of clean, renewable energy

	<b>Without Mitigation</b>	<b>With Mitigation</b> (The provision of renewable energy infrastructure is in itself a mitigation measure)
<b>Extent</b>	Local, Regional and National (4)	Local, Regional and National (4)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	Low (4)	Low (4)
<b>Probability</b>	Highly Probable (4)	Highly Probable (4)
<b>Significance</b>	Medium (48)	Medium (48)
<b>Status</b>	Positive	Positive
<b>Reversibility</b>	Yes	
<b>Irreplaceable loss of resources?</b>	Yes, impact of climate change on ecosystems	
<b>Can impact be mitigated?</b>	Yes	

**Enhancement:** See below

**Cumulative impacts:** Reduce carbon emissions via the use of renewable energy and associated benefits in terms of global warming and climate change.

**Residual impacts:** See cumulative impacts

#### **Assessment of No-Go option**

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

#### **Recommended mitigation measures**

The establishment of the proposed facility is a mitigation measure in itself. In order to maximise the benefits of the proposed project Bophirima Solar should:

- Use the project to promote and increase the contribution of renewable energy to the national energy supply;
- Maximise the public's exposure to the project via an extensive communication and advertising programme;
- Implement a training and skills development programme for locals during the first 5 years of the operational phase. The aim of the programme should be to maximise the number of South African's employed during the operational phase of the project.

#### 4.4.4 Influx of job seekers to the area

While the proposed Waterloo SEF on its own is unlikely to result in an influx of job seekers during the operational phase, the proposed establishment of a number of solar energy projects in the vicinity of Vryburg may attract job seekers to the area. These issues are similar to the concerns associated with the influx of jobs seekers during the construction phase and include:

- Impacts on existing social networks and community structures;
- Competition for housing, specifically low cost housing;
- Pressure on local services, such as schools, clinics etc.;
- Competition for scarce jobs;
- Increase in incidences of crime.

However, as in the case of the construction phase, the findings of the SIA indicate that potential for economically motivated in-migration and subsequent labour stranding in Vryburg during the operational phase is likely to be low. The majority of job seekers from outside of Vryburg are likely to come from nearby local towns. Due to relative proximity of these towns the risk of labour stranding in Vryburg is likely to be low. In addition, Vryburg already attracts job seekers due to its role as a key service and economic centre for the NLM.

**Table 4.11: Assessment of impact of job seekers on local communities**

**Nature:** Potential impacts on family structures, social networks and community services associated with the influx of job seekers

	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (2)	Local (1)
<b>Duration</b>	Permanent (5) (For job seekers that stay on the town)	Permanent (5) (For job seekers that stay on the town)
<b>Magnitude</b>	Minor (2)	Minor (2)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Low (27)	Low (24)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	No in case of HIV and AIDS	No in case of HIV and AIDS
<b>Irreplaceable loss of resources?</b>	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods	
<b>Can impact be mitigated?</b>	Yes, to some degree. However, the risk cannot be eliminated	

**Mitigation:** See below

**Cumulative impacts:** Impacts on family and community relations that may, in some cases, persist for a long period of time. Also in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.

**Residual impacts:** See cumulative impacts.

### **Assessment of No-Go option**

There is no impact as it maintains the current status quo. In addition, Vryburg already attracts job seekers due to its role as a key service and economic centre for the NLM.

### **Recommended mitigation measures**

It is impossible to stop people from coming to the area in search of a job. However, as indicated above, Bophirima Solar should ensure that the employment criteria favour local residents in the area. In addition Bophirima Solar should:

- In consultation with the NLM, investigate the option of establishing a MF to monitor and identify potential problems that may arise due to the influx of job seekers to the area. The MF should also include the other proponents of solar energy projects in the area;
- Implement a “locals first” employment policy;
- Implement a policy that no employment will be available at the gate.

#### **4.4.5 Loss of farm labour**

Experience from other projects indicates that the loss of farm workers is an issue of concern. In most instances local farmers are unlikely to be in a position to compete with the salaries offered by the solar energy companies. As a result farm labourers may be tempted to resign from their current positions on farms. The loss of skilled and experienced farm labour would have a negative impact on local farmers.

While the proposed Waterloo SEF on its own is unlikely to result in a significant loss of farm labour, the proposed establishment of a number of renewable energy projects in the vicinity of Vryburg and other parts of the NLM has the potential to impact on the farming sector. However, at the end of the day farm labour can be replaced. The potential impacts on farm operations are therefore likely to be temporary.

The potential impacts for the affected farmers associated with the loss of permanent farm labour are exacerbated by the security of tenure that permanent farm labourers enjoy in terms of the Extension of Security and Tenure Act (ESTA). Those farm labourers which are eligible under ESTA and who take up jobs during the construction phase are entitled stay on in their houses on the farms in question. The net effect is that the farmer may have to incur the costs associated with the construction of new dwellings for new labour appointed to replace the labour lost to the solar energy sector.

However, at the same time the employment opportunities associated with the solar energy sector may offer local farm workers an opportunity to get better paid jobs which would benefit them and their families. These jobs may also enable them to move off the farms and into local towns, which would improve their access to services such as schools and clinics etc. This would represent a positive social benefit for the farm workers in question.



**Table 4.12: Assessment of loss of farm labour during the operational phase**

**Nature:** Potential impact on local farmers associated with loss of farm labour to the operational phase

	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local and Regional (3)	Local and Regional (3)
<b>Duration</b>	Short term (2) (Assumed that farm labour can be replaced)	Short term (2) (Assumed that farm labour can be replaced)
<b>Magnitude</b>	Low (4)	Low (4)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Low (27)	Low (27)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes, if farm workers return or are replaced	Yes, if farm workers return or are replaced
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impact be mitigated?</b>	Yes, to some degree. However, the risk cannot be eliminated	

**Mitigation:** See below

**Cumulative impacts:** Impacts on farm operations due to loss of experienced farm labour

**Residual impacts:** See cumulative impacts.

#### **Recommended mitigation measures**

While Bophirima Solar could liaise with local farmers in the area and undertake not to employ farm worker were possible, it is not possible to prevent farm workers from applying for work in other sectors. There are therefore no recommended mitigation measures. Also it is assumed that farm labour can be replaced. The impacts would therefore be temporary.

#### **4.4.6 Impact on productive agricultural land**

As indicated above, the NLM has entered into a 20 year lease agreement with Bophirima Solar for the use of the land for the proposed SEF. The impact on farm income due to the loss of grazing will be more than offset by the income from Bophirima Solar. The impact of the proposed SEF on the economic potential of the farm will therefore be low.

In addition, the final disturbance footprint can also be reduced by careful site design and placement of components. The impact on farmland associated with the operational phase can therefore be mitigated by minimising the footprint of the proposed SEF. The impact on current and future agricultural uses of the land is therefore regarded as low.

**Table 4.13: Potential impacts on farming activities**

**Nature:** Potential loss of productive agricultural land associated with the SEF footprint and associated potential impact on viability of operations

	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (1)	Local (1)
<b>Duration</b>	Long term-permanent if disturbed areas are not effectively rehabilitated (5)	Short term if damaged areas are rehabilitated (2)
<b>Magnitude</b>	Minor (2)	Minor (2)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Low (24)	Low (15)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes, disturbed areas can be rehabilitated	Yes, disturbed areas can be rehabilitated
<b>Irreplaceable loss of resources?</b>	Yes, loss of farmland. However, disturbed areas can be rehabilitated	Yes, loss of farmland. However, disturbed areas can be rehabilitated
<b>Can impact be mitigated?</b>	Yes, however, loss of farmland cannot be avoided	Yes, however, loss of farmland cannot be avoided

**Mitigation:** See below

**Cumulative impacts:** Overall loss of farmland could affect the livelihoods of the affected farmers, their families, and the workers on the farms and their families. However, disturbed areas can be rehabilitated.

**Residual impacts:** See cumulative impacts.

#### **Assessment of No-Go option**

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

#### **Recommended mitigation measures**

Recommendations for the construction phase should be implemented. In addition, the proponent should investigate the option of establishing a Rehabilitation Fund to be used to rehabilitate the area once the proposed SEF has been decommissioned. The fund should be funded by revenue generated during the operational phase of the project. The motivation for the establishment of a Rehabilitation Fund is based on the experience from the mining sector where many mines on closure have not set aside sufficient funds for closure and decommissioning.

#### **4.4.7 Impact on sense of place and rural character of the landscape**

The components associated with the proposed facility will have a visual impact and, in so doing, impact on the landscape and rural sense of the place of the area. In addition, due to the low profile of the proposed Waterloo SEF, the impact on the areas sense of place is likely to be limited. The potential impact on motorists travelling along the N18 can also be effectively mitigated by implementing effective screening measures. These are discussed below. The impact of the proposed SEF on the areas sense of place with mitigation is therefore likely to be low.

**Table 4.14: Visual impact and impact on sense of place**

**Nature:** Visual impact associated with the proposed solar facility and the potential impact on the areas rural sense of place.

	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (2)	Local (1)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	Minor (2)	Minor (2)
<b>Probability</b>	Probable (4)	Highly Probable (4)
<b>Significance</b>	Medium (32)	Low (28)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes, solar facility can be removed.	
<b>Irreplaceable loss of resources?</b>	No	
<b>Can impact be mitigated?</b>	Yes	

**Mitigation:** See below

**Cumulative impacts:** Potential impact on current rural sense of place

**Residual impacts:** See cumulative impacts

#### **Assessment of No-Go option**

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

#### **Recommended mitigation measures**

Existing vegetation between the site and the N18 should be retained and where necessary additional vegetation screening should be established where required. The recommendations contained in the VIA should also be implemented.

#### **4.4.8 Potential impacts on tourism**

The tourism sector is regarded as an important economic sector in the NWP. The tourism potential of the area is linked to the areas natural resources, including the relatively undisturbed scenery and landscape. However, due to the sites proximity to Vyrburg the tourist potential of the area is low. In addition, the site is not located adjacent to any identified tourist routes. The impact of the proposed SEF on the tourism potential of the area and the NLM and NWP is therefore likely to be low. In some instances the plant may also attract tourists to the area. However, the significance of this potential benefit is also rated as low positive.

**Table 4.15: Potential impact on tourism**

**Nature:** Potential impact of the SEF on local tourism

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

**Enhancement:** See below

**Cumulative impacts:** The proposed PVSEF is one of two SEFs proposed in the MM area. Due to size and height, of PVSEFs, cumulative impacts are not rated significant.

**Residual impacts:** See cumulative impacts

#### **Assessment of No-Go option**

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

#### **Recommended mitigation measures**

The recommendations contained in the VIA should be implemented.

### **4.5 ASSESSMENT POWER LINE OPTIONS**

The potential social impact associated with power lines is linked to the visual impact on the areas sense of place and character. However, due to the proximity of the site to Vryburg and the limited number of dwellings the social impacts associated with the overhead power lines are likely to be low.

**Table 4.16: Assessment of transmission line options**

**Nature:** Potential visual impact and impact on sense of place associated with power lines

	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (2)	Local (1)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	Minor (2)	Minor (2)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Low (24)	Low (21)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes	
<b>Irreplaceable loss of resources?</b>	No	
<b>Can impact be mitigated?</b>	Yes	

**Enhancement:** See below

**Cumulative impacts:** Limited visual and impact on sense of place

**Residual impacts:** See cumulative impacts

#### **Assessment of No-Go option**

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

#### **Recommended mitigation measures**

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

### **4.6 ASSESSMENT OF DECOMMISSIONING PHASE**

Typically, the major social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income. This has implications for the households who are directly affected, the communities within which they live, and the relevant local authorities. However, in the case of the proposed facility the decommissioning phase is likely to involve the disassembly and replacement of the existing components with more modern technology. This is likely to take place in the 20 - 25 years post commissioning. The decommissioning phase is therefore likely to create additional, construction type jobs, as opposed to the jobs losses typically associated with decommissioning.

Given the relatively large number of people employed during the operational phase (~ 53), the decommissioning of the facility has the potential to have a negative social impact on the local community. However, the potential impacts associated with the decommissioning phase can also be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be Low (negative).

## Recommended mitigation measures

The following mitigation measures are recommended:

- Bophirima Solar should ensure that retrenchment packages are provided for all staff retrenched when the plant is decommissioned.
- All structures and infrastructure associated with the proposed facility should be dismantled and transported off-site on decommissioning;
- Bophirima Solar should investigate the option of establishing an Environmental Rehabilitation Trust Fund to cover the costs of decommissioning and rehabilitation of disturbed areas. The Trust Fund should be funded by a percentage of the revenue generated from the sale of energy to the national grid over the 20 year operational life of the facility. The rationale for the establishment of a Rehabilitation Trust Fund is linked to the experiences with the mining sector in South Africa and failure of many mining companies to allocate sufficient funds during the operational phase to cover the costs of rehabilitation and closure.

### 4.7 CUMULATIVE IMPACT ON SENSE OF PLACE

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

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

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

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

Research on wind farms undertaken by Warren and Birnie (2009) also highlights the visual and cumulative impacts on landscape character. The paper notes that given that aesthetic perceptions are a key determinant of people's attitudes, and that these perceptions are subjective, deeply felt and diametrically contrasting, it is not hard to understand why the arguments become so heated. Because landscapes are often an important part of people's sense of place, identity and heritage, perceived threats to familiar vistas have been fiercely resisted for centuries. The paper also identifies two factors that important in shaping people's perceptions of wind farms' landscape impacts. The first of these is the cumulative impact of increasing numbers of wind farms (Campbell, 2008). The research found that if people regard a region as having 'enough' wind farms already, then they may oppose new proposals. The second factor is the cultural context. This relates to people's perception and relationship with the landscape. In the South African context, the majority of South Africans have a strong connection with and affinity for the large, undisturbed open spaces that are characteristic of the South African landscape. The concerns raised with regard to wind farms and the impact on landscapes are also likely to apply to solar facilities.

As indicated above, the potential impact of the proposed WaterlooSEF on the areas sense of place is likely to be low. Two other SEFs are located in relative close proximity to the proposed Waterloo SEF, namely the Bophirima 20 MW and Sediba 75 MW SEF. Due to their proximity the potential for cumulative impacts associated with combined visibility (whether two or more solar facilities will be visible from one location) and sequential visibility (e.g. the effect of seeing two or more solar facilities along a single journey, e.g. road or walking trail) does exist. However, as indicated above, the site is severely overgrazed and there are a limited number of affected dwellings in the area. In addition, the site is / can be screened from the N18 by the natural topography and vegetation. The visibility of the proposed SEFs will also be mitigated by the low-scale nature of SEFs. In addition, the N18 is not a designated tourist route. The potential cumulative impacts associated with combined visibility (whether two or more wind farms (solar facilities) will be visible from one location) and sequential visibility (e.g. the effect of seeing two or more wind farms (solar facilities) along a single journey, e.g. road or walking trail) are therefore likely to be low.

However, the potential impact of solar facilities on the landscape is an issue that does need to be considered, specifically given South African's strong attachment to the land and the growing number of solar plant applications. With regard to the area, a number of SEFs have been proposed in the NWP. The North West Environmental Authorities should therefore be aware of the potential cumulative impacts when evaluating applications.

**Table 4.17: Cumulative impacts on sense of place and the landscape**

**Nature:** Visual impacts associated with the establishment of more than one SEF and the potential impact on the areas rural sense of place and character of the landscape.

	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local and regional (2)	Local and regional (2)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	Minor (2)	Minor (2)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Low (24)	Low (24)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes. Solar energy plant components and other infrastructure can be removed.	
<b>Irreplaceable loss of resources?</b>	No	
<b>Can impact be mitigated?</b>	Yes	

**Enhancement:** See below

**Cumulative impacts:** Impact on other activities whose existence is linked to linked to rural sense of place and character of the area, such as tourism, bird watching, and hunting.

**Residual impacts:** See cumulative impacts

### **Assessment of No-Go option**

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

### **Recommended mitigation measures**

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

## **4.8 CUMULATIVE IMPACT ON LOCAL ECONOMY**

In addition to the potential negative impacts, the proposed WaterlooSEF also has the potential to result in significant positive cumulative impacts, specifically the establishment of a number of SEFs in the area will create a number of socio-economic opportunities for the NLM and NWP, which, in turn, will result in a positive social benefit. The positive cumulative impacts include creation of employment, skills development and training opportunities, and downstream business opportunities.



**Table 4.18: Cumulative impacts on local economy**

**Nature:** The establishment of a number of solar energy facilities in and around Vryburg and the NLM and NWP will create employment, skills development and training opportunities, creation of downstream business opportunities.

	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local and regional (3)	Local and regional (4)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	Low (4)	Moderate (6)
<b>Probability</b>	Highly Probable (4)	Definite (5)
<b>Significance</b>	Medium (44)	High (70)
<b>Status</b>	Positive	Positive
<b>Reversibility</b>	Yes. Solar energy plant components and other infrastructure can be removed.	
<b>Irreplaceable loss of resources?</b>	No	
<b>Can impact be mitigated?</b>	Yes	

**Enhancement:** See below

**Cumulative impacts:** Positive impact on the local and regional economy through the creation of downstream opportunities and wage spend in the local economy

**Residual impacts:** See cumulative impacts

#### **Assessment of No-Go option**

There is no impact as it maintains the current status quo. This would represent a lost socio-economic opportunity for the NLM and NWP.

#### **Recommended mitigation measures**

The proposed establishment of suitably sited renewable energy facilities within the NLM and NWP should be supported.

### **4.9 ASSESSMENT OF NO-DEVELOPMENT OPTION**

As indicated above, South Africa currently relies on coal-powered energy to meet more than 90% of its energy needs. As a result South Africa is one of the highest per capita producers of carbon emissions in the world and Eskom, as an energy utility, has been identified as the world's second largest producer carbon emissions. The No-Development option would represent a lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy. Given South Africa's position as one of the highest per capita producer of carbon emissions in the world, this would represent a High negative social cost.

However, at a provincial and national level, it should be noted that the Waterloo SEF development proposal is not unique. In that regard, a significant number of other renewable energy developments are currently proposed in the NWP and other parts of South Africa. Foregoing the proposed Waterloo SEF development would therefore not

necessarily compromise the development of renewable energy facilities in the NWP and or South Africa. However, the socio-economic benefits for local communities in and around Vryburg would be forfeited.

**Table 4.19: Assessment of no-development option**

**Nature:** The no-development option would result in the lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy

	<b>Without Mitigation</b>	<b>With Mitigation<sup>12</sup></b>
<b>Extent</b>	Local-International (4)	Local-International (4)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	Moderate (6)	Moderate (6)
<b>Probability</b>	Highly Probable (4)	Highly Probable (4)
<b>Significance</b>	Moderate (56)	Moderate (56)
<b>Status</b>	Negative	Positive
<b>Reversibility</b>	Yes	
<b>Irreplaceable loss of resources?</b>	Yes, impact of climate change on ecosystems	
<b>Can impact be mitigated?</b>	Yes	

**Enhancement:** See below

**Cumulative impacts:** Reduce carbon emissions via the use of renewable energy and associated benefits in terms of global warming and climate change.

**Residual impacts:** See cumulative impacts

#### **Recommended enhancement measures**

The proposed facility should be developed and the mitigation and enhancement measures identified in the SIA and other specialist studies should be implemented. However, the impact of large solar facilities on the sense of place and landscape are issues need to be addressed in the location, design and layout of the proposed facility.

<sup>12</sup> Assumes establishment of a Community Trust

---

## SECTION 5: KEY FINDINGS AND RECOMMENDATIONS

---

### 5.1 INTRODUCTION

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

- A review of the issues identified during the Scoping Process;
- A review of key planning and policy documents pertaining to the area;
- Semi-structured interviews with interested and affected parties;
- A review of social and economic issues associated with similar developments;
- A review of selected specialist studies undertaken as part of the EIA;
- A review of relevant literature on social and economic impacts;
- The experience of the authors with other solar energy projects in South Africa

### 5.2 SUMMARY OF KEY FINDINGS

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

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

#### 5.2.1 Policy and planning issues

The following key policy and planning documents were reviewed:

- 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);
- North West Province Growth and Development Strategy (2004-2014);
- Dr Ruth S Mompati District Municipality Integrated Development Plan (IDP) 2012-2017;
- Bophirima District Municipality Spatial Development Framework (2007);
- Naledi Local Municipality IDP 2012-2017.

The findings of the review indicated that solar energy was strongly supported at a national and local level. At a national level the White Paper on Energy Policy (1998) notes:

- Renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future;
- The support for renewable energy policy is guided by a rationale that South Africa has a very attractive range of renewable resources, particularly **solar** and wind and

that renewable applications are in fact the least cost energy service in many cases; more so when social and environmental costs are taken into account.

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

At a provincial and local level the review found that high unemployment and poverty levels in the study area, coupled to low education and skills levels constitute the most urgent social development challenges in the study area. The findings of the SIA indicate that the proposed SEF has the potential to support local economic development and create employment opportunities. The proposed development therefore supports a number of key objectives contained in the NLM IDP.

In summary, the findings of the review of the relevant policies and documents pertaining to the energy sector therefore indicate that solar energy and the establishment of solar energy plants are supported at a national, provincial, and local level. It is therefore the opinion of the authors that the establishment of a SEF in the area is supported by national, provincial and local policies and planning documents.

### **5.1.1 Construction phase impacts**

The key social issues associated with the construction phase include:

#### **Potential positive impacts**

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

The construction phase is expected to extend over a period of 18-24 months and create approximately ~ 400 employment opportunities. It is anticipated that approximately 55% (220) of the employment opportunities will be available to low skilled workers (construction labourers, security staff etc.), 30% (120) to semi-skilled workers (drivers, equipment operators etc.) and 15% (60) for skilled personnel (engineers, land surveyors, project managers etc.). The majority of the employment opportunities, specifically the low and semi-skilled opportunities, are likely to be available to local residents in the area, specifically residents from Vryburg and Huhudi. The majority of the beneficiaries are likely to be historically disadvantaged (HD) members of the community. This would represent a significant positive social benefit in an area with limited employment opportunities. However, in the absence of specific commitments from the developer to employ local contractors the potential for meaningful skills to local employment targets the benefits for members from the local communities may be limited. In addition, the low education and skills levels in the area may also hamper potential opportunities for local communities.

The capital expenditure associated with the construction phase will be in the region of R1.1- 1.5 billion (2012 rand value). The total wage bill for the 18-24 month construction phase will be in the region of R73.8 – R98.4 million (2012 rand value). A percentage of the wage bill will be spent in the local economy which will create opportunities for local businesses in Vryburg. The sector of the local economy that is most likely to benefit from the proposed development is the local service industry. The potential opportunities for the local service sector would be linked to accommodation, catering, cleaning, transport and security, etc. associated with the construction workers on the site. The benefits to the local economy will however be confined to the construction period (18-24 months).

### Potential negative impacts

- Impacts associated with the presence of construction workers on site and in the area;
- Influx of job seekers to the area;
- Loss of farm labour to the construction phase;
- Increased risk of stock theft, poaching and damage to farm infrastructure associated with presence of construction workers on the site;
- Increased risk of veld fires;
- Impact of heavy vehicles, including damage to roads, safety, noise and dust;
- Potential loss of productive farmland associated with construction-related activities.

The significance of the potential negative impacts with mitigation was assessed to be of Low significance. The majority of the potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented. In addition, given that the majority of the low and semi-skilled construction workers can be sourced from the local area the potential risk to local family structures and social networks is regarded as low. However, the impact on individuals who are directly impacted on by construction workers (i.e. contract HIV/ AIDS) was assessed to be of Medium-High negative significance.

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

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

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

## 5.2.2 Operational phase

The key social issues affecting the operational phase include:

### Potential positive impacts

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

The total number of permanent employment opportunities is estimated to be in the region of. Of this total ~ 40 are low skilled workers, 10 semi-skilled and 3 skilled. The annual wage bill for the operational phase will be ~ R4.68 million (2012 rand value). The majority of the beneficiaries are therefore likely to be historically disadvantaged (HD) members of the community. Given the location of the proposed facility the majority of permanent staff is likely to reside in Vryburg.

The establishment of a Community Trust also creates an opportunity to support local economic development in the area. Community Trusts provide an opportunity to generate a steady revenue stream that is guaranteed for a 20 year period. The revenue from the proposed SEF plant can be used to support a number of social and economic initiatives in the area, including:

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

The long term duration of the revenue stream associated with a SEF linked Community Trust also enables local municipalities and communities to undertake long term planning for the area. Experience has however also shown that Community Trusts can be mismanaged. This issue will need to be addressed in order to maximise the potential benefits associated with the establishment of a Community Trust.

Due the number of other renewable energy projects proposed in the vicinity of the Vryburg and the NLM as a whole, it is recommended that the NLM investigate the establishment of a single, renewable energy linked Development Trust whereby all potential renewable energy producers would contribute to the Trust. The motivation for the establishment of a larger, local municipality or district municipality trust would be to maximize the potential benefits to the broader region by creating a single fund that can be used to promote and support local, socio-economic development in the region as a whole. The option of establishing a municipal level fund should be investigated by the NLM in consultation with other renewable energy companies.

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

### Potential negative impacts

- Influx of job seekers to the area;
- Loss of farm workers to jobs associated with the operational phase;
- Loss of productive agricultural land;
- The visual impacts and associated impact on sense of place;
- Potential impact on tourism.

The significance of the potential negative impacts with mitigation was assessed to be of Low significance. All of the potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented.

The visual impacts on landscape character associated with large renewable energy facilities, such as SEFs, are highlighted in the research undertaken by Warren and Birnie (2009). In the South African context, the majority of South Africans have a strong connection with and affinity for the large, undisturbed open spaces that are characteristic of the South African landscape. The impact of large, solar energy plants on the landscape is therefore likely to be a key issue in South Africa, specifically given South African's strong attachment to the land and the growing number of solar energy applications. However, in the case of the proposed Waterloo SEF the impact on the areas sense of place with mitigation is likely to be low.

The significance of the impacts associated with the operational phase are summarised in Table 5.2.

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

<b>Impact</b>	<b>Significance No Mitigation</b>	<b>Significance With Mitigation</b>
<b>Creation of employment and business opportunities</b>	Medium (Positive impact)	High (Positive impact)
<b>Establishment of Community Trust</b>	Medium (Positive impact)	High (Positive impact)
<b>Promotion of renewable energy projects</b>	Medium (Positive impact)	Medium (Positive impact)
<b>Influx of job seekers</b>	Low (Negative impact for community as a whole)	Low (Negative impact for community as a whole)
<b>Loss of farm labour</b>	Low (Negative)	Low (Negative)
<b>Impact on agricultural land</b>	Low (Negative impact)	Low (Negative impact)
<b>Visual impact and impact on sense of place</b>	Medium (Negative impact)	Low (Negative impact)
<b>Impact on tourism</b>	Low (Positive and Negative)	Low (Positive and Negative)

### 5.2.3 Assessment of cumulative impacts

Two other SEFs are located in relative close proximity to the proposed Waterloo SEF, namely the Bophirima 20 MW and Sediba 75 MW SEF. Due to their proximity the potential for cumulative impacts associated with combined visibility (whether two or more solar facilities will be visible from one location) and sequential visibility (e.g. the

effect of seeing two or more solar facilities along a single journey, e.g. road or walking trail) does exist. However, the visual character of the area has been negatively impacted by overgrazing and poor management. The visibility of the proposed SEFs will also be mitigated by the low-scale nature of SEFs. In addition, the sites are / can be screened from the N18. The potential cumulative impacts associated with combined visibility (whether two or more wind farms (solar facilities) will be visible from one location) and sequential visibility (e.g. the effect of seeing two or more wind farms (solar facilities) along a single journey, e.g. road or walking trail) are therefore likely to be low.

However, the potential impact of solar facilities on the landscape is an issue that does need to be considered, specifically given South African's strong attachment to the land and the growing number of solar plant applications. With regard to the area, a number of SEFs have been proposed in the NWP. The North West Environmental Authorities should therefore be aware of the potential cumulative impacts when evaluating applications.

In addition to the potential negative impacts, the proposed Waterloo SEF also has the potential to result in significant positive cumulative impacts, specifically the establishment of a number of renewable energy facilities in the NLM and NWP will create a number of socio-economic opportunities for the region, which, in turn, will result in a positive social benefit. The positive cumulative impacts include creation of employment, skills development and training opportunities, creation of downstream business opportunities.

#### **5.2.4 Transmission line options**

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

#### **5.2.5 Assessment of no-development option**

The No-Development option would represent a lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy. Given South Africa's position as one of the highest per capita producer of carbon emissions in the world, this would represent a High negative social cost. The no-development option also represents a lost opportunity in terms of the employment and business opportunities (construction and operational phase) associated with the proposed Waterloo SEF, and the benefits associated with the establishment of a Community Trust. This also represents a negative social cost.

However, at a provincial and national level, it should be noted that the Waterloo SEF development proposal is not unique. In that regard, a significant number of renewable energy development, including SEFs, are currently proposed in the NWP and South Africa. Foregoing the proposed Waterloo SEF development would therefore not necessarily compromise the development of renewable energy facilities in the NWP or South Africa. However, the socio-economic benefits the local communities in Vryburg would be forfeited.

#### **5.2.6 Decommissioning phase**

Typically, the major social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income. This has implications for the households who are directly affected, the communities within which they live, and the relevant local authorities. However, in the case of the SEFs decommissioning phase is likely to involve the disassembly and replacement of the existing components with more



modern technology. This is likely to take place in the 20-25 years post commissioning. The decommissioning phase is therefore likely to create additional, construction type jobs, as opposed to the jobs losses typically associated with decommissioning.

Given the relatively large number of people employed during the operational phase (~53), the decommissioning of the facility does have the potential to have a negative social impact on the local community. However, the potential impacts associated with the decommissioning phase can also be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be Low (negative).

Bophirima Solar should also investigate the option of establishing an Environmental Rehabilitation Trust Fund to cover the costs of decommissioning and rehabilitation of disturbed areas. The Trust Fund should be funded by a percentage of the revenue generated from the sale of energy to the national grid over the 25-30 year operational life of the facility. The rationale for the establishment of a Rehabilitation Trust Fund is linked to the experiences with the mining sector in South Africa and failure of many mining companies to allocate sufficient funds during the operational phase to cover the costs of rehabilitation and closure.

### **5.3 CONCLUSIONS AND RECOMMENDATIONS**

The findings of the SIA indicate that the development of the proposed Waterloo SEF will create employment and business opportunities for locals during both the construction and operational phase of the project. The establishment of a Community Trust will also benefit the local community. The enhancement measures listed in the report should be implemented in order to maximise the potential benefits. In addition, the proposed establishment of a number of renewable energy facilities in the NLM and NWP will create socio-economic opportunities, which, in turn, will result in a positive social benefit. The significance of this impact is rated as High Positive.

Due the number of other renewable energy projects proposed in the vicinity of the Vryburg and the NLM as a whole, it is recommended that the NLM investigate the establishment of a single, renewable energy linked Development Trust whereby all potential renewable energy producers would contribute to the Trust. The motivation for the establishment of a larger, local municipality or district municipality trust would be to maximize the potential benefits to the broader region by creating a single fund that can be used to promote and support local, socio-economic development in the region as a whole. The option of establishing a municipal level fund should be investigated by the NLM in consultation with other renewable energy companies.

The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the challenges created by climate change, represents a positive social benefit for society as a whole. The establishment of the proposed Waterloo SEF is therefore supported by the findings of the SIA.

However, the potential impacts associated with large, solar energy facilities on an areas sense of place and landscape cannot be ignored. These impacts are an issue that will need to be addressed by the relevant environmental authorities, specifically given the large number of applications for solar facilities in the area.

#### **5.4 IMPACT STATEMENT**

The findings of the SIA undertaken for the proposed Waterloo SEF indicate that the development will create employment and business opportunities for locals during both the construction and operational phase of the project. The establishment of a Community Trust will also benefit the area. In addition, the visual integrity of the site has been impacted by the existing power lines on the site. It is therefore recommended that the facility as proposed be supported, subject to the implementation of the recommended mitigation measures and management actions contained in the report.

## ANNEXURE A

### Interviews

- Fouché, Ms. Louise (04-07-12). Tiger Kloof School, Vryburg.
- Kubeka, Mr. (05-07-12). Dr Ruth S. Mompoti District Municipality: Spatial planner.
- Manamela, Mr. Arnold (16-07-12 – telephonic). Naledi Local Municipality: Spatial planner.
- Masasi, Mr. Maxwell (04-07-12). Tiger Kloof School, Vryburg: Farm manager.
- Moncho, Ms. Ellen (05-07-12). Dr Ruth S. Mompoti District Municipality: IDP Manager.
- Ncobo, Mr. Melrose (06-07-12). Naledi Local Municipality: Electrical Engineering.
- Opperman, Ms. Clara (12-07-12 – e-mail). Dr Ruth S. Mompoti District Municipality: GIS.
- Ramorogadi, Cllr. E (05-07-12). Naledi Local Municipality: Ward 4 Councillor.
- Van der Merwe, Ms. Anna (06-07-12). Georgia Farm, Vryburg: owner.
- Van Zyl, Dr Deon (04-07-12). Bophirima Farm, Vryburg: owner.

### References

- Bophirima District Municipality (2007). *Bophirima Spatial Development Framework*.
- Dr Ruth S Mompoti District Municipality (2012). *Integrated Development Plan 2012-2017*.
- Dr Ruth S Mompoti District Municipality (2010). *Integrated Development Plan 2010/2011 Review*.
- Erasmus, BPJ (1995). *Oppad in Suid-Afrika*. Jonathan Ball, Johannesburg.
- IDC of SA, DBSA, TIP (2011). *Green Jobs. An Estimate of the Direct Employment Potential of a Greening South African Economy*.
- Naledi Local Municipality (2012). *Integrated Development Plan 2012-2017*.
- Naledi Local Municipality (2009). *Integrated Development Plan 2009/ 2010 Revision*.
- North West Province: Office of the Premier (2004). *North West Province Growth and Development Strategy 2004-2014*.
- North West Province (2004b). *North West Province Spatial Development Framework – North West Environment Management Series*.
- Republic of South Africa: Department of Cooperative Governance and Traditional Affairs (DCGTA) (2011). *Dr Ruth Segomotsi Mompoti District Municipality Profile*.
- Republic of South Africa (2008). *National Energy Act, Act nr. 34 of 2008*;
- Republic of South Africa (2003). *White Paper on Renewable Energy*;
- Republic of South Africa (December 1998). *White Paper on Energy Policy*;

### MAPS

- Chief Directorate Surveys and Mapping (2001). *2624DD Devondale 1: 50 000*.
- Chief Directorate Surveys and Mapping (2001). *2724BB Lefton 1: 50 000*.
- Chief Directorate Surveys and Mapping (2001). *2724BA Thakwaneng 1: 50 000*.

### INTERNET

- [www.saexplorer.co.za](http://www.saexplorer.co.za)
- [www.spoornet.co.za/RailOnLine/locnet\\_ajax\\_search.jsp](http://www.spoornet.co.za/RailOnLine/locnet_ajax_search.jsp)
- [www.statsa.gov.za](http://www.statsa.gov.za)
- [www.whc.unesco.org/en/list/915](http://www.whc.unesco.org/en/list/915)

- Google Earth 2012.

## ANNEXURE B

### METHODOLOGY FOR THE ASSESSMENT OF POTENTIAL IMPACTS

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

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

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

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

S = Significance weighting

E = Extent  
D = Duration  
M = Magnitude  
P = Probability

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

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