

**SOCIAL IMPACT ASSESSMENT  
OF  
BIOTHERM ALLDAYS  
PHOTOVOLTAIC/CONCENTRATED  
PHOTOVOLTAIC POWER PLANT, PHASE 1  
(75 MW)  
LIMPOPO PROVINCE  
(DRAFT REPORT)**

**OCTOBER 2012**

Prepared for

**SAVANNAH ENVIRONMENTAL (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

---

## **EXECUTIVE SUMMARY**

### **INTRODUCTION AND LOCATION**

Savannah Environmental (Pty) Ltd (hereafter referred to as Savannah Environmental) was appointed by BioTherm Energy (Pty) Ltd (BioTherm) as the lead consultants to manage the Environmental Impact Assessment (EIA) process for the establishment of the proposed Alldays photovoltaic solar energy facility (PVSEF) and associated infrastructure. The proposed site is located within the Musina Local Municipality (MLM) in the Limpopo Province of South Africa, approximately 70 km west of the town of Musina, ~35 km south-east of the Pontdrift border post between South Africa and Botswana, and ~35 km north-east of the small town of Alldays (Capricorn District Municipality, Limpopo).

BioTherm is proposing the establishment of the Alldays PVSEF in two phases, namely:

- Alldays Phase 1 (up to 75 MW installed capacity); and
- Alldays Phase 2 (up to 20 MW).

Tony Barbour was appointed by Savannah Environmental to undertake a specialist Social Impact Assessment (SIA) as part of the EIA process. This report contains the findings of the SIA undertaken as part of the EIA process for Phase 1 (75 MW) of the proposed project.

### **DESCRIPTION OF THE PROPOSED PVSEF**

Phase 1 of the proposed BioTherm Alldays PVSEF project has a generation capacity of up to 75 MW. The site is located on Farm Gotha No. 102 MS, which covers a total area of ~ 3000 ha, and is located directly to the south of De Beers' Venetia mine. A broader area of approximately 520 ha is being considered within which the facilities associated with Phase 1 and 2 will be established. The total area earmarked for Phase 1 and 2 is up to 150 ha and 20 ha respectively. Generated electricity would be fed into the existing Eskom Venetia substation located directly to the north of Gotha Farm. The project is therefore an Independent Power Producer (IPP) project. BioTherm are investigating two solar technology options, namely Photovoltaic (PV) panels and Concentrated photovoltaic (CPV) panels.

The basic infrastructure associated with Phase 1 would include:

- Photovoltaic (PV) or Concentrated Photovoltaic (CPV) panels with an installed capacity of up to 75 MW. Should CPV be used, panels would be up to 20 m tall;
- A new on-site substation to evacuate the power from the facility into the Eskom grid via the Eskom Venetia Substation;
- Mounting structures would consist of either rammed steel piles or piles with pre-manufactured concrete footings to support the PV/CPV panels;
- Cabling between the project components, to be laid underground where practical;
- Internal access roads and site perimeter fencing;
- Workshop area for maintenance, storage, and offices (Savannah, 2012).

Based on the information from other solar energy projects the construction phase for a 75 MW SEF is expected to extend over a period of 18-24 months and create approximately 291 employment opportunities. The operational phase will employ approximately 60 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 1.35 billion for a 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.
- 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 Census 2001 and other sources;
- Review of relevant planning and policy frameworks for the area;
- Review of information from similar projects; and
- Identification of social issues associated with the proposed project.

## **SUMMARY OF KEY FINDINGS**

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

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

### **Fit with planning**

The key documents reviewed included:

- The National Energy Act (2008);
- The White Paper on the Energy Policy of the Republic of South Africa (December 1998);
- The White Paper on Renewable Energy (November 2003);
- Integrated Resource Plan (IRP) for South Africa (2010-2030);
- Limpopo Provincial Growth and Development Strategy (2009-2014);
- Musina Local Municipality Integrated Development Plan (2012/2013-2017);
- Musina Local Municipality Local Economic Development Strategy (2007).
- Musina Local Municipality Spatial Development Framework (2011).

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

### **Construction phase**

The key social issues associated with the construction phase include:

#### **Potential positive impacts**

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

Based on the information from other solar energy projects the construction phase for a 75MW PVSEF is expected to extend over a period of 18-24 months and create approximately 291 employment opportunities, depending on the final design. Of this total ~ 68% (198) will be available to low-skilled workers (construction labourers, security staff etc.) and semi-skilled workers (drivers, equipment operators etc.) and 32% (93) to skilled personnel (engineers, land surveyors, project managers etc.). The total wage bill for the construction phase is estimated to be in the region of R 60 million. A percentage of the wage bill will be spent in the local economy and will create opportunities for local businesses in the MLM.

The work associated with the construction phase will be undertaken by contractors and will include the establishment of the PVSEF and the associated components, including, access roads, services and power line. Given the proximity of the site to Musina the majority of the low and semi-skilled employment opportunities are likely to benefit members from the local community. The majority of the beneficiaries are also likely to be historically disadvantaged (HD) members of the community.

The capital expenditure on completion is anticipated to be in the region of R1.35 billion for a 75MW facility. However, given the technical nature of the project and high import content associated with solar energy projects the potential opportunities for the MLM economy will be limited. Opportunities are, however, likely to exist for local contractors and engineering companies in Musina. The sector of the local economy that is most likely to benefit from the proposed development is the local service industry. The potential opportunities for the local service sector would be linked to accommodation, catering, cleaning, transport and security, etc. associated with the construction workers on the site. The majority of non-local construction workers are likely to be accommodated in Musina and on local guest farms in the area. This will create opportunities for local hotels, B&Bs and guest farms owners.

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

#### **Potential negative impacts**

- Influx of construction workers employed on the project;
- Increased risk of stock theft, poaching and damage to farm infrastructure associated with construction workers;

- Increased risk of veld fires associated with construction related activities;
- Impact of heavy vehicles, including damage to roads, safety, noise and dust;
- Loss of agricultural land associated with construction related activities.

The significance of the potential negative impacts with mitigation was assessed to be of Low significance. The majority of the potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented. However, the impact on individuals who are directly impacted on by construction workers and or job seekers (i.e. contract HIV/ AIDS) was assessed to be of Medium-High negative significance. However, at a community level the risk posed by construction workers to local family structures and social networks is regarded as low. 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>	Low (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>Risk of stock theft, poaching and damage to farm infrastructure</b>	Medium (Negative impact)	Low (Negative impact)
<b>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>	High (Negative impact)	Low (Negative impact)

### **Operational phase**

The key social issues affecting the operational phase include:

#### **Potential positive impacts**

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

The total number of permanent employment opportunities is estimated to be in the region of 60. Of this total approximately 80% will be low and medium-skilled and 20% high skilled positions. The majority of the beneficiaries are therefore likely to be historically disadvantaged (HD) members of the community. Over time it will also be possible to increase the number of local employment opportunities through the implementation of a skills development and training programme linked to the operational

phase. Such a programme would support the strategic goals of promoting local employment and skills development contained in the MLM IDP and the LPGDP.

The establishment of a Community Trust funded by revenue generated from the sale of energy from the proposed PVSEF also creates an opportunity to support local economic development in the area. BioTherm has indicated that they are committed to establishment of a community trust. Community Trusts provide an opportunity to generate a steady revenue stream that is guaranteed for a 20 year period. The revenue from the proposed PVSEF plant can be used to support a number of social and economic initiatives in the area, including:

- Education;
- School feeding schemes;
- Training and skills development;
- Support for SMME's.

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

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

#### **Potential negative impacts**

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

The visual impacts on landscape character associated with large renewable energy facilities, such as solar thermal plants, are highlighted in the research undertaken by Warren and Birnie (2009). In the South African context, the majority of South Africans have a strong connection with and affinity for the large, undisturbed open spaces that are characteristic of the South African landscape. The impact of solar energy plants on the landscape is therefore likely to be a key issue in South Africa, specifically given South African's strong attachment to the land and the growing number of solar energy applications. The visual impacts associated with the proposed BioTherm Alldays PVSEF are, however, likely to be low due to its relatively small size (75W). 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)	Medium (Positive impact)
<b>Benefits associated with the establishment of a community trust</b>	Medium (Positive impact)	High (Positive impact)
<b>Establishment of infrastructure for the generation of renewable energy</b>	Medium (Positive impact)	Medium (Positive impact)
<b>Visual impact and impact on sense of place</b>	Low (Negative impact)	Low (Negative impact)
<b>Impact on tourism</b>	Low (Positive and Negative)	Low (Positive and Negative)

### **Cumulative Impacts**

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

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

### **Transmission lines**

Two power line alternatives are proposed with regard to the Eskom grid.

A new on-site substation to connect via a loop in loop out to the Soutpan/Venetia 1 132 kV power line to evacuate the power from the facility into the Eskom grid. The alternative would be to construct a 132kV connection line (up to 2 km), parallel to existing power line to the Venetia substation. (Figure 1.8).

There is very little difference between Alternative 1 and 2. However, Alternative 1 is the preferred alternative due to the potential for reduced impact on movement of vehicles associated with Venetia Mine.

### **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 negative social cost.

The No-Development option would also result in a loss in employment opportunities associated with both the construction and operational phase. In addition, the benefits to the local community associated with the establishment of a Community Trust funded by revenue generated from the sale of energy from the PVSEF would be forfeited. The revenue from the proposed PVSEF plant can be used to support a number of social and economic initiatives in the area. These benefits would be forgone if the proposed PVSEF plant is not developed. Given the limited economic opportunities in the area this would represent a significant negative social cost for the local community.

### **Decommissioning phase**

Due to the relatively small number of people affected (~60) the social impacts associated with the decommissioning of the facility are likely to be low. In addition, the potential impacts can be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be Low (negative).

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

## **CONCLUSION AND RECOMMENDATIONS**

The findings of the SIA indicate that the development of Phase 1 (75MW) of the proposed BioTherm Alldays PVSEF will create employment and business opportunities for locals during both the construction and operational phase of the project. The establishment of a Community Trust funded by revenue generated from the sale of energy from the proposed PVSEF also creates an opportunity to support local economic development in the area. This represents a significant social benefit for an area where there are limited opportunities.

The findings of the SIA also indicate that a number of concerns identified by De Beers (Venetia Diamond Mine) need to be addressed in consultation with BioTherm. It is therefore recommended that BioTherm meet with representatives from De Beers to discuss these issues.

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

## **IMPACT STATEMENT**

The findings of the SIA undertaken for Phase 1 (75MW) of the proposed BioTherm Alldays PVSEF indicate that the development will create employment and business opportunities for locals during both the construction and operational phase of the project. The establishment of a Community Trust also creates an opportunity to support



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

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

# TABLE OF CONTENTS

---

EXECUTIVE SUMMARY .....	i
SECTION 1: INTRODUCTION.....	1
1.1 INTRODUCTION .....	1
1.2 TERMS OF REFERENCE.....	2
1.3 PROJECT LOCATION AND SURROUNDING LAND USES .....	2
1.4 PROJECT DESCRIPTION.....	5
1.4.1 Photovoltaic (PV) technology.....	6
1.4.2 Concentrated photovoltaic (CPV) technology .....	7
1.5 APPROACH TO STUDY .....	9
1.5.1 Definition of social impacts .....	10
1.5.2 Timing of social impacts .....	11
1.6 ASSUMPTIONS AND LIMITATIONS .....	11
1.6.1 Assumptions.....	11
1.6.2 Limitations .....	12
1.7 SPECIALIST DETAILS.....	12
1.8 DECLARATION OF INDEPENDENCE.....	12
1.9 REPORT STRUCTURE .....	12
SECTION 2: POLICY AND PLANNING ENVIRONMENT.....	13
2.1 INTRODUCTION .....	13
2.2 RENEWABLE ENERGY POLICY .....	13
2.2.1 National Energy Act (Act 34 of 2008) .....	13
2.2.2 The National White Paper on Renewable Energy (2003) .....	14
2.2.3 Integrated Resource Plan for Electricity (2010-2030) .....	14
2.3 SOCIO-ECONOMIC DEVELOPMENT POLICY.....	16
2.3.1 National Development Plan .....	16
2.3.2 Limpopo Employment, Growth and Development Plan (2009-2014) .....	17
2.3.3 Musina Local Municipality Integrated Development Plan .....	17
2.3.4 Musina Local Municipality Local Economic Development Framework .....	19
2.4 SPATIAL POLICY AND PVSEF SITE SELECTION CRITERIA.....	20
2.4.1 Musina Spatial Development Framework (2011).....	21
SECTION 3: OVERVIEW OF STUDY AREA .....	23
3.1 INTRODUCTION .....	23
3.2 ADMINISTRATIVE CONTEXT.....	23
3.3 PROVINCIAL AND DISTRICT LEVEL SOCIO-ECONOMIC CONTEXT .....	24
3.3.1 Limpopo Province .....	24
3.3.2 Provincial economy.....	25
3.3.3 Vhembe District .....	27
3.4 LOCAL MUNICIPAL SOCIO-ECONOMIC CONTEXT .....	28
3.4.1 Musina Local Municipality (MLM) .....	28
3.4.2 Demographic overview .....	28
3.4.3 Economic context .....	29
3.4.4 Land uses.....	30
3.4.5 Settlement patterns.....	30
3.5 LOCAL AND SITE SPECIFIC CONTEXT .....	31
3.5.1 Road network .....	31
3.5.2 Western Ward 2 context.....	34
3.5.3 Gotha Farm .....	34
3.5.4 Adjacent farms .....	36
3.5.5 De Beers Venetia.....	38
3.5.6 Conservation .....	39

3.6	HISTORY OF THE AREA .....	40
	SECTION 4: ASSESSMENT OF KEY SOCIAL ISSUES .....	43
4.1	INTRODUCTION .....	43
4.2	IDENTIFICATION OF KEY SOCIAL ISSUES .....	43
4.3	POLICY AND PLANNING ISSUES .....	43
4.4	SOCIAL IMPACTS ASSOCIATED WITH THE CONSTRUCTION PHASE.....	45
4.4.1	Creation of employment and business opportunities .....	45
4.4.2	Presence of construction workers in the area .....	48
4.4.3	Increased risk of stock theft, poaching and damage to farm infrastructure 51	
4.4.4	Increased risk of veld fires.....	52
4.4.5	Impact of construction related activities.....	54
4.4.6	Damage to and loss of farmland .....	55
4.5	SOCIAL IMPACTS ASSOCIATED WITH THE OPERATIONAL PHASE .....	57
4.5.1	Creation of employment and business opportunities .....	58
4.5.2	Benefits associated with the establishment of a community trust.....	59
4.5.3	Development of clean, renewable energy infrastructure .....	60
4.5.4	Visual impact and impact on sense of place.....	61
4.5.5	Impact on tourism .....	62
4.5.6	Potential impacts on operations at Venetia Mine.....	64
4.6	ASSESSMENT OF POWER LINE OPTIONS .....	64
4.7	ASSESSMENT OF NO-DEVELOPMENT OPTION .....	65
4.8	ASSESSMENT OF CUMULATIVE IMPACTS .....	67
4.9	ASSESSMENT OF DECOMMISSIONING PHASE .....	69
	SECTION 5: KEY FINDINGS AND RECOMMENDATIONS .....	71
5.1	INTRODUCTION .....	71
5.2	SUMMARY OF KEY FINDINGS .....	71
5.2.1	Policy and planning issues .....	71
5.2.2	Construction phase .....	71
5.2.3	Operational phase .....	73
5.2.4	Assessment of cumulative impacts.....	75
5.2.5	Transmission line options .....	75
5.2.6	Assessment of no-development option.....	75
5.2.7	Decommissioning phase .....	75
5.3	CONCLUSIONS AND RECOMMENDATIONS.....	76
5.4	IMPACT STATEMENT .....	76
	ANNEXURE A .....	78
	ANNEXURE B .....	80
	ANNEXURE C .....	82

## ACRONYMS

CPV	Concentrated photovoltaic
DEA	Department of Environmental Affairs (National)
DM	District Municipality
HD	Historically Disadvantaged
EIA	Environmental Impact Assessment
IDP	Integrated Development Plan
IPP	Independent Power Producer
KNP	Kruger National Park
kV	Kilovolts
LED	Local Economic Development
LGDS	Limpopo Growth and Development Strategy
LM	Local Municipality
LSTFP	Limpopo-Shashe Transfrontier Park
MCLWHS	Mapungubwe Cultural Landscape and UNESCO World Heritage Site
MLM	Musina Local Municipality
MNP	Mapungubwe National Park
MSDF	Musina (Local Municipality) Spatial Development Framework
Mtoe	Million tonnes of oil equivalent
MW	Megawatt
PV	Photovoltaic
PVSEF	Photovoltaic solar energy facility
SADC	Southern African Development Community
SDF	Spatial Development Framework
SEF	Solar Energy Facility
SIA	Social Impact Assessment
UNESCO	United Nations Cultural and Scientific Organisation
VBR	Vhembe Biosphere Reserve (UNESCO)
VDM	Vhembe District Municipality
VLNR	Venetia Limpopo Nature Reserve (De Beers Consolidated)

---

## SECTION 1: INTRODUCTION

---

### 1.1 INTRODUCTION

Savannah Environmental (Pty) Ltd (hereafter referred to as Savannah Environmental) was appointed by BioTherm Energy (Pty) Ltd (BioTherm) as the lead consultants to manage the Environmental Impact Assessment (EIA) process for the establishment of the proposed Alldays photovoltaic solar energy facility (PVSEF) and associated infrastructure. The proposed site is located within the Musina Local Municipality (MLM) in the Limpopo Province of South Africa, approximately 70 km west of the town of Musina, and ~35 km south-east of the Pontdrift border post between South Africa and Botswana, and ~25 km north-east of the small town of Alldays (Capricorn DM of Limpopo Province) (Figure 1.1). BioTherm is proposing the establishment of the Alldays PVSEF in two phases, namely:

- Phase 1 (up to 75 MW installed capacity);
- Phase 2 (up to 20 MW).

Tony Barbour was appointed by Savannah Environmental to undertake a specialist Social Impact Assessment (SIA) as part of the EIA process. This report contains the findings of the SIA undertaken as part of the EIA process for Phase 1 (75MW) of the proposed project.



Figure 1.1: Location of BioTherm Alldays PVSEF

## 1.2 TERMS OF REFERENCE

The terms of reference for the SIA require:

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

## 1.3 PROJECT LOCATION AND SURROUNDING LAND USES

The proposed Alldays PVSEF is located in the extreme western portion of the Musina Local Municipality (MLM), approximately 70 km west of the town of Musina, and ~35 km south-east of the Pontdrift border post between South Africa and Botswana. The MLM forms part of the Vhembe District Municipality (VDM) of South Africa's Limpopo Province (Figure 1.2 and 1.3). Alldays, located in the Capricorn DM is the nearest town.

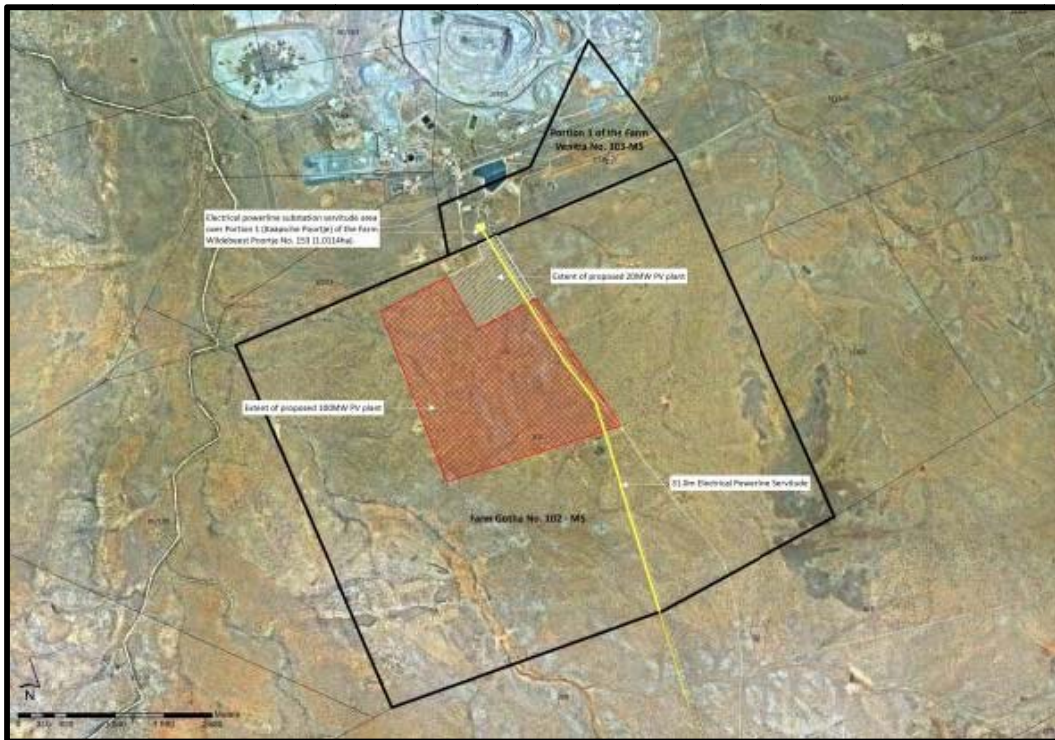


**Figure 1.2: Location Vhembe DM** (Source: Wikipedia)



**Figure 1.3: Location of Musina LM** (Source: Wikipedia)

The subject property consists of the Farm Gotha No. 102 MS, which covers a total area of 3161.4396ha (VIA, Zone Land Solutions, April 2012). Broader development areas of approximately 520 ha in total are being considered for Phases 1 and 2. The Phase 1 development area is approximately 450 ha in size, of which ~150 ha would be required for accommodating the actual PV panel arrays (Figure 1.4).



**Figure 1.4: Location of Phase 1 (75 MW, red) and Phase 2 (20MW, white)**

(Source: VIA, Zone Land Solutions, April 2012).

An existing Eskom substation (Eskom Venetia) is located on the De Beers property immediately to the north of the site. In addition, an existing power line servitude (indicated in yellow in Figure 1.4) bisects the property. During 1992, at the same time that a servitude area for an electrical substation on the adjacent Farm Venetia No. 103/1-MS was registered, a 31m wide power line servitude was registered over the subject property. The substation, *inter alia*, provides electricity to the Venetia mine (VIA, Zone Land Solutions, April 2012).

In terms of adjacent land uses, the proposed site is located directly to the south of the De Beers Venetia diamond mine, along the Bridgewater-Musina gravel road (Photograph 1.1). Venetia operates a conventional open-pit mine with a life expectancy of approximately 20 more years. The typical mining infrastructure and buildings are present on the mine site which includes crushers, stockpiles and conveyors, treatment plants, processing plants, and a range of mobile equipment. A local airstrip and electrical substation have also been erected on the Venetia landholdings (VIA, Zone Land Solutions, April 2012). As indicated in Photograph 1.1, the mine and associated infrastructure are clearly visible from the proposed Alldays PVSEF site. The proposed PVSEF would therefore not be established in a pristine bushveld context lacking in pre-existing industrial landscape references.



**Photograph 1.1: View of Venetia diamond mine, looking north from Musina Road**



The De Beers Venetia mine and Limpopo Nature Reserve (VLNR) are located to the north of the PVSEF site. The VLNR borders onto the Mapungubwe National Park/ UNESCO Mapungubwe World Heritage site to the north, and forms part of the mooted Limpopo-Shashe Transfrontier Conservation Area. The Mapungubwe National Park (MNP) also forms part of the recently proclaimed UNESCO Vhembe Biosphere Reserve (VBR). With the exception of De Beers mining activities at Venetia, conservation, game farming (hunting) and tourism-orientated land uses dominate in the local area. Agricultural activities are mainly associated with extensive beef cattle farming on spatially extensive commercial farms, as well as irrigation agriculture further north along the Limpopo valley. The landscape character of the region typifies a Bushveld landscape of great open plains with the occasional high hill or ridge (VIA, Zone Land Solutions, April 2012).

The Abend Ruhe Gotha guesthouse operates from the subject property. The guesthouse complex consists of chalets and a lapa as well as facilities for caravans and campers. Access to Gotha farm is off the Musina road. The Santer Road links Gotha with Brombeek and the Brombeek public gravel road. The Santer Road is however a private road, and kept locked by the owners.

Other key roads in the area include the east-west aligned R572 (Portdrif roiad) and the north south aligned R 521. The R527 is located ~20 km to the north of the proposed PVSEF. This road provides direct access to the MNP as well as the VLNR from Musina and the N1. The R521 located >10 km to the west of the PVSEF site links the Pontdrift border post to the provincial capital of Polokwane (and the N1), via the small towns of Vivo and Alldays (Capricorn DM).

Both the R521 and R572 have been identified as scenic routes by Limpopo Tourism, with Mapungubwe as the key destination. The proposed PVSEF site is however unlikely to be visible from either road. The Musina road directly to the north of the site is likely used mainly by De Beers's traffic and adjacent farm owners.

#### **1.4 PROJECT DESCRIPTION**

BioTherm is proposing the establishment of the Alldays PVSEF in two phases, viz. Alldays Phase 1 (up to 75 MW installed capacity) and Alldays Phase 2 (up to 20 MW). BioTherm is currently considering panel-based solar, but has yet to make a final decision on technology (i.e. PV vs. concentrated PV) and supplier. Separate Special Purpose Vehicles (SPVs) would be created for each of the two proposed development phases (Savannah, 2012). As indicated above, the focus of the SIA is on Phase 1, the 75 MW component of the project.

Solar energy facilities, such as those using PV/CPV panels use the energy from the sun to generate electricity through a process known as the Photovoltaic Effect. This effect refers to photons of light colliding with electrons, and therefore placing the electrons into a higher state of energy to create electricity.

According to information provided by Savannah in the Background Information Document, BioTherm are investigating two solar technology options, namely Photovoltaic (PV) panels and Concentrated photovoltaic (CPV) panels. Solar energy facilities, such as those using PV/CPV panels use the energy from the sun to generate electricity through a process known as the Photovoltaic Effect. This effect refers to photons of light colliding with electrons, and therefore placing the electrons into a higher

state of energy to create electricity. The basic components of each the two technology options are briefly discussed below.

#### **1.4.1 Photovoltaic (PV) technology**

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

##### **Photovoltaic Cell**

A photovoltaic (PV) cell can consist of a thin film technology or polycrystalline silicon 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.



**Figure 1.5: Illustration of a photovoltaic solar facility**

##### **Inverter**

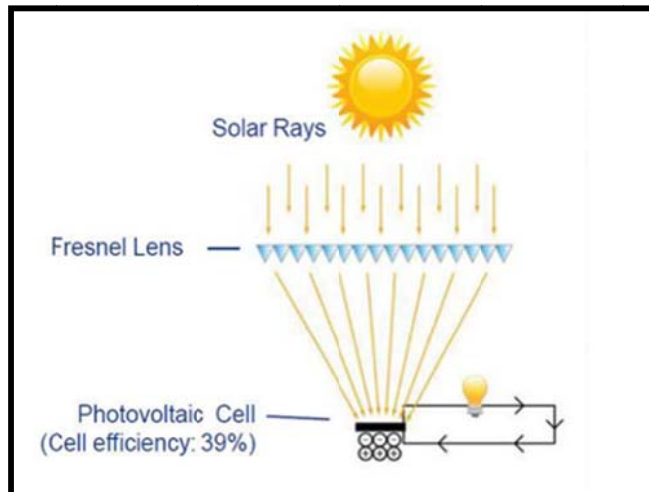
The photovoltaic effect produces electricity in direct current. Therefore an inverter must be used to change it to alternating current.

##### **Support Structure**

The PV panels will be attached to a support structure approximately 2 meters off the ground set at an angle so to receive the maximum amount of solar radiation. The angle of the panel is dependent on the latitude of the proposed facility and the angles may be adjusted to optimise for summer or winter solar radiation characteristics. The PV panels are designed to operate continuously for more than 20 years, unattended and with low maintenance. Figure 1.5 illustrates a typical PV solar facility.

### 1.4.2 Concentrated photovoltaic (CPV) technology

Concentrated photovoltaic (CPV) technology uses optics such as lenses to concentrate a large amount of sunlight onto a small area of solar photovoltaic materials to generate electricity (Figure 1.6). Unlike traditional, more conventional flat panel systems, CPV systems are often much less expensive to produce, because the concentration allows for the production of a much smaller area of solar cells.



**Figure 1.6: Illustration of how the CPV technology increases the conversion efficiency through the use of Fresnel Lenses which concentrates the amount of light entering the PV cells** (Source: AmonixTM)

#### **Photovoltaic Cell**

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

#### **Inverter**

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

#### **Support Structure**

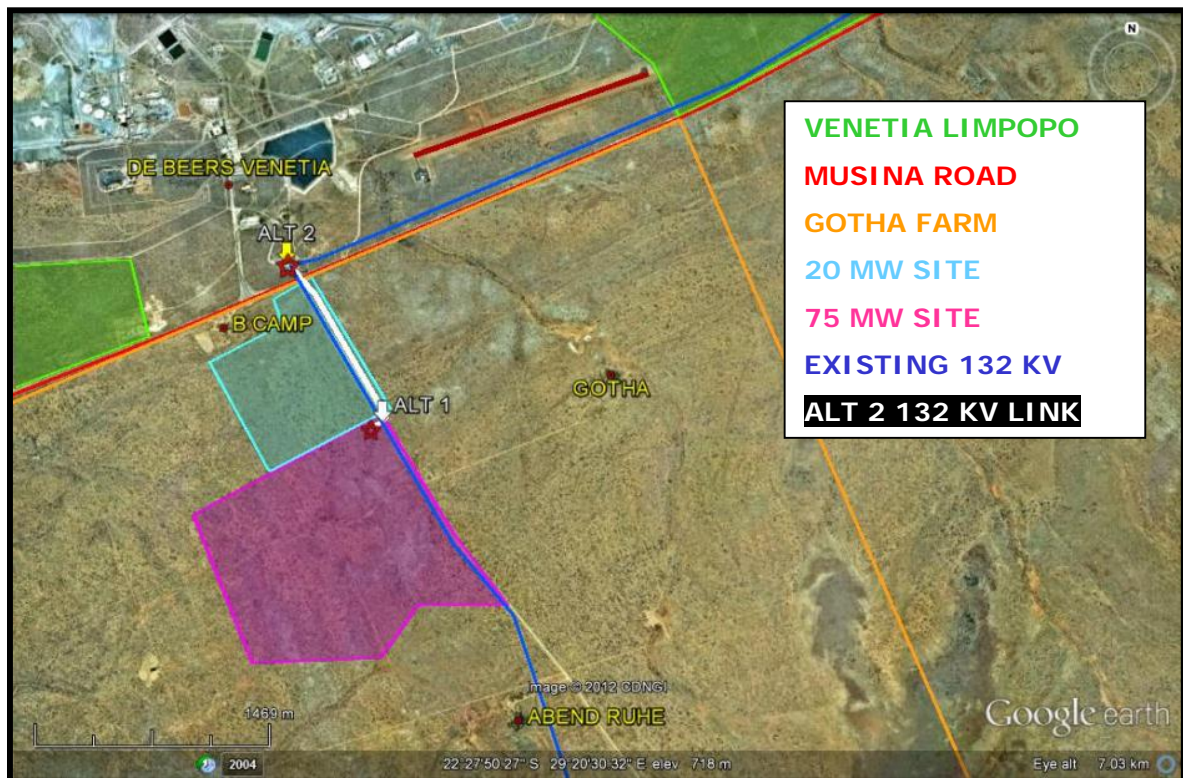
The CPV Modules will be elevated up to 2m above ground level by a support structure and have a total height of up to 20m. The modules will be able to track the path of the sun during the day, thereby increasing the efficiency of the panels (Figure 1.7).



**Figure 1.7: Example of a CPV plant** (Source: Savannah, 2012)

Based on the information provided by Savannah the proposed Phase 1 Alldays PVSEF will consist of the infrastructure:

- Photovoltaic (PV) or Concentrated Photovoltaic (CPV) panels with an installed capacity of up to 75MW.
- A new on-site substation to evacuate the power from the facility into the Eskom grid via the Venetia Substation located adjacent to the proposed development site.
- Mounting structure to be either rammed steel piles or piles with pre-manufactured concrete footings to support the PV/CPV panels.
- Cabling between the project components, to be laid underground where practical.
- Internal access roads and fencing.
- Workshop area for maintenance, storage, and offices (Savannah, 2012).



**Figure 1.8: Alternative links into Eskom grid**

Based on the information from the proponent the construction phase for a 75MW PVSEF (Phase 1) is expected to extend over a period of 18-24 months and create approximately 292 employment opportunities. The capital expenditure on completion is anticipated to be in the region of R 1.35 billion for a 75 MW facility. The total wage bill will be in the region of R60 million. The operational phase will employ approximately 60 people full time for a period of up to 20 years.

## 1.5 APPROACH TO STUDY

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

- Describing and obtaining an understanding of the proposed intervention (type, scale, location), the settlements and communities likely to be affected by the proposed project
- Collecting baseline data on the current social and economic environment;
- Identifying the key potential social issues associated with the proposed project. This requires a site visit to the area and consultation with affected individuals and communities. As indicated in the limitations, due to time constraints it was not possible to undertake a site visit to interview key stakeholders. This will be undertaken at a later stage in the project and the SIA for the BA will be amended accordingly if required. The author is, however, confident that issues assessed represent the key social issues likely to be associated with the proposed BioTherm

Alldays PVSEF. This is based on the author's experience in undertaking similar projects for other sites across the country.

- Assessing and documenting the significance of social impacts associated with the proposed intervention
- Identifying alternatives and mitigation measures

In this regard the study involved:

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

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

### 1.5.1 Definition of social impacts

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

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

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

findings and recommendations of the assessment are incorporated into and inform the planning and decision-making process.

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

### **1.5.2 Timing of social impacts**

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

## **1.6 ASSUMPTIONS AND LIMITATIONS**

### **1.6.1 Assumptions**

#### **Strategic importance of the project and no-go option**

It is assumed that the strategic importance of promoting renewable energy, including solar energy, is supported by the national and provincial energy policies.

#### **Technical suitability**

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

#### **Fit with planning and policy requirements**

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

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

#### **Generic issues relating to renewable energy**

A number of the key authorities in the other parts of South Africa, specifically the Western and Northern Cape Provinces, have been interviewed as part of the SIAs for other solar energy projects. For the purpose of the BioTherm Alldays SIA it is assumed that the generic issues relating to renewable energy, and specifically solar energy, also apply to the proposed BioTherm PVSEF plant.

## **1.6.2 Limitations**

### **Demographic data**

The demographic data used in the study is largely based on Census 2001<sup>1</sup> and StatsSA's Community Survey 2007, or projections based on them. 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.

## **1.7 SPECIALIST DETAILS**

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

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 renewable energy 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 PVSEF 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

---

<sup>1</sup> Data from Census 2011 will only become available in March 2013.  
([www.statssa.gov.za/census2011/faq.asp](http://www.statssa.gov.za/census2011/faq.asp)).



---

## SECTION 2: POLICY AND PLANNING ENVIRONMENT

---

### 2.1 INTRODUCTION

Legislation and policy embody and reflect key societal norms, values and developmental goals. The legislative and policy context therefore plays an important role in identifying, assessing and evaluating the significance of potential social impacts associated with any given proposed development. An assessment of the “policy and planning fit<sup>2</sup>” of the proposed development therefore constitutes a key aspect of the Social Impact Assessment (SIA). In this regard, assessment of “planning fit” conforms to international best practice for conducting SIAs.

Section 2 of this Social Study Report provides an overview of the most significant policy documents of relevance to the proposed Alldays PVSEF development. Arranged thematically, these are:

#### **Renewable Energy Policy**

- National Energy Act (2008);
- National White Paper on Renewable Energy (2003);
- National Integrated Resource Plan for Electricity (2010-2030).

#### **Socio-Economic Developmental Policy**

- National Development Plan (2011);
- Limpopo Growth and Development Strategy (2009-2014);
- Musina Local Municipality Integrated Development Plan (2012/2013-2017);
- Musina Local Municipality Local Economic Development Strategy (2007).

#### **Spatial Policy and PVSEF siting criteria**

- Musina Local Municipality Spatial Development Framework (2011).

### 2.2 RENEWABLE ENERGY POLICY

In as far as could be established, the interrelated issues of climate change response, energy provision from renewable sources, and the promotion of renewable energy do not appear to be explicitly addressed in current Limpopo provincial policy documents other than the LGDS. Focus in this section has therefore been on key national level policy documents.

#### **2.2.1 National Energy Act (Act 34 of 2008)**

The National Energy Act was promulgated in 2008. One of the objectives of the Act was to promote diversity in energy supply and its sources. In this regard, the objectives of

---

<sup>2</sup> Planning fit” can simply be described as the extent to which any relevant development satisfies the core criteria of appropriateness, need, and desirability, as defined or circumscribed by the relevant applicable legislation and policy documents at a given time.

the Act, as stated in the preamble, make direct reference to facilitating the “increased generation and consumption of renewable resources”.

### **2.2.2 The National White Paper on Renewable Energy (2003)**

This White Paper on Renewable Energy (further referred to as the White Paper) supplements the *White Paper on Energy Policy* (1998), which recognized the significant medium and long-term potential of renewable energy. The 2003 White Paper sets out Government’s vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa.

As signatory to the Kyoto Protocol, Government is determined to achieve its statement 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 operated.

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-subsidized 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 utilized 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).*

### **2.2.3 Integrated Resource Plan for Electricity (2010-2030)**

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

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

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

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

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.

	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>3</sup>	0	805	400	100	300
2023	250	1 600	1 183 <sup>3</sup>	0	805	400	100	300
2024	250	1 600	283 <sup>3</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 up grade has long lead time and thus makes commitment to power capacity necessary

**Table 2.1: Commitments before next IRP (IRP for South Africa)**

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 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;
- 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;
- 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 wind 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.

## **2.3 SOCIO-ECONOMIC DEVELOPMENT POLICY**

### **2.3.1 National Development Plan**

The National Planning Commission tasked with outlining a developmental growth vision and plan for the country during the course of 2011 released documents providing a diagnostic overview and vision statement/ plan. The resultant National Development Plan (NDP) essentially does not deviate from, but supplements, the 12 National (Medium Term) Outcomes 2014. Essentially the NDP contains a plan aimed at eliminating poverty and reducing inequality by 2030, and provides that such should be the guiding objectives of the NDP over the next 20 years. While the Plan aims to address poverty and exclusion on the one hand, it simultaneously attempts to nurture economic growth by creating a virtuous cycle of expanding opportunities, building capabilities, poverty reduction, involving communities in their own development, all leading to rising living standards.

The NDP identifies 9 key challenges and associated remedial plans. While all nine challenges/ plans are envisaged as part of integrated whole, the highest priorities are regarded employment creation and improving the quality of national education. In this regard, a number of construction (~291) and operational (~60) opportunities would be associated with the Alldays SEF Phase 1. Managing the transition towards a low carbon national economy is identified as one of the 9 key national challenges. Expansion and

acceleration of commercial renewable energy is recommended as a key intervention strategy.

### **2.3.2 Limpopo Employment, Growth and Development Plan (2009-2014)**

The Limpopo Employment, Growth and Development Plan (commonly referred to as the LGDP) was adopted in 2009. It covers the 5-year period up to 2014. The LGDP notes that the Province has excellent agricultural potential, mineral reserves, and tourism resources. The mining sector has grown in importance in the provincial economy. The growth in mining between 1995 and 2002 has been remarkable as compared to agriculture and manufacturing.

The LGDP identified four Development Corridors for the province, namely the Trans-Limpopo Corridor, the Phalaborwa Corridor, the Dilokong Corridor and the East-West Corridor. Only the Trans-Limpopo Corridor is partially located in the Vhembe DM/ Musina LM study area, namely along the N1 highway. The town of Musina is anticipated to benefit from its location near the Beitbridge border post, mainly in terms of retail development and the potential development of the town as a logistics and transportation hub.

The LGDS notes that the provincial economy is vulnerable to the impacts of climate change, biodiversity loss and diminishing water resources. Key interventions would need to include diversification of the energy mix in pursuit of renewable energy alternatives, and the promotion of energy efficiency. In this regard, Limpopo provincial government should promote development of the provincial renewable energy sector, amongst others by supporting research, information sharing and establishing regulatory and capacity support in facilitating the use of renewable energy. The growth of a green economy has also been identified as one of six key growth areas by the Limpopo government.

### **2.3.3 Musina Local Municipality Integrated Development Plan**

The MLM 5-year Integrated Development Plan (IDP) 2012-2017 is currently in its first year (2012/2013). Key aspects of relevance to the proposed Alldays PVSEF are discussed below.

The IDP notes that the MLM has a dualistic economy, with the commercial and services sectors concentrated in the town of Musina, and the remainder of the MLM essentially functioning as agricultural hinterland, or for accommodating other primary sector activities such as mining. The IDP further notes that infrastructure and facilities are mainly concentrated in and around Musina and the eastern part of the MLM, resulting in a spatial imbalance. This imbalance would need to be addressed in order to make optimal use of the significant tourism development potential in the western MLM, mainly associated with the Mapungubwe National Park/ UNESCO World Heritage Site and the proposed Limpopo-Shashe Transfrontier Park.

In alignment with the National Spatial Development Perspective (2005), the IDP envisages that the bulk of infrastructure investment in the MLM should be focused/prioritised in Musina town as the growth point, while the provision of basic services should be the focus in rural settlement clusters and lower-order service centres.

#### **Key development issues and constraints**

A number of socio-economic development challenges are identified for the MLM, including:

- The MLM's natural resource base and economy do not have the capacity to absorb the total MLM workforce population, forcing a large percentage of the labour force to seek employment outside of the MLM, or opportunities within the local informal sector;
- Low income levels and poverty are pervasive, affecting the bulk of the MLM population. Low income levels have a negative knock-on effect on the local economy in terms of low spending power, which in turn negatively effects local business development, and ultimately the MLM's ability to retain what spending power it does have;
- Land claims are a major factor influencing development. Approximately 36% of the MLM area is currently subject to land claims;
- The economic relationship between the settlements in the municipality and Musina CBD are not yet strong;
- There is a shortage of job opportunities and job creation in the area. It is essential that job opportunities are spread to also include people from the settlements in the rural eastern parts of the municipality;
- Established businesses and farmers still prefer to employ immigrants at lower wages;
- SMME's need financial assistance to expand their businesses and to promote/advertise their products;
- There is a lack of finance to pursue farming projects.

Key opportunities are identified as the MLM's large, relatively young workforce, and its comparative advantages in the agriculture, mining, manufacturing and transport sectors, compared to the Vhembe District Municipality (VDM). The MLM development strategy should therefore focus on capitalising on identified advantages to further strengthen its position in the District.

The agricultural sector of MLM contributes to approximately half of the employment created in the VDM sector. This high degree of concentration of employment in a single sector is noted as a cause for concern, as the MLM does not have any other source of income to cushion the impacts of any negative changes that could occur in the agricultural sector, therefore creating a strong need to diversify employment. The IDP therefore indicates that the MLM should focus on a dual strategy of retaining existing opportunities, and on labour creation in other sectors to decrease the MLM's reliance on the sector. With regard to the important mining sector (~27% of MLM GDP), the IDP notes inconsistent electricity provision as the key development constraint.

### **Development priorities and objectives**

Economic cluster strategies and objectives aimed at employment creation and poverty alleviation focus on development of the key tourism and mining sectors, micro-enterprise development (SSMEs), multi-sector skills development, and the growth of a green economy. With regard to the growth of a green economy, a number of intervention areas are identified, including promoting the use of renewable energy. Solar energy is not specifically mentioned (MLM, 2012 – Table 39). With regard to rural economic development, focus is on land reform and agricultural support, including to small-scale and subsistence farmers.

Social cluster strategies and objectives focus on the provision of social services, including with regard to HIV/ Aids (mainly with regard to the provision of care facilities), education and multi-sector skills development, and plans to support vulnerable groups such as women, the youth and senior citizens.

Annexure 1 of the IDP indicates that the MLM has a Tourism Strategy and an Integrated HIV/ Aids Plan and HIV/ Aids Council in place, but that an SSME Strategy still needs to be compiled. The MLM HIV/Aids strategy is aligned with the Limpopo Provincial and National strategies, and addresses amongst others, the following aspects:

- Social mobilization and communication with the community;
- Prevention services rendered by all relevant departments;
- Care and support services for people living with HIV/AIDS including awareness programme for living positive programmes;
- Involvement of all stakeholders in integration and implementation of various programmes;
- Sourcing of external funding;
- Promotions of partnerships and referral networks.

#### **2.3.4 Musina Local Municipality Local Economic Development Framework**

The MLM Local Economic Development Framework (LEDF) was compiled by Kayamandi Development Services for the MLM in April 2007. The LEDF sets out a vision and strategic direction for economic development in the MLM, with a view towards enabling development in a coordinated and structured manner. In accordance with the NSDP, the LEDF builds on the unique comparative and competitive advantages of the MLM, and the specific opportunities thereby presented. Key identified development opportunities are mainly based on the existing as well as untapped potential of the MLM's established economic sectors.

Five Strategic Thrusts are identified to enable focused and coordinated development:

- Thrust 1: Business support and extension;
- Thrust 2: Rural integration;
- Thrust 3: Agricultural production, value chain development and promotion;
- Thrust 4: Tourism development and promotion;
- Thrust 5: Mining sector value chain development and integration.

These Thrusts give expression to the following key MLM development objectives:

- Expanding and developing the urban economy, including supporting the growth and development of SMMEs;
- Enhancing rural development and economic integration within the MLM;
- Expanding local human resource development in order to capacitate local residents for participation in local economic activities;
- increasing agricultural production and stimulate local value-adding activities related to the Agricultural sector;
- Promoting and improving the MLM as a tourism destination;
- Identifying specific projects aimed at economic growth and job creation for implementation in Musina Municipality.

A number of Programmes and Projects are associated with each Thrust area. Of specific relevance to the proposed Alldays PVSEF are the following:

Thrust programmes include: 3). Entrepreneurial business support, mentorship and skills development. The LEDF notes that Council should encourage and facilitate the development of relevant training programmes which develop skills in particularly the SMME development, agricultural, mining and tourism-related sectors. The establishment of the proposed Limpopo-Shashe Transfrontier Park should also be supported, as it is

likely to provide significant opportunities for both the local economy and local entrepreneurs.

Thrust 4 is of greatest relevance to the proposed PVSEF. Thrust 4 is aimed at stimulating the development of the tourism industry in the MLM by taking full advantage of the unique cultural, historical and natural assets found in the Municipality. Key programmes include: 1). Promotion of Mapungubwe & Environs as Tourism Icon; 2). Development of MLM tourism assets, activities and themed routes; 3). Destination building, marketing and branding.

The LEDF notes that the MLM is currently (2007) not well-established as an eco-tourism destination. The bulk of visitors to the MLM are still associated with transit traffic, mainly to Zimbabwe. In addition, the MLM is located relatively far from key tourism markets such as Gauteng Province. In this respect, the promotion of Mapungubwe<sup>3</sup> as a unique destination is identified as key to growing the local tourism sector.

The development and branding of designated tourism routes is identified as a key strategy. The LEDF notes that such routes enable effective linkages between a wide range of attractions and activities within the MLM, and promote retention of tourists and related spending within the MLM.

With regard to the Mapungubwe area, the LEDF notes that private sector initiatives are currently focused on destination building around the UNESCO Mapungubwe World Heritage Site, including the development of the Mapungubwe Route and the Limpopo Valley Conservancy. The LED notes that these initiatives have the potential to play a major supporting role in the development of a tourism cluster around Mapungubwe, i.e. by providing facilities and experiences not available within Mapungubwe National Park (MNP), and by effectively packing a range of products and activities in such a way that the long journey to this destination is worthwhile. Opportunities for development on private land could include adventure activities such as quad bike and horse trails, as well as further accommodation facilities.

In developing the Tourism industry, it is also important that linkages are established with other sectors of the economy. Musina Municipality comprises large areas of commercial agricultural land involved in the farming of oranges, mangoes, cotton, game etc. This creates opportunities for the development of farm stay experiences, allowing visitors to stay on a working farm and gain insight into the running of such farming enterprises. A further linkage opportunity for tourism development in MLM is based on the past and present importance of the Mining sector to the MLM, including De Beers' operational Venetia diamond mine.

The development of renewable energy (solar and or wind) is not specifically addressed in the LEDF.

## **2.4 SPATIAL POLICY AND PVSEF SITE SELECTION CRITERIA**

No Provincial or municipal spatial policy documents currently appear to make provision for siting criteria/ guidelines for the development of renewable energy facilities such as SEFs. Limpopo Province does not seem to have a Provincial Spatial Development

---

<sup>3</sup> See Section 3.3.3. and further for a discussion of Mapungubwe National Park/ UNESCO Cultural Landscape and World Heritage Site.



Framework at the moment<sup>4</sup>. Focus in discussion below is on the recent MLM Spatial Development Framework.

#### **2.4.1 Musina Spatial Development Framework (2011)**

The 2011 MLM Spatial Development Framework (SDF) was compiled by BC Gildenhuis and Associates. It is understood that the SDF has been approved by Council in terms of the Municipal Systems Act (2000). Spatial Development Plans contained in the SDF essentially deal with urban areas (Musina town) only. No Spatial Development Categories (SPCs) are provided for the MLM rural area/ Alldays PVSEF site and study area, and no specific spatial development proposals are made for the study area. The SDF does however provide a broad spatial development framework for the MLM, of which the following aspects are of relevance to the proposed PVSEF development:

According to the SDF, key aspects of the MLM spatial development context include the following:

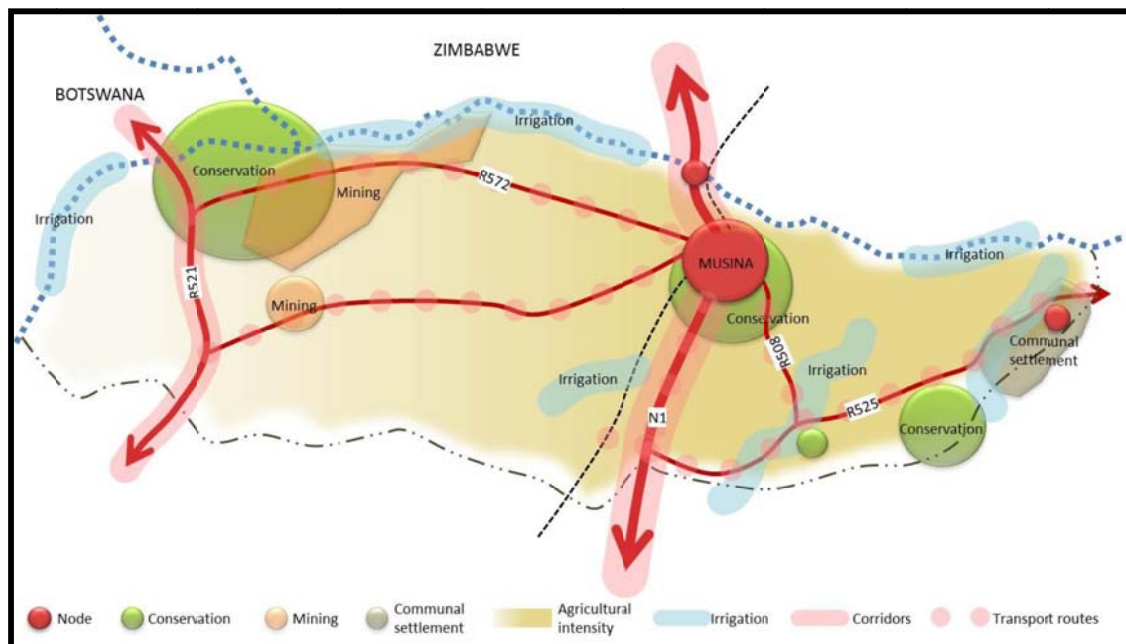
- The MLM is dominated by the single urban node of Musina which practically provides access to all available amenities and facilities;
- Land use activities in the rural area are mainly comprised of agriculture, mining, conservation and tourism;
- Agriculture remains the backbone of employment provision in the MLM. The largely extensive agriculture practices are dispersed throughout the municipal area. This, combined with low population densities, makes it very difficult to focus development in specific nodes or to provide general access to opportunities, amenities and resources. Poverty, a lack of access to transport and long distances compounds this problem;
- While the mining sector contributes to general economic activity and job creation, the sector is also responsible for stimulating undesirable in-migration and urbanization in the MLM;
- Tourism forms an important component of the broader development framework, and includes wildlife/ conservation tourism, passing trade associated with the Beitbridge and Pont Drift border posts, and game farming and hunting. Game farming and hunting is also associated with other extensive agricultural practices and are not localised but distributed through the whole municipal area. The SDF notes that the sector could fulfil an import job creation role, and also contribute towards economic stability in the MLM;
- Given the important links with the tourism sector, conservation is identified as one of the highest development priorities for the MLM;
- Various cross border issues influence development and planning in the municipality. The link with Zimbabwe has become one of the busiest roads in Africa. The links and impact is not always through legal and formalised interaction but the impact of black market importers from Zimbabwe and refugees and other people looking for employment in the area;
- Access to water is one of the biggest obstacles to development in the municipality.

The following spatial development principles and concept put forward in the SDF include the following:

---

<sup>4</sup> The MLM SDF makes cursory reference to a (Limpopo) Provincial Spatial Development Framework. Internet searches could not trace such a document. It is assumed that the (ex) Northern Province Spatial Rationale (2002) is meant in the MLM SDF.

- As indicated in Figure 2.1, the proposed Alldays PVSEF site is located in an area indicated as suitable for mining and lower intensity farming use. Conservation uses (Venetia Limpopo Reserve, etc.) are located to the north of the site;
- Musina town has been identified as a provincial growth point and is a key district development priority area. Development in the MLM should center on Musina as a primary node;
- The N1 link between Musina and Beit Bridge is identified as the only viable activity spine in the MLM;
- Insufficient rural densities to justify development of rural service centres;
- The natural environment forms the basis of tourism in the municipality and it is therefore imperative that the natural environment is conserved to ensure the long term sustainability of the tourism industry in the municipality;
- The rural environment should be protected from development that is not in line with the rural character of the area. The most important principle that applies is that development should be restricted and that the rural character should be maintained;
- The agricultural sector is by far the biggest employment generator but it is also the sector shedding jobs at a very high rate. Retaining jobs in the agricultural sector should be a very high priority for Council;



**Figure 2.1: Musina LM spatial development concept**

Source: Musina LM SDF: Map 4.4. (Musina LM; 2011).

- The N1 is identified as the only primary corridor in the MLM. The R572 is identified as a secondary route. The SDF notes that the segment between Venetia Mine and Musina is not a high priority corridor in terms of traffic and movement, but it services a very large part of the municipal area. The R521 from Polokwane, via Alldays to Pontdrift is identified as a tertiary route. This SDF notes that, as the shortest route to Mapungubwe from Gauteng, the R521 may eventually become of provincial significance. The SDF however does not explicitly assign scenic route status on any roads in the MLM.

The SDF deals with carbon sequestration, but does not comment on the renewable energy sector, or the development and siting of solar energy facilities.

---

## SECTION 3: OVERVIEW OF STUDY AREA

---

### 3.1 INTRODUCTION

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

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

Section 3 also provides a summary of the history of the area.

### 3.2 ADMINISTRATIVE CONTEXT

The proposed Alldays PVSEF is located in the extreme western portion of the Musina Local Municipality (MLM), in the Vhembe District Municipality (VDM) of South Africa's Limpopo Province.

Limpopo Province ("Limpopo") is the northernmost of South Africa's nine provinces, and borders onto three neighbouring countries, as well as three other South African provinces. Limpopo borders onto (clockwise from the north) Zimbabwe (north), Mozambique (east), Mpumalanga Province (east and south east), Gauteng Province (south), North West Province (south and west), and Botswana (west and north west). The Limpopo River forms the boundary with Botswana, Zimbabwe and Mozambique. Limpopo is comprised of five District Municipalities (DMs), which in turn are comprised of a total of 24 Local Municipalities (LMs). The five DMs are (clockwise from the north): Vhembe, Mopani, Sekhukhune, Capricorn and Waterberg. Polokwane (Capricorn DM) is the provincial capital, and the seat of provincial government.

The Vhembe DM (VDM) (DC 34) is the northernmost of the five Limpopo DMs. The VDM borders onto Zimbabwe (north), the Mopani DM (the east and south), the Capricorn DM (south), the Waterberg DM (west) and Botswana (west and north). Vhembe is comprised of six LM's, namely the Musina LM, Mutale LM, Thulamela LM and Makhado LM. Thohoyandou (Thulamela LM) is the administrative seat of the VDM.

The MLM (LIM341) is the northernmost local municipality in the country, and borders onto two neighbouring countries, namely Botswana (Kgatleng District) and Zimbabwe (Matabeleland South Province), both located to the north. Within South Africa, the MLM borders onto (clockwise from the east), the Kruger National Park (small segment only), the Mutale LM and Makhado LM (both within the VDM), and the Blouberg LM within the Capricorn DM. The town of Musina is the administrative seat of the MLM.

The MLM consists of six wards, of which four are urban and are associated with the town of Musina/ Nancefield. The Alldays PVSEF site is located in Ward 2. Ward 2 is the largest of the MLM wards, and accounts for most of the municipal area. The Ward 2 area is a large and sparsely populated rural area with no significant towns or large settlements. The Ward essentially consists of spatially extensive game and beef cattle commercial

farming operations (Dzebu – pers. comm). The proposed PVSEF site is located in the western part of Ward 2, just to the south of the Venetia diamond mine.

### 3.3 PROVINCIAL AND DISTRICT LEVEL SOCIO-ECONOMIC CONTEXT

#### 3.3.1 Limpopo Province

Limpopo Province is the fifth largest of South Africa's nine provinces (125 755 km<sup>2</sup> = 10.3% of the national territory), and has an estimated (mid-2010) population of 5.4 million people (~10.9% of the national total). The province's population density is 42 people/ km<sup>2</sup>. The vast majority of the Limpopo population is Black African (~97.5%), making it the most racially homogenous province in the country. The Northern Sotho (including the Bapedi) constitutes the largest ethnic majority (~60%). Other groups include Tsonga (Shangaan) speakers (25%) and TshiVenda speakers (11%). Whites form the most significant minority (~2.4%).

The northern portion of the province (roughly the Vhembe DM) is located to north of the Tropic of Capricorn. The Limpopo climate is therefore largely sub-tropical, with frost absent, and a long growing season for natural vegetation and crops. The availability of water is however a key constraint. Rainfall in the province generally decreases from east to west, and south to north. A substantial portion of the province may be classified as semi-arid to arid. The vast majority of the province is located within the savannah biome, but also includes tropical forest in the eastern, moister lowveld areas. Dry bushveld vegetation (deciduous woodland with a grassy ground layer) is dominant over most of the province. The Limpopo River, which forms the northern provincial and national borders, is the second largest east-draining river (after the Zambezi) on the African continent. The Olifants River in the eastern part of the province and the Shashe in Botswana are major tributaries. Both the Limpopo and the Olifants systems support significant irrigation agriculture. Due to agricultural abstraction and other factors, the Limpopo river near Musina currently fills up to its banks only once every seven years or so<sup>5</sup>.

Land used for grazing by the commercial farming sector is the spatially most dominant land use. Traditional use focused on beef production, but game farming (hunting, auctioning, game viewing) is currently greatly gaining in importance. Conservation constitutes a further key land use. Three national parks (including the bulk of the Kruger National Park), one UNESCO World Heritage Site (Mapungubwe, near Musina), and two UNESCO Biosphere Reserves are located within the province, in addition to two Transfrontier parks. The province is also home to a large number of private conservation operations, mainly along the Kruger National Park (KNP), and in the north-west, along the "Golden Horseshoe" formed by the Limpopo river valley in the Musina LM. The Province is currently branding itself as the premier eco-tourism destination in South Africa.

Infrastructural underdevelopment, especially in the field of education, is an enduring legacy of the Apartheid era and the fact that large parts of Limpopo were run by homeland governments (viz. Venda, Gazankulu, Lebowa). Currently, 91% of Limpopo's schools are in Quintile's 1-3, which places them in the poorer sector of the range, with Quintiles 4-5 representing the best-resourced schools<sup>6</sup>. This poses a major challenge for skills development, employment creation, and economic growth in the province.

---

<sup>5</sup> [www.en.Wikipedia.org](http://www.en.Wikipedia.org).

<sup>6</sup> [www.limpopobusiness.co.za](http://www.limpopobusiness.co.za).

Key towns in Limpopo include Polokwane (capital), Modimolle, Bela-Bela, Makhado, Phalaborwa, Thabazimbi, Tzaneen, Thohoyondou and Musina. Large mining operations are associated with a number of the major towns in Limpopo, including Thabazimbi, Phalaborwa, and Musina. Heavy industry/ processing are mainly concentrated around Polokwane. The study area is located ~200 km west of Polokwane via the R521. Only the town of Musina is located in significant proximity to the proposed Alldays PVSEF site (viz. ~70-80 km). Polokwane is located ~320 km north of Johannesburg (Gauteng Province).

### 3.3.2 Provincial economy

Agriculture, mining and tourism are the three pillars of the Limpopo economy. The growth of a green economy has also been identified as one of six key growth areas by the Limpopo government. The Limpopo agricultural sector is based on subtropical and other fruit, nut, beverage, vegetable and fibre crops, beef carcass production, and (increasingly) game farming. Cropping activities are mainly located in the eastern, lowveld portion of the province, or/ and in association with river systems and irrigation schemes. Some of South-Africa's largest agri-business operations are located in Limpopo, including ZZ2 (tomatoes) and Wesfalia (avocados and mangoes). In addition, most of country's citrus and subtropical fruit is produced in the eastern Limpopo lowveld.

According to the Limpopo Department of Trade and Industry, Limpopo currently produces about 75% of South Africa's mangoes, 65% of its papayas, 36% of its tea, 25% of its citrus, bananas, and litchis, 60% of its avocados, 60% of its tomatoes, 70% of its mangoes and 35% of its oranges. Other crops include coffee, nuts, guavas, sisal, cotton, tobacco and timber in addition to staples such as sunflowers, potatoes, maize, wheat and table grapes<sup>7</sup>. The Vhembe DM and Letaba valley (Mopani DM) are major contributors to the Johannesburg Fresh Produce Market (the biggest market in Africa), with Limpopo growers as a group contributing about 45% of the produce sold (annual turnover of R3.5-billion). In addition to commercial agriculture, subsistence farming is the mainstay of a large section of the rural population. Food security and access to water have been identified as key development issues by the Limpopo Department of Economic Development, Environment and Tourism<sup>8</sup>.

The drier, higher-lying bushveld portion of the province is mainly suited to raising beef cattle and to game farming. While Limpopo accommodates 7.5% of the national beef cattle herd, it is the undisputed leader in game farming. The annual Thabazimibi Wildlife Auction (Waterberg DM) is currently the biggest in the country. More than half of South Africa's game farms are located in Limpopo, and the province attracts an estimated ~80% of all commercial hunting activity in the country. The north-western part of the Province (centered in the Capricorn DM, around Alldays, Vivo and Lephalale, but also including parts of the Musina LM and the Waterberg DM) is the premier commercial hunting destination in South Africa. The value of the national sector was estimated at R7.6 billion in 2010, of which Limpopo accounted for the bulk. The growth of the provincial game farming sector has been at ~6% per year since the early 1990's<sup>9</sup>. The trend however potentially holds negative implications for food security, as well as local employment, as game farming typically requires less labour than stock farming (UOVS; 2007).

---

<sup>7</sup> [http://www.til.co.za/doing\\_busi.php](http://www.til.co.za/doing_busi.php).

<sup>8</sup> See the Departmental overview provided on Limpopo Business's website.

<sup>9</sup> [www.limpopobusiness.co.za](http://www.limpopobusiness.co.za).

From a regional trade perspective, despite being landlocked, the province is strategically located with regard to the economic heartland of South Africa (Gauteng Province), and traversed by the N1 highway which connects South Africa to its neighbors in the northern Southern African Development Community (SADC) via Zimbabwe. The Beitbridge border crossing north of Musina is one of the busiest in sub-Saharan Africa, and handles large volumes of road freight. An international airport is located in Polokwane, and an additional two regional airports at Hoedspruit and Phalaborwa. The rail network is mostly devoted to getting ore to coastal processing plants. The proposed Maputo development corridor (including an upgrade of Maputo port in Mozambique) is likely to stimulate economic development in Limpopo, as Maputo is substantially closer than ports traditionally used in South Africa (mainly Durban and Richard's Bay).

The R120-billion coal-fired Medupi power station (Eskom) is currently being developed next to the existing coal-fired Matimba power station near Lephalale (Capricorn DM). One of the biggest engineering projects to date in South Africa, according to TradeInvest's Limpopo Business publication, Medupi is already having an enormous influence on the local economy, and is expected to have a long-lasting effect on the provincial economy as well. Exxaro's Grootgeluk mine (also near Lephalale) will supply 14.6 million tons of coal every year to Medupi for 40 years. As a result of the Medupi development, housing stock prices in Lephalale are amongst the highest in South Africa. This trend is mirrored by other key mining towns in the province, such as Phalaborwa and Burgersfort. The De Hoop Dam (80 million m<sup>3</sup>/a) on the Steelpoort river, a tributary of the Olifants River (in Sekhukhune DM in the south east) is scheduled for commissioning in 2012. The scheme will provide mainly for residential and mining uses, with approximately 23 platinum mines in the area standing to benefit.

According to the Council for Geosciences, ~80% of the earth's geological history is represented in Limpopo Province. Limpopo is therefore well-endowed with mineral resources, including coal, copper, iron, chromium, platinum, diamonds, antimony, andalusite, and numerous others<sup>10</sup>. According to TradeInvestSA's Limpopo Business publication, the mining sector currently contributes 27% to provincial gross domestic product (GDP). Large mines are located at Phalaborwa, Thabazimbi, Burgersfort, Steelpoort, Venetia, and elsewhere. Limpopo and the adjacent North West Province hold much of the world's strategic platinum group (platinum, palladium, etc.) metal and chromate reserves. The Venetia diamond mine in north-western Musina LM is the most productive diamond mine in South Africa. The Waterberg DM is anticipated to take over as the leading coal producing area in the country once the Mpumalanga coal fields run out (next few decades). Limited mining processing (mainly silicone and aluminium smelters) currently takes place in Limpopo, but the mining sector has strong links to the provincial construction sector. The mining sector is a key water user in a province which includes large tracts of semi-arid and arid areas.

According to the Limpopo Premier's office, the tourism sector currently employs ~ 22 414 people. In 2008, the Province accounted for 5% of all foreign tourist bed nights in South Africa, and the sector continues to show growth. The R 93 million Provincial tourism budget for 2010/11 represented 11% of Limpopo's total budget<sup>11</sup>. The sector reported a 1.7% increase in foreign direct spend in 2009/ 2010, that is, before the 2010 World Cup, and despite the global recession<sup>12</sup>.

---

<sup>10</sup> According to the Limpopo Department of Trade and Industry's website, resources include three types of precious metals and stones, 12 types of ferrous and base metals, and 23 types of industrial minerals.

<sup>11</sup> [www.en.wikipedia.org/wiki/Limpopo](http://www.en.wikipedia.org/wiki/Limpopo).-

<sup>12</sup> [www.en.wikipidia.org](http://www.en.wikipidia.org).

Limpopo is already established as the leading eco-tourism province in the country, and the provincial government is keen to further grow the sector and maintain its leading position. Key tourism assets are its wildlife and cultural heritage. A total of 54 nature reserves are located in the province, including three national parks and a number of provincial, local authority and private reserves (totalling some ~3.6 million hectares). The bulk (roughly the northern two thirds) of the Kruger National Park (KNP) is located in Limpopo. The area to the east of the KNP is particularly rich in private game reserves, and includes some the highest rated safari destinations in the world (Sabi Sands, etc). Two UNESCO Biosphere Reserves (Waterberg and Vhembe) are located in the province. Cultural/ historical tourism was greatly boosted by the listing of the Mapungubwe Cultural Landscape and UNESCO World Heritage Site in 2003 (Musina LM). Perusal of the Limpopo Tourism website indicates that approximately 15 designated tourism routes have been established in the province, celebrating both its natural and cultural heritage.

The growth of a green economy is identified as one of six key focus areas for the provincial economy. One of the Technical Working Groups giving input to the Premier of Limpopo's Employment and Growth Advisory Council is analyzing ways to turn Limpopo into a green economy. Focus is currently mainly on biofuels (bioethanol, biodiesel and methane gas) and fuel from waste. A good potential for solar (good solar intensity), and the potential for local manufacturing tie-ins with solar plants have been identified - including solar panel components (i.e. minerals needed for solar PV manufacture are locally mined in Limpopo, e.g. silica)<sup>13</sup>.

### 3.3.3 Vhembe District

The Vhembe District Municipality (VDM) is the northernmost of the five DMs comprising Limpopo Province, and borders onto Botswana, Zimbabwe and (via the Kruger National Park) Mozambique (Figure 3.1). The VDM is located north of the Tropic of Capricorn, in a hot, arid part of South Africa. The landscape is dominated by dry bushveld savannah. The Limpopo River ("Vhembe" in TshiVenda) along its northern border, the Soutpansberg range in the western part of the VDM (~60 km south of the Alldays PVSEF site), and lake Funduzi in the south-east, are key landmarks. The northern portion of the Kruger National Park (Punda Maria gate) borders onto Vhembe. The Vhembe region is the heartland of the Venda people, and during Apartheid, a large portion of the VDM (mainly east and south-east) formed part of the Venda Bantustan (Section 3.3.3 provides a settlement history of the area).

The VDM is 25 597 km<sup>2</sup> in extent, and has an estimated 2010 population of ~1.33 million. It is the district with the smallest percentage of non-Black people in the country – around 7 000, mainly White, Afrikaans speaking people concentrated in the Musina LM. The Largest towns in the VDM are Musina (Messina), Makhado (Louis Trichardt) and Thohoyandou - located in the Musina, Makhado and Thulamela LMs, respectively. The majority of settlements in the VDM are clustered east of the N1, predominantly in Thulamela and Mutale LMs. Only 8 major settlements in Makhado LM are located west of the N1. Although the district is strategically located on the N1 corridor, it mainly serves as throughway for trade traffic to and from Africa with currently very little direct spin-offs accruing to the local economy (apart from the relative limited shopping in Musina and at Beitbridge)<sup>14</sup>.

Vhembe's vast bushveld supports commercial and game farming, and the district has considerable cultural and historical assets. The major economic sector is agriculture,

---

<sup>13</sup> [www.limpopobusiness.co.za](http://www.limpopobusiness.co.za).

<sup>14</sup> [www.vhembe.gov.za](http://www.vhembe.gov.za)

both in terms of commercial and subsistence farming. Game farming is a growing subsector, as is ecotourism. Like the rest of Limpopo Province, mining forms the third key pillar of the VDM economy. Key operations include De Beers' Venetia Diamond mine ~70-80 km west of Musina<sup>15</sup>.

### **3.4 LOCAL MUNICIPAL SOCIO-ECONOMIC CONTEXT**

Pending the outcome of Census 2011, no data is currently available at community or ward level. Focus in presentation below is therefore at a MLM level, with reference to provincial data only by way of contextualisation. Data was mainly derived from the MLM IDP 2012/ 2013-2017 (in turn mainly derived from Census 2001, StatsSA's Community Survey 2007), and the 2011 MLM SDF (based on 2009 dwelling count-based projections by the SDF authors).

#### **3.4.1 Musina Local Municipality (MLM)**

The MLM municipal area covers approximately 7578 km<sup>2</sup>, extending from the confluence of the Mogalakwena and Limpopo rivers in the west, to the confluence of the Nwanedi and Limpopo rivers in the east; and from Tshipise and Mopane in the south, to the Limpopo River (Botswana and Zimbabwe borders) in the north (MLM 2012) (Figure 3.2 above). The MLM is the northernmost local municipality in the country, and is entirely located north of the Tropic of Capricorn. The vast majority of the population is Venda, with White, mainly Afrikaans-speaking people constituting the most significant ethnic minority. While strategically located in relation to neighbouring countries, the MLM is located relatively far from South Africa's economic powerhouse, Gauteng province. Musina town, for instance, is located ~550 km from Johannesburg.

#### **3.4.2 Demographic overview**

##### **Population**

Ethnically, the Limpopo population is the most homogenous in South Africa, with the Black African group comprising ~97.5% of the population. The Black African group consists of several ethnic groups distinguished by culture, language and race. 97.3% of the population is Black, 2.4% is White, 0.2% is Coloured, and 0.1% is Indian/Asian. The province has the smallest percentage and second smallest by number of white South Africans in the country. It also has the highest Black percentage out of all the provinces. Vhembe district has the smallest share of White people in Limpopo.

According to the 2007 Community Survey, the MLM has an estimated population of 57 195 (14203 households) – a substantial increase since Census 2001, which counted 39 310 people for the MLM<sup>16</sup>. Approximately 94% of the MLM population is Black African. The White group forms the most significant minority, and accounts for 5.9% of the population share (MLM, 2012). According to the SDF, the vast majority (~63%) of the MLM population lives in the town of Musina (MLM, 2011).

##### **Age structure**

The MLM has a youthful population with ~40% under the age of 18. The largest cohort is accounted for by young adults (35.4%), with adults and the elderly only making up

---

<sup>15</sup> [www.limpopobusiness.co.za](http://www.limpopobusiness.co.za)

<sup>16</sup> The 2011 MLM SDF indicates a projected 2009 MLM total of 38 748 – i.e. roughly the same as the Census 2001 total.



24.2%. According to the 2011 SDF, there are relatively fewer children, but more young adults in the farming areas than in urban Musina. The situation with regard to young adult suggests employment seeking out-migration from Musina elsewhere, while the rural farming area still provides job opportunities.

### **Education levels**

MLM educational levels are very low. Approximately 19% of the population has had no formal education, 33% only partial or a full Primary education, and only 4.1% hold a tertiary qualification. With the exception of Musina town and other small urban areas which have a higher concentration of skilled people, the profile is fairly even across the MLM. As noted in the 2011 SDF, the bulk of the population is therefore only equipped for low and elementary skilled jobs (58% of the population) in the primary sector, mainly in Agriculture (MLM, 2011; MLM, 2012).

### **Employment**

According to the 2007 Community Survey, the MLM had an unemployment rate of 25%, and a labour force participation rate of 81%. The highest unemployment is amongst the 15-19 year age cohort (36%), and generally declines with age (MSM; 2012). The extent to which the municipal agricultural sector is able to absorb labour is a key factor in un/employment levels in the MLM (MLM; 2011).

Primary sector activities accounted for the bulk of employment in 2007, with Agriculture providing 54% of opportunities, and Mining 18%. The Services sector (including government services) was the third most significant, providing an estimated 23%. Wholesale (6%) and Manufacturing (5%) were other significant employment providers (MLM; 2012).

### **Household income and poverty levels**

MLM poverty levels are very high. An estimated 85% of household heads earn less than R3200 per month – of which 65% has either no formal income, or earn less than R800/month. Only an estimated 14.3% of breadwinners earn more than R3500/month (MLM, 2011). The vast majority of poor are Black (99% according to a 2006 estimate). In 2011 the MLM provided -indigent support to 2459 households in the municipality (MLM; 2012).

#### **3.4.3 Economic context**

The MLM accounts for 11% of the Vhembe DM's GDP. Key economic activities are related to primary sector activities, mainly agriculture and mining, with limited local beneficiation. Thanks to the MLM's strategic location along the N1 south of Beitbridge, the transport sector also plays an important role in the MLM economy. Conservation-based tourism and game farming (including for hunting) are further significant established and growing land uses. Broken down by sector, the three main contributors to the MLM economy are Agriculture, Forestry and Fishing (35%), Mining (30%), and Transport and communication (15%). Manufacturing accounts for a further 11%, and Finance and business services for 9% (MLM, 2012).

The GDP generated by the MLM agricultural sector currently contributes up to three times more to the Musina municipality's economy than this sector does to the VDM economy. The MLM agricultural sector also contributes to more than a third of the GDP generated by this sector in the VDM. The MLM agricultural sector also provides the bulk of agricultural employment opportunities in the VDM (MLM, 2012).

The MLM manufacturing sector is not currently performing well. However, given the MLM's strong agricultural base, opportunities for expansion of the manufacturing industry exists through agro-processing and other activities.

With regard to tourism, at least two designated provincial tourism routes are located within the western MLM, both focusing on the Mapungubwe National Park (MNP) and Cultural Landscape. These are the Mapungubwe Route (R521 and R572) and the Limpopo Valley Route (including portions of the R572). A number of private reserves and game farms are however located in the MLM. The MNP currently offers ~100 beds in a number of small rest camps.

#### **3.4.4 Land uses**

In terms of land uses, commercial farming and conservation are the spatially most extensive land uses, accounting for the vast bulk of the MLM. Due to low veld carrying capacities, agricultural activities are mainly comprised of extensive beef cattle and game farming activities. As elsewhere in Limpopo Province, mining plays a major role in the local economy, and include copper, manganese, iron and diamonds.

Conservation land uses are associated with the Mapungubwe National Park (MNP)/ Mapungubwe Cultural Landscape UNESCO World Heritage Site, as well as a number of private conservation areas, including De Beers' 360 km<sup>2</sup> Venetia Limpopo Nature Reserve (VLNR), and the Vhembe and Limpopo Valley Game Reserves (located to the west and east of the VLNR, respectively). Parts of the MLM, including the MNP have been declared part of the Vhembe Biosphere Reserve (proclaimed by UNESCO in 2009). Statutory and private conservation uses, linked to conservation, eco-tourism and heritage tourism are therefore of established and growing importance in the MLM area.

A substantial portion of the MLM (mainly eastern portion) is currently subject to land claims (~36% of the municipal area); also including a cluster of claims on land surrounding the Venetia mine (MLM IDP, 2012; MLM SDF, 2011). It is however unclear whether the proposed Alldays PVSEF site is currently subject to any registered land claims.

#### **3.4.5 Settlement patterns**

The MLM has an estimated (2007) population of 57195 (~14 000 households) –yielding an estimated gross population density of 7.5 people per km<sup>2</sup>. As with the VDM, the rural settlement pattern is concentrated in the eastern part of the MLM. Only ~0.08% of the MLM consists of urban areas, all essentially associated with the town of Musina (an estimated 63% of the MLM population). The remainder of the MLM is mainly comprised of land used for commercial farming, but also includes substantial parcels used for conservation.

The settlement pattern in the rural area outside Musina is sparse - of the remaining (non-urban) population of the MLM, an estimated (2009) 26.5% live on commercial farms, and 10% in traditional villages (mainly in the east and south-east parts of the MLM). The land use pattern in the commercial farming parts of the MLM is typically that of farmsteads/ residential clusters on spatially extensive properties on grazing land (stock, game), and a denser settlement pattern associated with irrigation cropping activities along the Limpopo River valley. Musina town (including the high-density Nancefield suburb to the north of the historical town), located along the N1 in the central/ eastern portion of the MLM, is by far the largest urban area, and essentially the

only higher-order settlement in the MLM. The town dates its origins to the opening of the Messina copper mine in 1905, at the site of earlier Bantu copper and iron mining activities (“Musina”)<sup>17</sup> abandoned for unknown reasons during the 19<sup>th</sup> century. The name reverted back to its original spelling in 2003. Musina is the seat of the MLM, and functions as regional service centre. The town forms the centre of a large mining area. Copper, iron ore, coal, magnetite, graphite, asbestos, diamonds and semi-precious stones are currently mined in the town’s hinterland.

Musina is located ~15 km south of the Beitbridge border crossing point, one of the busiest road freight crossing points in Africa, and is currently positioning itself to become the regional logistics hub for cross-border traffic and freighting. By the same token, Musina is vulnerable to influxes of refugees linked to lasting political instability in Zimbabwe<sup>18</sup>. Musina is located ~70-80 km east of the proposed PVSEF site. With regard to other settlements in the MLM, Thipise (south east MLM) is the second most significant. Thipise functions as a local service point (3<sup>rd</sup> order settlement). The remaining settlements in the MLM may be described as 5<sup>th</sup> order settlements (small residential areas without any economic base, and in this case, very limited development potential). Evangelina, Bridgewater, Brombeek and other places in vicinity to the SEF site do not appear to be settlements, but mere places (named after farms, etc) along local roads.

The Ward 2 area is a large and sparsely populated rural area with no significant towns or large settlements. The Ward essentially consists of spatially extensive lower intensity game and beef cattle commercial farming operations (Dzebu – pers. comm; Musina SDF). This also holds true for the settlement pattern on properties in the Gotha and Venetia area. Interviewees indicated that farms in the immediate area tend not to be occupied by owners, and are often run as weekend/ holiday farms with secondary economic activities such as game and cattle (see further below). With a few exceptions (such as Gotha and Brombeek), limited employment and tenure opportunities are associated with farms in the area (Daneel, Dzebu, Heinlein – pers. comm).

### **3.5 LOCAL AND SITE SPECIFIC CONTEXT**

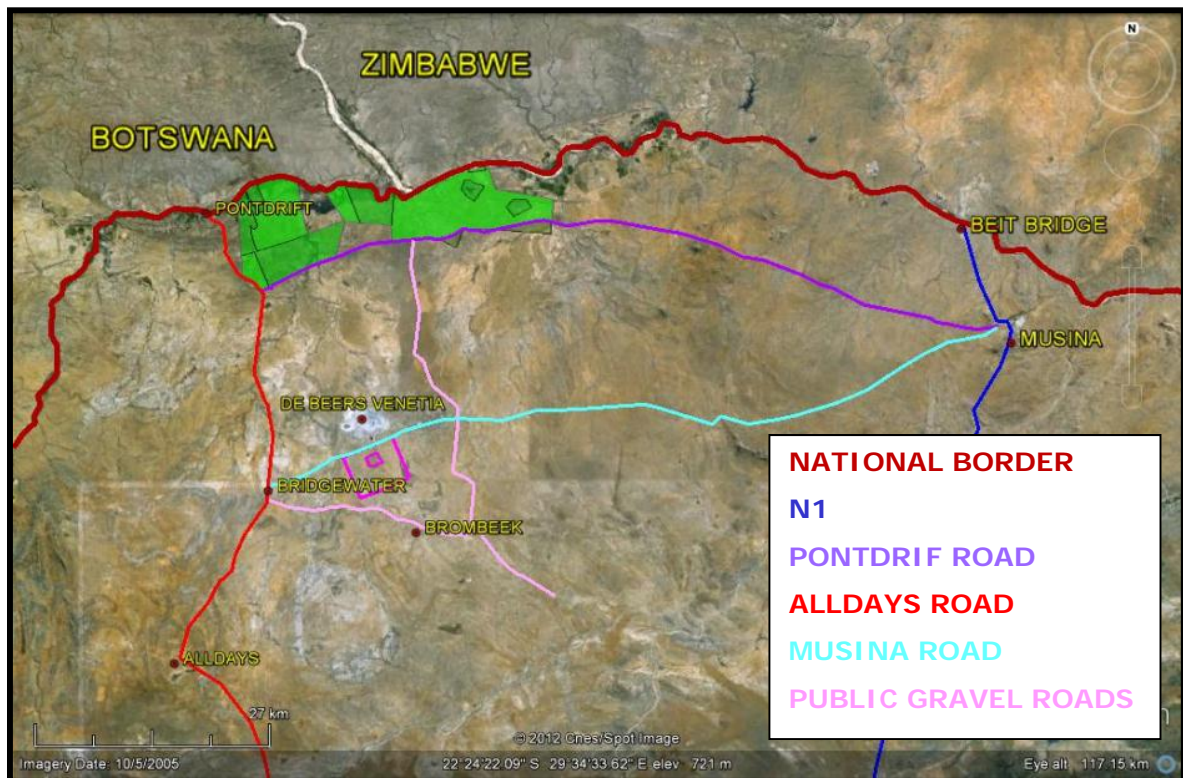
#### **3.5.1 Road network**

The regional and local public transport network is illustrated in Figure 3.1 below. As indicated the PVSEF site is located directly to the south of the R521 east (Musina Road) which mainly carries traffic associated with De Beers’ Venetia operations.

---

<sup>17</sup> “Musina” denoted the “spoiling” presence of copper deposits amongst more desirable iron ore deposits in the area.

<sup>18</sup> According the New York Times, during the January 2009 election crisis in Zimbabwe, Musina had a shifting population of about 15,000 foreigners, mainly Zimbabweans, many of whom lived in a refugee camp at the municipal showgrounds, or in the streets (MLM SDF, 2011).



**Figure 3.1: Regional road network**

Other key roads in the area include the east-west aligned R572 (Pontdrif Road) and the north south aligned segment of the R 521 (Alldays Road). The R527 is located ~20 km to the north of the proposed PVSEF. This road provides direct access to the MNP as well as the VLNR from Musina and the N1. The R521 located >10 km to the west of the PVSEF site links the Pontdrift border post to the provincial capital of Polokwane (and the N1), via the small towns of Vivo and Alldays (Capricorn DM). Both the R521 and R572 have been identified as scenic routes by Limpopo Tourism, with Mapungubwe as the key destination. The proposed PVSEF site is however unlikely to be visible from either road. The Musina road directly to the north of the site is likely used mainly by De Beers' traffic and adjacent farm owners.

A number of public gravel roads are also located in the area, namely the Bridgewater-Brombeek road to the south of Gotha, and a road aligned along the eastern boundary of the Venetia Limpopo reserve across Ostrolenka farm.

As indicated in Figure 3.2, Corea Farm, De Beers Venetia, Gotha and Rugen are the only properties obtaining primary access off the Musina road. A private gravel road, the Santer Road, links Gotha with Brombeek and the Brombeek public gravel road to the south of Gotha. The Santer Road is a private road, and kept locked by the owners (Photograph 3.1). The road primarily provides access to Gotha and Abend Ruhe from the north, movement between Gotha and Brombeek (Ceon parent farm) (same owner), and access to Santer A and Santer B farms from the Brombeek gravel road in the south. The Brombeek Road also provides primary access to the farms in the vicinity of Gotha, e.g. Ceon, Kaalkraal and Brombeek farm proper located to the south-east.

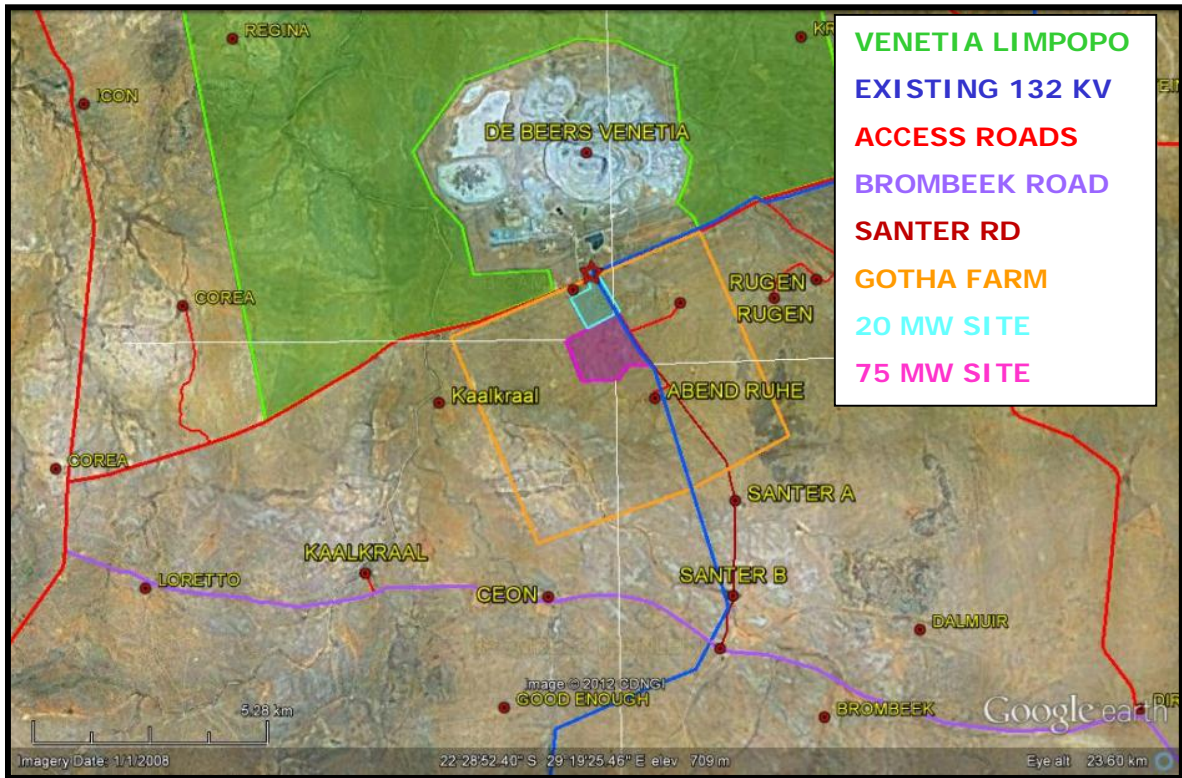


Figure 3.2: Local area access roads



Photograph 3.1: View north along Santer Road adjacent to 75 MW site

### 3.5.2 Western Ward 2

As indicated above, the proposed PVSEF site is located in the western portion of Ward 2 of the MLM, which borders onto Botswana and Zimbabwe. Ward 2 is a rural ward, and includes the entire western and central parts of the MLM. The Pontdrift border crossing is located in Ward 2. No significant settlements are located in Ward 2. Roughly speaking, the northern half of the Ward 2 area is comprised of statutory or private conservation land uses, and the southern portion of commercial farming operations (beef cattle and game). Irrigation cropping dominates along the Limpopo valley. The De Beers Venetia diamond mine currently constitutes the most significant mining operation in Ward 2, but the large Vele colliery which is currently under construction along the Limpopo east of Pontdrif, and should soon start operations<sup>19</sup>.

The landscape in the western MLM south of the Limpopo valley (i.e. PVSEF study area) consists of mixed western Mopane veld on open flat terrain interspersed with sandstone and conglomerate formations. Mopane veld is characterised by mopane trees (*Colophospermum mopane*), which range in size from scrub to medium sized trees, depending on moisture availability. Stands of majestic Baobab (*Adansonia digitata*) and Ilala palm (*Hyphaene coriacea*)<sup>20</sup> occur in places. The Limpopo valley is dominated by thorny *Acacia* spp. such as majestic Fever trees (*A. Xantephloea*), but also includes majestic specimen of *Ficus* spp., Jackalberry and others. The veld carrying capacity is generally low, and mainly suited to raising beef cattle, and to big game farming (including all of the “big five”) or conservation management, all typically on extensive land parcels. The area around the Limpopo valley is conspicuously rich in bird life, with more than 350 species having been recorded<sup>21</sup>. Animals such as warthog are still frequently encountered along public roads in the study area. The sense of place is that of arid African bushveld.

With regard to the immediate landscape context around the Alldays PVSEF site, it should be noted that the large Venetia open cast mine is located directly adjacent to the proposed PVSEF site (Figure 3.3). In addition, the area also accommodates the Eskom Venetia substation, and is traversed by 132 kV and 22 kV Eskom lines and the Musina road. The proposed PVSEF would therefore not be established in a pristine bushveld context lacking in pre-existing industrial landscape references.

### 3.5.3 Gotha Farm

Gotha Farm is owned by Ms. Marthie Heinlein, and accounts for the bulk of a larger 3284 ha farming operation which also includes Brombeek (subdivided from Ceon) to the south of Gotha. Santer A and Santer B, now two separate farms, historically also formed part of the Heinlein operations, but have been sold. The Santer road (locked from Gotha and Santer A sides) still provides primary movement between Gotha and Brombeek (Ceon). Gotha is essentially a commercial farm which accommodates additional key uses in the form of Abend Ruhe guest camp and a rental residential complex adjacent to the farm entrance, Camp B (Photograph 3.2). An additional residential/ farm building cluster is located east of the Santer Road.

---

<sup>19</sup> The planned production capacity of Vele is 5mtpa at full production. To achieve this production target the mining rate is fixed at 14 million tonnes per annum ([www.mining-technology.com/projects/vele\\_colliery\\_projec/](http://www.mining-technology.com/projects/vele_colliery_projec/)).

<sup>20</sup> [www.environment.gov.za/projprog/tfcas/limpopo\\_shashe.htm](http://www.environment.gov.za/projprog/tfcas/limpopo_shashe.htm); [www.sanparks.org](http://www.sanparks.org)

<sup>21</sup> [www.environment.gov.za/projprog/tfcas/limpopo\\_shashe.htm](http://www.environment.gov.za/projprog/tfcas/limpopo_shashe.htm). This figure represents more than a third of the national Roberts bird list (~920 species).



**Photograph 3.2: Quarters and caravan stands at B Camp (Gotha)**

Key farming activities consist of beef cattle (core herd of 200 cows plus calves) and game farming. Game species include giraffe, water buck, gemsbok, hartebeest, blue wildebeest, impala and kudu – including some very high value species (giraffe). Game related activities are primarily focused on breeding for auctions, but also include trophy and limited biltong hunting. Game drives are key part of the Abend Ruhe package. Limited sheep and goats are currently kept on Gotha, mainly as a result of historic losses to theft (Heinlein – pers. comm).

The Abend Ruhe complex consists of chalets, restaurant and bar, and a lapa as well as facilities for caravans and campers. Abend Ruhe currently provides 29-45 beds (private/ shared), not counting caravan and tent stands (Photograph 3.3). Abend Ruhe and some neighbouring game farms along the Alldays Road cater to mainly a staple of contractors during the week, and tourists over weekends. Abend Ruhe is currently often fully occupied throughout the year, and the owner has indicated that sufficient demand for substantially more exists (Heinlein – pers. comm).



**Photograph 3.3: Guest chalets and caravan stands at Abend Ruhe**

The so-called B Camp residential facility is located on a small portion of Gotha, adjacent to the Musina road opposite the main entrance to De Beers Venetia. B Camp is essentially a permanent labour camp, offering a variety of accommodation facilities, ranging from single quarters, to bunk-bed rooms, and caravan stands. Gotha provides basic services, and the owner's daughter, Ms. Nelia Erasmus, runs a small shop on the premises. B Camp provides ~130 beds plus caravan stands. Accommodation is in constant demand from Be Deers and other (e.g. roads) contractors and subcontractors (Heinlein – pers. comm).

The owner, Ms Marthie Heinlein, resides on Brombeek. Her daughter, Nelia, and her family reside in the main Gotha farm house to the east of the Santer road. Labourer/ staff accommodation is associated with main building clusters on Brombeek and Abend Ruhe. Gotha combined operations currently employ 32 permanent workers, including farm and guest house managers. All are tenured on Goitha or Brombeek (Heinlein – pers. comm).

#### **3.5.4 Adjacent farms**

Figure 3.4 illustrates Gotha farm in relation to adjacent properties to the south of the Musina road. Gotha borders onto five different properties, namely (clockwise from the north):

- Rugen farm (Delport) was recently sold by De Beers when the portion south of R521 was sold off Venetia Limpopo. The property appears to carry only game, and the owner apparently resides elsewhere (Heinlein – pers. comm);



- Rugen farm (De Korter). Owners reside in the Western Cape and visit only occasionally. Supports mixed game and beef cattle, but not primary activity (Heinlein – pers. comm);
- Santer A belongs to the two sons of the recently deceased Mr Eggberry. Both sons are UK based, but apparently intending to spend more time on the farm. No significant farming activities associated with Santer A (Daneel, Heinlein – pers. comm);
- Ceon (~2000 ha) belongs to Mr Hennie Coetzer. Mr Coetzer, his farm manager, Ms Franci Daneel, Ms. Daneels parents and two labourer families reside on Ceon, in two clusters adjacent to the Brombeek public gravel road. Farming activities are primarily related to beef cattle and game farming, mainly for capturing and selling at auctions, but also limited hunting;
- Kaalkraal belongs to Mr Gerald and Ms Cheryl Hodgson. Kaalkraal Lodge is located on the property, and Kaalkraal also appears to accommodate some beef cattle and game farming activities (Coetzer, Daneel – pers. comm). Access to Kaalkraal is off the Brombeek road.

As Figure 3.3 indicates, residential clusters on adjacent farms are located at some distance from the PVSEF sites – the nearest, on Rugen, is located >3km away. The generally flat topography and short sighting distances as a result of tree cover is likely to provide good visual screening.

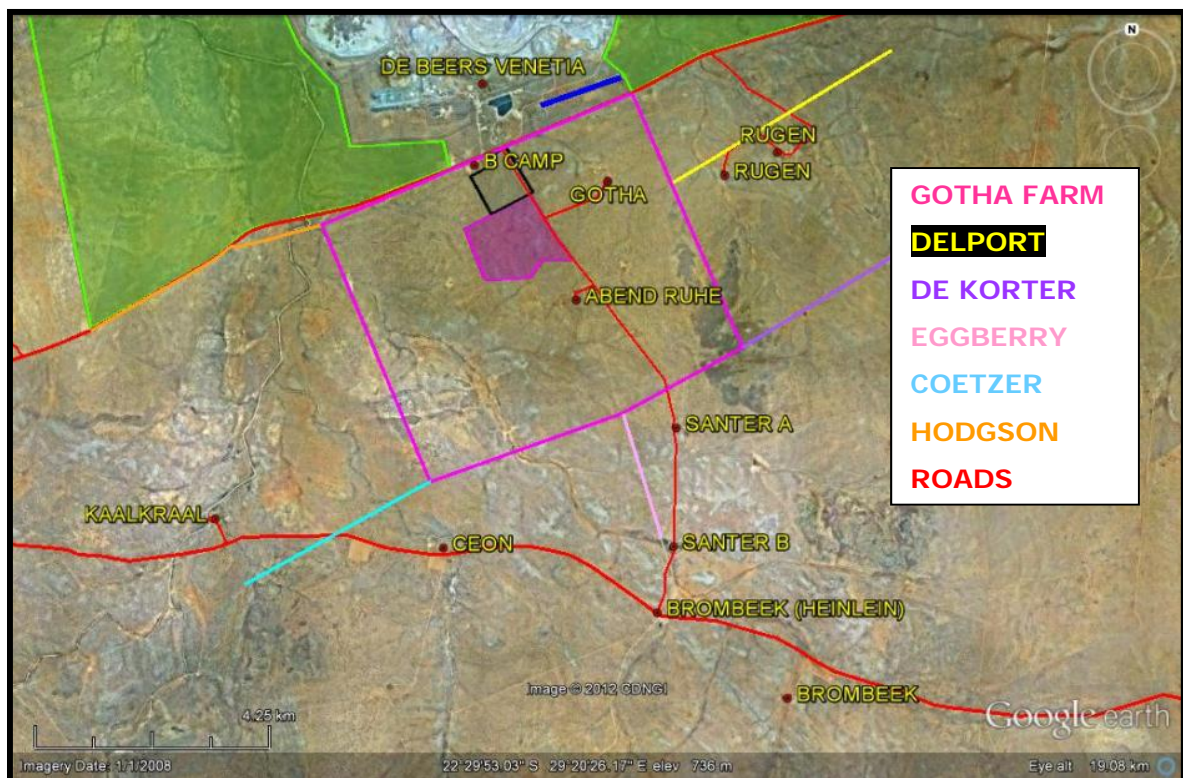


Figure 3.3: Farms adjacent to Gotha

### 3.5.5 De Beers Venetia

De Beers' Venetia mine is located directly to the north of the proposed PVSEF site. Venetia mine was commissioned in 1992, and currently accounts for 80% of De Beers' South African production, and 40% of all diamonds produced in South Africa. Current mining is open-cast, but De Beers envisages moving operations underground around 2018-2021. This would extend the mine's operational lifespan until ca. 2046 (De Beers website).



Figure 3.4: De Beers Venetia in relation to Alldays PVSEF sites

In 2004 Venetia employed 955 people, and recovered 7187300 carats (= 1437.5 kg) of diamonds<sup>22</sup>. The mining operation currently provides ~1 200 permanent opportunities, and an additional on-going ~1 200 opportunities to contractors and sub-contractors. Operations are carried out throughout the year, 24 hours a day, but no workers live on the property. All workers are transported in on a shift-by-shift basis from Musina and Alldays. De Beers makes use of a dedicated bus service operated by a sub-contractor. Contractors make use their own vehicles or chartered mini taxi buses. A large scale new underground mining project is anticipated to commence in 2013. Construction phase employment would peak at around 1000 (Maree, Nyabane – pers. comm).

A small airfield linked to the mine is located just to the north of the Musina Road, less than 1 km from the proposed 20 MW Phase 2 site, and less than 2 km from the Phase 1 75 MW site. The airstrip is used for product export (security requirement) as well as personnel and visitor traffic (Maree – pers. comm).

<sup>22</sup> [www.en.wikipedia.org/wiki/Venetia\\_Diamond\\_Mine](http://www.en.wikipedia.org/wiki/Venetia_Diamond_Mine)

Venetia is located in an environmentally sensitive area and De Beers spent ~ R17m on initial environmental engineering projects. Venetia was also the first South African diamond mine to become ISO 19002 compliant. The 35km-long water supply pipeline to the Limpopo River as well as other service supply pipelines are buried, the mine has a state-of-the-art dust control system, and noise and lighting impacts are minimised. De Beers also established the 360 km<sup>2</sup> Venetia Limpopo Nature Reserve (VLNR) to the north of the mine, and moved a large number of animals from a new mining area to the reserve<sup>23</sup>. Three of the “big five” are currently represented in the VLNR. In addition, endangered African hunting/ wild dog have recently been released into the VLNR.

### 3.5.6 Conservation

As was indicated above, the northern half of Ward 2 area is largely comprised of conservation land uses. These are associated with private conservation areas (from west to east, Vhembe Game Reserve, VLNR, Limpopo Valley Game Reserve), as well as the Mapungubwe National Park and (partially overlapping) Mapungubwe Cultural Landscape and UNESCO World Heritage Site (located ~20 km to the north of the proposed PVSEF site).

The Mapungubwe National Park (MNP), including the Mapungubwe Cultural Landscape and UNESCO World Heritage Site (MCLWHS), is located ~20 km to the north of the proposed PVSEF site, in the area between the R572 and Limpopo River, east of the R521 near Pontdrift (Figure 3.5). Mapungubwe was proclaimed a National Monument in 1999, but the MNP was only established in 2004. The MNP comprises an area of ~280 km<sup>2</sup>, made up of two land parcels separated from each other by De Beers land holdings. The MNP was proclaimed to protect the important historical site of the Mapungubwe Hill complex and other nearby Iron Age villages (such a K2), as well as endemic wildlife (including elephant and large antelope species) and vegetation (including critically endangered riparian vegetation types associated with the Limpopo valley). The Mapungubwe Cultural Landscape, centered around Mapungubwe Hill, was declared a UNESCO World Heritage Site in 2003. The MCLWGS is one of eight world heritage sites in South Africa, and the only one in Limpopo Province. Mapungubwe also forms part of the proclaimed UNESCO Vhembe Biosphere Reserve (listed in 2009).

Initiatives are currently underway to link a number of private and statutory conservation areas in Botswana, Zimbabwe and South Africa into the proposed Limpopo-Shashe Transfrontier Conservation Area (LSTFCA). The MNP would form the core of the LSTFCA. According to an agreement between SANParks and De Beers in 2002, the VLNR would also be integrated into the TFCA<sup>24</sup>. According to South Africa's official gateway website, an agreement of understanding has recently been signed between the three countries, and a tourism development study has already been undertaken<sup>25</sup>.

---

<sup>23</sup> [www.mining-technology.com/projects/de\\_beers/](http://www.mining-technology.com/projects/de_beers/)

<sup>24</sup> [www.environment.gov.za/projprog/tfcas/limpopo\\_shashe.htm](http://www.environment.gov.za/projprog/tfcas/limpopo_shashe.htm)

<sup>25</sup> [www.southafrica.info/about/history/mapungubwe.htm](http://www.southafrica.info/about/history/mapungubwe.htm)



**Figure 3.5: Mapungubwe National Park and proposed Limpopo-Shashe TFCA**  
(Source: SANParks).

### 3.6 HISTORY OF THE AREA

The MLM, including the Alldays PVSEF study area, is rich in cultural history, and includes aspects of recognized international and national cultural significance. Inhabitation of the Limpopo valley by hominids dates back at least 500 000 years<sup>26</sup>. The Soutpansberg and Limpopo valley are rich in San rock art, dating back to 15 000 years before present (BP). The Khoi/ San were displaced by Bantu peoples from around 2300-2000 BP onwards, initially by the Vhangona (most likely ancestors of the Venda), and later the Vhatwanamba, Vhaleya and other Sotho speaking groups. The Bantu introduced crop cultivation and Iron Age technology to the area, including relatively sophisticated mining and metalworking techniques.

The Mapungubwe civilisation, centered on Mapungubwe Hill (“hill of the jackals”) in the western MLM (~20 km north of the Alldays PVSEF site), evolved in the Limpopo-Shashe area from around 2300 BP onwards, reaching a golden age during the early 13<sup>th</sup> century. The fertile Limpopo valley enabled the cultivation of staple crops and the keeping of large herds of stock, consequently, the establishment of a large sedentary population, and the division of labour. The economic basis of Mupungubwe consisted of mining, refining and working of copper, iron and gold, and control of locally abundant ivory supplies – commodities and objects which were then traded directly and indirectly with

<sup>26</sup> [www.sanparks.org](http://www.sanparks.org).

cultures in places as remote as Egypt, Iran, India and China (mainly via Arab, East African and Zimbabwean intermediary traders).

Wealth from ivory, gold and trade, combined with the fertile floodplain of the Limpopo, enabled the creation of a classic riparian/ agricultural class-based society, culminating in the Kingdom of Mapungubwe (ca. 800 -1300). The Kingdom is commonly regarded as the oldest example of a complex, class-based society in Southern Africa, and the first step in the creation of the famous Kingdom of Zimbabwe during the 13<sup>th</sup> century. The structures at Mapungubwe Hill are furthermore commonly regarded as precursors to the Great Zimbabwe complex in southern Zimbabwe (another UNESCO World Heritage site)<sup>27</sup>.

At the height of its glory during the early 13<sup>th</sup> century, the Mupungubwe Hill area is estimated to have supported a settled community of around 5 000 people. It was the regional centre of power, and its extensive territory included the area around the Alldays PVSEF site. When conditions in the Limpopo valley became hotter and drier during the mid-13<sup>th</sup> century, Mapungubwe was abandoned. By 1240 the kingdom was in decline, and the centre of power was shifting north. The bulk of the kingdom's population consequently abandoned the Limpopo-Shashe area, moved into southern/ central Zimbabwe, and became part of the ancestral stock pool of the Shona people.

From about the 14<sup>th</sup> century onwards, Shona speaking peoples in turn crossed the Limpopo into South Africa, settling amongst the ancestral Venda. South of the Limpopo, a distinctive Venda pottery style evolved by the 15<sup>th</sup> century, and TshiVhenda became established as a distinct dialect from ancestral SeSotho by the 16<sup>th</sup> century. By the 18<sup>th</sup> century, a powerful Venda kingdom had evolved (roughly coinciding with what today is the Vhembe district). The kingdom was centred to the south-east of the Musina area, on what today is Vhembe's district seat, Thohoyandou (site of the first Venda capital of D'zata). The study area formed part of the Venda kingdom's outlying territory, and functioned as a source of minerals and game, including elephant (ivory).

European big game hunters and explores first started entering the Vhembe district during the early 19<sup>th</sup> century. One of the first to settle in the district was Coenraad de Buys, who settled near the Soutpansberg in 1820. The European presence north of the Vaal River was boosted by the Great Trek (late 1830's), which eventually resulted the establishment of the Transvaal Boer Republic (ZAR) in the 1850's. During the course of the remaining decades of the 19<sup>th</sup> century, the ZAR progressively increased its territory, both by treaty, as well as through violent annexation. Vhembe - and specifically the Soutpansberg – was the last area to be annexed by the ZAR (1898), effectively the last area to be colonised by Europeans.

European colonial settlement of the Vhembe district initially centred on big game hunting and ivory trading, but was later greatly accelerated by the discovery of rich mineral deposits in the area. Makhado (Louis Trichardt) was proclaimed in 1899. Musina originated around the Messina copper mine which opened in 1905. The town was

---

<sup>27</sup> Mapungubwe has also become a symbol of the African Renaissance, of the recognition of the existence of complex and sophisticated cultures in Southern Africa long before the advent of the European colonial period. In this regard it may be noted that Mapungubwe was the first national heritage site to be declared in terms of the National Heritage Resources Act (1999). The Order of Mapungubwe (2002) – depicting the small iconic gilded (gold leaf pinned onto a wooden core) rhino which was discovered at Mapungubwe during excavations in the 20<sup>th</sup> century – is currently the Republic of South Africa's highest award of honor.

proclaimed in 1915, and first became a municipality in 1968. White ownership of land was established over much of the Musina municipal area by the mid-20<sup>th</sup> century.

Under the Apartheid-era Bantustan policy, much of what today constitutes the eastern and southern Vhembe DM, was proclaimed as the self-governing Bantustan of Venda (1973), with its capital at Thohoyandou (proclaimed in 1979). Small portions of Vhembe were also incorporated into the Gazankulu homeland. Venda was disbanded at the end of the Apartheid era. The northern and western parts of the Vhembe district, including the study area, did not form part of Venda, but of the Northern Transvaal commercial farming area. The bulk of land in the MLM currently remains in the hands of a minority of mainly white commercial farmers.

---

## **SECTION 4: ASSESSMENT OF KEY SOCIAL ISSUES**

---

### **4.1 INTRODUCTION**

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

- Review of project related information, including other specialist studies;
- Experience with renewable energy projects, including solar energy projects

In identifying the key issues the following assumption is made:

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

### **4.2 IDENTIFICATION OF KEY SOCIAL ISSUES**

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

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

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

### **4.3 POLICY AND PLANNING ISSUES**

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

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

- The National Energy Act (No. 34 of 2008);
- The White Paper on the Energy Policy of the Republic of South Africa (December 1998);
- The White Paper on Renewable Energy (November 2003);
- Integrated Resource Plan (IRP) for South Africa (2010-2030);
- Limpopo Provincial Growth and Development Strategy (2009-2014);
- Musina Local Municipality Integrated Development Plan (2012/2013-2017);
- Musina Local Municipality Local Economic Development Strategy (2007).

- Musina Local Municipality Spatial Development Framework (2011).

The findings of the review indicated that solar energy development is strongly supported at national and provincial levels.

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

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

The IRP 2010 also allocates 43% of new energy generation facilities in South Africa to renewables. At a provincial level the LPGDS notes that the Limpopo provincial government should promote development of the provincial renewable energy sector, amongst others by supporting research, information sharing and establishing regulatory and capacity support in facilitating the use of renewable energy. At a local level the MLM IDP identifies the need to promote the use of renewable energy as a key intervention area.

A review of key socio-economic development policy documents indicated a strong overlap between economic development and renewable energy. In this regard, managing the transition towards a low carbon national economy is identified as one of the 9 key national challenges in the 2011 NDP. The NDP recommends expansion and acceleration of commercial renewable energy as a key intervention strategy. With regard to local level development, the review (read together with baseline information provided in Section 3) indicated that employment creation, economic diversification and skilling/training are key priorities for the study area. In this regard, the WEF holds the potential of up to 60 long term employment opportunities, the bulk of which would potentially accrue to members of local communities.

With regard to general siting principles and the Musina spatial economy, the proposed SEF site is located in disturbed landscape context (De Beers Venetia and other infrastructure, for instance the Eskom Venetia substation and associated lines, as well as the Musina road. Distance, vegetation and topography are likely to screen the site from all significant sensitive receptors such as potential scenic routes, Mapungubwe, and game farms in the Alldays district. The Musina LED manager has further confirmed that the SEF would not pose a risk in terms of the LM's strategic tourism development strategy (Dzebu – pers. comm).

In summary, a review of key policy documents indicate strong support for renewable, including SEF, development. In terms of location and siting, the proposed PVSEF would be located in a disturbed landscape context and not in proximity to significant sensitive receptors. At the same time, the proposed development would hold opportunities for addressing key local development priorities, such as employment and SMME development. Based on these factors, it may be concluded that the PVSEF is generally well supported in terms of overall planning fit.



#### 4.4 SOCIAL IMPACTS ASSOCIATED WITH THE CONSTRUCTION PHASE

The key social issues associated with the construction phase include:

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

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

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

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

##### **4.4.1 Creation of employment and business opportunities**

Based on the information provided by the proponent the construction phase for a 75MW PVSEF is expected to extend over a period of 18-24 months and create approximately 291 employment opportunities, depending on the final design. Of this total ~ 60% (175) will be available to low-skilled workers (construction labourers, security staff etc.), 15% (43) to semi-skilled workers (drivers, equipment operators etc.) and 25% (73) to skilled personnel (engineers, land surveyors, project managers etc.). The work associated with the construction phase will be undertaken by contractors and will include the establishment of the PVSEF and the associated components, including, access roads, services and power line.

The majority of the low-skilled employment opportunities associated with the project are likely to benefit members from the local community. In this regard the majority of the beneficiaries are likely to be historically disadvantaged (HD) members of the community. The low education and skills levels in the area may however hamper potential opportunities for local communities. The majority of the skilled and semi-skilled opportunities are likely to be associated with the contractors appointed to construct the proposed PVSEF and the associated infrastructure. The majority of contractors also tend to use their own staff and this may limit the potential for direct employment opportunities for locals during the construction phase. In the absence of specific commitments by the developer to set local employment targets the potential benefits for local communities are likely to be limited.

The total wage bill for the construction phase is estimated to be in the region of R 60 million. This is based on the assumption that the average monthly salary for low skilled, semi-skilled and skilled workers will be in the region of R 5 000, R 8 000 and R 25 000 respectively for a period of 20 months. A percentage of the wage bill will be spent in the local economy and will create opportunities for local businesses in the MLM, including Polokwane and Musina. The sector of the local economy that is most likely to benefit from the proposed development is the local service industry. The potential opportunities for the local service sector would be linked to accommodation, catering, cleaning, transport and security, etc. associated with the construction workers on the site. The majority of construction workers are likely to be accommodated in Musina, which is the closest town to the site. However, due the distance (70km) between the site and Musina

it may be necessary to accommodate workers on the site and or on local guest farms and B&Bs in the area. This will create opportunities for local B&Bs and guest farms and farmers who may want to rent out their houses.

In terms of potential accommodation, there are three facilities in Alldays, namely, At se Gat, the Alldays Hotel, and Manula Lodge. At se Gat is busy renovating and building more rooms, and owner of Manula indicated they could add at least 15 more chalets (Pieter Botes – pers. comm). The Manula Lodge also caters for functions. The guest farm, Abend Ruhe and other neighbouring game farms along the Alldays Road also provide accommodation. Abend Ruhe (45 beds plus tent and caravan stands) is currently fully occupied throughout the year, and the owner has indicated that there is sufficient demand to provide more accommodation (Heinlein – pers. comm). The support for local SMME development is in line with the key local LM and DM policy objectives. The LED Manager for the LML recommended that BioTherm consult with MLM and Blouberg LM to develop a local data base, advertise opportunities and offer assistance with applications, advice on loans, etc. The benefits to the local economy will be confined to the construction period (18-24 months).

The capital expenditure on completion is anticipated to be in the region of R 1.35 billion for a 75 MW facility. In terms of business opportunities for local companies, the expenditure of these sums during the construction phase will create business opportunities for the regional and local economy. However, given the technical nature of the project and high import content associated with solar plants the opportunities for the MLM may be limited. However, opportunities may exist for local contractors and engineering companies in Polokwane and Musina. Implementing the enhancement measures listed below can enhance these opportunities.

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

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

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

<b>Nature:</b> Creation of employment and business opportunities during the construction phase		
	<b>Without Mitigation</b>	<b>With Enhancement</b>
<b>Extent</b>	Local – Regional (2) (Rated as 2 due to potential opportunities for local communities and businesses)	Local – Regional (3) (Rated as 3 due to potential opportunities for local communities and businesses)
<b>Duration</b>	Short Term (2)	Short Term (2)
<b>Magnitude</b>	Low (4)	Low (4)
<b>Probability</b>	Probable (3)	Highly probable (4)
<b>Significance</b>	Low (24)	Medium (36)
<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	
<b>Enhancement :</b> See below		
<b>Cumulative impacts:</b> Opportunity to up-grade and improve skills levels in the area. However, due to relatively small number of local employment opportunities this benefit is likely to be limited.		
<b>Residual impacts:</b> Improved pool of skills and experience in the local area. However, due to relatively small number of local employment opportunities this benefit is likely to be limited.		

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

There is no impact as it maintains the current status quo. The potential employment and economic benefits associated with the proposed PVSEF would therefore be forgone. The potential opportunity costs in terms of the capital expenditure, employment, skills development, and opportunities for local business are therefore regarded as a negative.

### **Recommended enhancement measures**

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

#### **Employment**

- Where reasonable and practical, BioTherm should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. However, due to the low skills levels in the area, the majority of skilled posts are likely to be filled by people from outside the area.
- Where feasible, efforts should be made to employ local contractors that are compliant with Black Economic Empowerment (BEE) criteria;
- Before the construction phase commences BioTherm should meet with representatives from the MLM 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 BioTherm intends following for the construction phase of the project.

- Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the construction phase.
- The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.

### **Business**

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

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

#### **4.4.2 Presence of construction workers in the area**

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

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

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

The provision of accommodation for low and semi-skilled workers was raised as key issue by representative from De Beers, Mr.Vissser, and the MLM LED Manager, Mr. Dzebu. Based on the information collected during the site interviews the option of accommodation construction workers on the site is not supported due to impact on farmer safety and the lack of water and basic services. All of the workers on the De Beers Venetia Mine are accommodated off site in the towns of Musina and Blouberg. At any given time DBV has ~1 200 contractors and sub-contractors (e.g. Basil Read at the moment). The higher skilled workers typically stay on local guest farms during the week, including Abend Ruhe (45 beds). B Camp on Gotha is the only local opportunity for

medium and low-skilled (130 beds). The majority of the workers on Venetia Mine are therefore transported to the sites on a daily basis from Musina and the other towns in the area. The Venetia Mine is also poised to commence with a large, new underground project, which will create employment for ~1 000 workers. The Venetia Mine will therefore employ ~ 2 200 workers, the majority of whom will need to be provided with accommodation off the mine site. The representative from De Beers raised concerns regarding the potential cumulative impact that the construction phase together with Venetia's expansion programme would have in terms of accommodation and services. The representative from De Beers also raised concerns regarding the potential abuse by workers and possibly the contractor of the free bus service to and from the mine that De Beers provides its workers (Davies, Maree – pers. comm).

The MLM LED Manager indicated that the accommodation of workers was likely to be a key issue. In this regard Musina also provides accommodation for a large transitory Zimbabwean population, many of whom work on farms and other mines in the MLM. The LED manager indicated that basic services was likely to be a key issue, specifically with regard to potable water infrastructure in an area that was prone to frequent and severe droughts. Based on the observations during the site visit the potential availability of accommodation in Musina and Alldays appears to be limited. BioTherm will therefore need to liaise with the MLM with regard to the provision of accommodation for construction workers.

The potential risks associated with accommodating construction workers in Musina and the other local towns in the MLM will to some extent be mitigated by the presence of the large numbers of existing workers in these towns. The construction workers associated with the Alldays PVSEF will therefore not represent the introduction of a new element. This does not necessarily mean that the risks will not materialize, but rather that the local communities in Musina and other towns in the MLM are familiar with construction workers and their behavior.

Employing members from the local community to fill the low-skilled job categories can help to reduce the risk and mitigate the potential impacts on the local communities. These workers will be from the local community and form part of the local family and social network and, as such, the potential impact will be low. The use of local residents to fill the low skilled job categories will also reduce the need to house construction workers on the site. Of the total 291 employment opportunities, 218 will be available to low and semi-skilled workers. However, due to the potential mismatch of skills and low education levels, the potential employment opportunities for the members from these local communities may be low.

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

<b>Nature:</b> 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 (3) (Rated as 3 due to potential severity of impact on local communities)	Local (2) (Rated as 1 due to potential severity of impact on local communities)
<b>Duration</b>	Short term for community as a whole (2) Long term-permanent for individuals who may be affected by STD's etc. (5)	Short term for community as a whole (2) Long term-permanent for individuals who may be affected by STD's etc. (5)

<b>Magnitude</b>	Low for the community as a whole (4) High-Very High for specific individuals who may be affected by STD's etc. (10)	Low for community as a whole (4) High-Very High for specific individuals who may be affected by STD's etc. (10)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Low for the community as a whole (27) Moderate-High for specific individuals who may be affected by STD's etc. (57)	Low for the community as a whole (24) Moderate-High for specific individuals who may be affected by STD's etc. (51)
<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	
<b>Mitigation:</b> See below		
<b>Cumulative impacts:</b> 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.		
<b>Residual impacts:</b> See cumulative impacts.		

### Assessment of No-Go option

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

### Recommended mitigation measures

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

- Where possible, BioTherm should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically semi and low-skilled job categories. This will reduce the potential impact that this category of worker could have on local family and social networks;
- BioTherm should consider the establishment of a Monitoring Forum (MF) for the construction phase which should be established before the construction phase commences and should include key stakeholders, including representatives from the local community, local councillors, farmers, and the contractor. The role of the MF would be to monitor the construction phase and the implementation of the recommended mitigation measures. The MF should also be briefed on the potential risks to the local community associated with construction workers;
- BioTherm and the contractor should, in consultation with representatives from the MF, develop a Code of conduct for the construction phase. The code should identify what types of behaviour and activities by construction workers are not permitted. Construction workers that breach the code of good conduct should be dismissed. All dismissals must comply with the South African labour legislation;

- BioTherm and the contractor should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase;
- The movement of construction workers on and off the site should be closely managed and monitored by the contractors. In this regard the contractors should be responsible for making the necessary arrangements for transporting workers to and from the site on a daily basis;
- The contractor should make the necessary arrangements for allowing workers from outside the area to return home over weekends and or on a regular basis during the 18-24 month construction phase. This would reduce the risk posed by construction workers to local family structures and social networks;
- It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay overnight on the site. This will make it possible to manage the potential impacts effectively.

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

The presence of construction workers on the site increases the potential risk of stock theft and poaching. The movement of construction workers on and off the site also poses a potential threat to farm infrastructure, such as fences and gates, which may be damaged. Stock and game losses may also result from gates being left open and/or fences being damaged.

The representative from De Beers indicated that the presence of a large number of construction workers in the area was a concern for the mine (Davies – pers. comm). The manager of Ceon Farm also indicated that theft (diesel, equipment etc.) was an issue in the area (Daneel – pers. com). Concerns were also raised regarding potential poaching for bush meat. Small stock (limited sheep and goats on a number of properties) are also at risk, but are far less valuable than game which may be killed or injured by wire snares (Maree – pers. comm). The increased number of construction workers in the area may result in an increase in poaching etc. However, with effective controls the potential risks can be reduced.

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

<b>Nature:</b> 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 (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 (6) (Due to reliance on agriculture and livestock for maintaining livelihoods)	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 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
<b>Mitigation:</b> See below		
<b>Cumulative impacts:</b> No, provided losses are compensated for		
<b>Residual impacts:</b> See cumulative impacts.		

### Assessment of No-Go option

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

### Recommended mitigation measures

The mitigation measures that can be considered to address the potential impact on livestock, game, and farm infrastructure include:

- BioTherm should enter into an agreement with the affected landowner/s whereby the company will compensate for damages to farm property and disruptions to farming activities. This includes losses associated with stock theft and damage to property etc.;
- BioTherm should investigate the option of establishing a MF (see above) that includes local farmers and develop a Code of Conduct for construction workers. Should such a MF be required it should be established prior to commencement of the construction phase. The Code of Conduct should be signed by BioTherm and the contractors before the contractors move onto site;
- BioTherm should hold contractors liable for compensating farmers and communities in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. This should be contained in the Code of Conduct to be signed between BioTherm, the contractors and neighbouring landowners. The agreement should also cover losses and costs associated with fires caused by construction workers or construction related activities (see below);
- The EMP must outline procedures for managing and storing waste on site, specifically plastic waste that poses a threat to livestock if ingested;
- Contractors appointed by BioTherm should ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms.
- Contractors appointed by BioTherm should ensure that construction workers who are found guilty of stealing livestock, poaching and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation;
- The housing of construction workers on the site should be limited to security personnel.

#### 4.4.4 Increased risk of veld fires

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



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

<b>Nature:</b> Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of veld 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) (Rated as 2 due to potential severity of impact on local farmers)
<b>Duration</b>	Short Term (2)	Short Term (2)
<b>Magnitude</b>	Moderate-High due to reliance on livestock for maintaining livelihoods (8)	Low (4)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Medium (42)	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	
<b>Mitigation:</b> See below		
<b>Cumulative impacts:</b> No, provided losses are compensated for.		
<b>Residual impacts:</b> See cumulative impacts.		

**Assessment of No-Go option**

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

**Recommended mitigation measures**

BioTherm should enter into an agreement with the affected landowners whereby the company will compensate for damages. This includes losses associated veld fires. In addition, the potential increased risk of veld fires can be effectively mitigated. The detailed mitigation measures are outlined in the EMP for the construction and operation phases. The aspects that should be covered include:

- Contractor to ensure that open fires on the site for cooking or heating are not allowed except in designated areas;
- Contractor to ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced. Measures to reduce the risk of fires include clearing working areas and avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high risk dry, windy winter months;
- Contractor to provide adequate fire fighting equipment on-site;
- Contractor to provide fire-fighting training to selected construction staff;
- As per the conditions of the Code of Conduct, in the advent of a fire being caused by construction workers and or construction activities, the appointed contractors must

compensate farmers for any damage caused to their farms. The contractor should also compensate the fire fighting costs borne by farmers and local authorities.

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

#### 4.4.5 Impact of construction related activities

The movement of heavy construction vehicles during the construction phase has the potential to damage roads and create noise, dust, and safety impacts for other road users and local communities in the area. However, the current road-use frequency along the Bridgewater-Musina gravel road to the south of Venetia mine is low.

The potential impacts associated with the construction phase, specifically dust and generation of waste water, and the potential to impact on the environmental monitoring programme at Venetia Mine was raised as a key issue by De Beers. The generation of dust and waste water during the construction phase has the potential to compromise the dust and groundwater monitoring programme at the Venetia Mine. In addition, concerns were raised that the Venetia substation may need to shut down when the PVSEF is connected to the grid. This is a potentially key issue and would impact on daily operations at the mine. In this regard the representative from Be Beers indicated that the potential impact on the mine associated with commissioning needed to be better understood (Davies, pers com.).

The potential social impacts associated with the construction related activities and the movement of construction related traffic can be effectively mitigated. As a result the significance with mitigation is rated to be Low Negative. However, Biotherm and De Beers should meet to discuss the timing of the construction phase and necessary mitigation measures that need to be put in place.

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

<b>Nature:</b> 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	
<b>Mitigation:</b> See below		
<b>Cumulative impacts:</b> If damage to roads is not repaired then this will affect the farming activities in the area and result in higher maintenance costs for vehicles of local farmers and other road users. The costs will be borne by road users who were no responsible for the damage.		

**Residual impacts:** See cumulative impacts

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

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

### **Recommended mitigation measures**

BioTherm should enter into an agreement with the affected landowners whereby the company will compensate for damages. This includes losses associated with damage to local internal farm roads that are affected by the site. In addition, the potential impacts associated with the construction phase and the movement of heavy vehicles can be effectively mitigated. The aspects that should be covered include:

- BioTherm and De Beers should make the necessary arrangements to meet and discuss the timing of the construction phase and necessary mitigation measures that need to be put in place;
- The contractor must ensure that damage caused to roads by the construction related activities, including heavy vehicles, is repaired before the completion of the construction phase. The costs associated with the repair must be borne by the contractor;
- Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers;
- All vehicles must be road-worthy and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.

#### **4.4.6 Damage to and loss of farmland**

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

The owner of Gotha Farm on whose land the current 75 MW site is largely located, Ms Heinlen, indicated that the site (pink area in Figure 4.1) coincided with an established cattle camp on Gotha. Due to its location the camp is centrally located and accessible by road. Gotha has a herd of 200 beef cows, with three calving periods per year (Heinlein – pers. comm). The owner indicated that the camp cannot be relocated to another part of the farm due to its location. The area is also the only portion on Gotha with suitable grass cover during normal rainfall years and where no significant poisonous plants grow. The fencing, watering points, etc. have all been developed for the present use. Based on this, the owner would prefer an alternative site to be considered (yellow area in Figure 4.1). At the same time, the owner of Ceon, located just to the south of Gotha and adjacent to the existing 132 kV line, also indicated he would be interested in a PVSEF on his farm, should BioTherm need to identify an alternative site.



**Figure 4.1: Location of proposed (pink) area and alternative (yellow) area on Gotha Farm**

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

<b>Nature:</b> The activities associated with the construction phase, such as establishment of access roads and the construction camp, movement of heavy vehicles and preparation of foundations for the PVSEF and power lines will damage farmlands and result in a loss of farmlands for future farming activities.		
	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (3)	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>	Moderate, due to importance of farming in terms of local livelihoods (4)	Minor (2)
<b>Probability</b>	Definite (5)	Highly Probable (4)
<b>Significance</b>	High (60)	Low (20)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	No, in case of footprint associated with solar thermal plant	No, in case of footprint associated with solar thermal plant
<b>Irreplaceable loss</b>	Yes, loss of farmland. However,	Yes, loss of farmland. However,

<b>of resources?</b>	disturbed areas can be rehabilitated	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
<b>Mitigation:</b> See below		
<b>Cumulative impacts:</b> 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.		
<b>Residual impacts:</b> 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 option of considering an alternative site (yellow area in Figure 4.1) should be investigated by BioTherm and discussed with the owner of Gotha Farm;
- The footprint associated with the construction related activities (access roads, construction platforms, workshop etc.) should be minimised;
- An Environmental Control Officer (ECO) should be appointed to monitor the establishment phase of the construction phase;
- All areas disturbed by construction related activities, such as access roads on the site, construction platforms, workshop area etc., should be rehabilitated at the end of the construction phase;
- The implementation of a rehabilitation programme should be included in the terms of reference for the contractor/s appointed. The specifications for the rehabilitation programme should be drawn up the Environmental Consultants appointed to undertake the EIA;
- The implementation of the Rehabilitation Programme should be monitored by the ECO.

## 4.5 SOCIAL IMPACTS ASSOCIATED WITH THE OPERATIONAL PHASE

The key social issues affecting the operational phase include:

### Potential positive impacts

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

### Potential negative impacts

- The visual impacts and associated impact on sense of place;
- Potential impact on tourism;
- Potential impacts on operations at Venetia Mine.

#### 4.5.1 Creation of employment and business opportunities

Based on the information from other PVSEF projects the establishment of a 75MW PVSEF will create ~ 60 permanent employment opportunities during the 20 year operational phase. Of this total ~ 30 (50%) will be low skilled (security and maintenance), 10 (17%) semi-skilled and 20 (33%) skilled employees. The majority of the low and semi-skilled work opportunities associated with the operational phase are likely to be taken up by members from the local community. It will be possible to increase the number of local employment opportunities through the implementation of a skills development and training programme linked to the operational phase. Such a programme would support the strategic goals of promoting local employment and skills development contained in the MLM IDP. The LED Manager for the MLM indicated that the project was supported by the MLM and that the opportunities for creating local employment opportunities should be maximized.

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

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

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

<b>Nature:</b> 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)	Low (4)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Medium (30)	Medium (33)
<b>Status</b>	Positive	Positive
<b>Reversibility</b>	N/A	
<b>Irreplaceable loss of resources?</b>	No	
<b>Can impact be enhanced?</b>	Yes	
<b>Enhancement:</b> See below		
<b>Cumulative impacts:</b> 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
<b>Residual impacts:</b> See cumulative impacts

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

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

### **Recommended enhancement measures**

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

- BioTherm should implement a training and skills development programme for locals during the first 5 years of the operational phase. The aim of the programme should be to maximise the number of South African's and locals employed during the operational phase of the project.

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

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

- Education;
- School feeding schemes;
- Training and skills development;
- Support for SMME's.

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

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

<b>Nature:</b> 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>28</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	
<b>Enhancement:</b> See below		
<b>Cumulative impacts:</b> Promotion of social and economic development and improvement in the overall well-being of the community		
<b>Residual impacts:</b> 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 PVSEF plant.

#### **4.5.3 Development of clean, renewable energy infrastructure**

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

<sup>28</sup> Enhancement assumes effective management of the community trust



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

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

<b>Nature:</b> 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>	Minor (2)	Low (4)
<b>Probability</b>	Highly Probable (4)	Highly Probable (4)
<b>Significance</b>	Medium (40)	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	
<b>Enhancement:</b> See below		
<b>Cumulative impacts:</b> Reduce carbon emissions via the use of renewable energy and associated benefits in terms of global warming and climate change.		
<b>Residual impacts:</b> 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 BioTherm should:

- Implement a training and skills development programme for locals during the first 5 years of the operational phase. The aim of the programme should be to maximise the number of South African's employed during the operational phase of the project;

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

The components associated with the proposed facility will have a visual impact and, in so doing, impact on the landscape and rural sense of the place of the area. Care therefore

needs to be taken to ensure that the development of large renewable energy projects not impact on visual character and sense of place of the landscape.

The findings of the Visual Impact Assessment (VIA) for the proposed Alldays PVSEF (Phase 1 and 2) found that the proposed activity will have a **negligible** impact from the *middle* and *background* and a **low** impact from the *foreground* (<1km) (VIA, Zone Land Solutions, April, 2012). In addition, the VIA found that users of the Venetia access road would not see the proposed 100MW (Phase 1 and 2) plant directly from the road as the facility will be set back some 250m. A dense vegetated buffer will also be created around the boundary of the site, especially the 20MW (Phase 2) project site, as this facility will be located closer to the mentioned road. The VIA also found that the area's sense of place has already been impacted due to the adjacent activities, which include the Venetia diamond mine and its associated infrastructure. Based on the findings of the assessment the VIA recommends that the proposed activity be approved subject to the conditions described Environmental Management Programme.

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

<b>Nature:</b> 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 (3)	Probable (3)
<b>Significance</b>	Low (24)	Low (21)
<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	
<b>Enhancement:</b> See below		
<b>Cumulative impacts:</b> Potential impact on current rural sense of place		
<b>Residual impacts:</b> See cumulative impacts		

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

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

#### **Recommended mitigation measures**

The recommendations contained in the VIA should be implemented.

#### **4.5.5 Impact on tourism**

The LPGDP identifies tourism as an important economic sector. However, based on the findings of the VIA the proposed facility is not likely to impact on the tourism sector in the area or the Province. This is due to the location of the proposed PVSEF and the existence of the Venetia Mine and Venetia substation.

In addition, the game farms located to the south and west of Gotha (Ceon, Kaalkraal) obtain access from (and are orientated towards) the Brombeek Road, and, as such, are unlikely to be affected by the project. The site will be screened from these areas by the natural vegetation and topography. The two Rugen properties to the east of Gotha (De Korter, Delport) are not inhabited by the owners, and do not accommodate any tourism or commercial hunting related activities. The provisionally identified scenic roads (Alldays and Pontdrift Roads) and Mapungubwe are both located at a distance from the site and would be screened by the natural vegetation and topography in the area. Mapungubwe, which is the key tourist attraction in the region, would not be affected. The LED manager also indicated that the proposed site would not impact on tourism in the area (Dzebu – pers. comm). The significance of this issue is therefore rated as low negative. In some instances the plant may also attract tourists to the area. However, the significance of this potential benefit is also rated as low positive.

**Table 4.11: Impact on tourism**

<b>Nature:</b> Potential impact of the solar thermal plant 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	
<b>Enhancement:</b> See below		
<b>Cumulative impacts:</b> Potential negative and or positive impact on tourism in the Local Municipality Area.		
<b>Residual impacts:</b> See cumulative impacts		

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

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

#### **Recommended enhancement measures**

In terms of mitigating the visual impacts, it is virtually impossible to hide the facility. The impact on the sense of place of the area cannot therefore be effectively mitigated. In terms of efforts to enhance the proposed benefits to tourism:

- BioTherm should liaise with representatives from the MLM and local tourism representatives to raise awareness of the proposed facility;
- BioTherm should investigate the option of establishing a renewable energy interpretation centre at entrance to the site. The centre should include a viewing area where passing visitors can stop and view the site.

#### **4.5.6 Potential impacts on operations at Venetia Mine**

The representatives from Venetia Mine, Mr Davies and Maree, raised a number of issues of concern. These issues do not necessarily represent impacts, but rather concerns that will need to be addressed by BioTherm in consultation with Venetia Mine. The key concerns raised by De Beers include:

- Brand risk. Initial concern around the use of the Venetia name has been addressed. However, there is concern that the public may see the PVSEF as part of the operations at Venetia Mine. The implications of this and opinions are divided between positive (green energy) and negative (some people may accuse De Beers of trying to link operations to the PVSEF and claim goodwill);
- Impacts on Venetia Mines monitoring programmes (see comments under construction phase).
- Potential impact on access to Venetia due to link-in power line (Alternative 2). This would be addressed by simply ensuring that any lines linking with the Venetia substation will be equal or higher than the existing lines;
- Land use compatibility. Concern that blasting activities at Venetia have the potential to impact on the PV structures and damage foundations etc. This issue will need to be noted by BioTherm. Venetia Mine cannot be held accountable for damage related to existing activities taking place on the mine;
- Water use and water quality management issues. This issue was also raised by a number of other parties in the area and is linked to the use of water for cleaning etc. Operational water use associated with on-going panel washing operations (150 ha footprint) and spillage, disposal, etc. of soaps, detergents, etc. may impact on water supply and groundwater resource quality upstream from Venetia Mine operations. This would also have implications for Venetia's water monitoring programme and its results;
- Potential impacts on use of Venetia Mine airfield. The airstrip is located <1 km and <2 km north east of the proposed 20 MW and 75MW Phases and is used for all product export (security) and by personnel and visitors. Concerns that the PVSEF may pose a safety risk (reflective glare/ reflection, electronic interference, approach constraints). Venetia Mine has indicated that they would like this issue to be pursued not only with CA authority, but also Anglo American's aircraft division (Davies, Maree – pers. comm).

#### **Recommended mitigation measures**

Representatives from BioTherm and De Beers should meet to discuss these issues and identify appropriate mitigation measures.

#### **4.6 ASSESSMENT OF POWER LINE OPTIONS**

Two power line alternatives are proposed with regard to the Eskom grid.

- Alternative 1, the preferred alternative, would entail linking directly into the existing 132 kV line traversing Gotha from the proposed ~400 m<sup>2</sup> substation;

- Alternative 2 would entail a short overhead 132 kV overhead linking line to the Eskom Venetia substation located just to the north of the Musina road (Figure 1.8).

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

There is very little difference between Alternative 1 and 2. However, Alternative 1 is the preferred alternative due to the potential for reduced impact on movement of vehicles associated with Venetia Mine.

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

<b>Nature:</b> 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	
<b>Enhancement:</b> See below		
<b>Cumulative impacts:</b> Limited visual and impact on sense of place		
<b>Residual impacts:</b> See cumulative impacts		

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

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

#### **Recommended mitigation measures**

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

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

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

The No-Development option would represent a lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy. Given South Africa's position as one of the highest per capita producer of carbon emissions in the world, this would represent a negative social cost. However, as indicated above, the overall contribution of Phase 1 (75MW) of BioTherm Alldays PVSEF to South Africa's total energy requirements will be relatively small. In addition, the current application is not unique. The potential contribution of the proposed BioTherm Alldays PVSEF should therefore be regarded as valuable, but should not be overestimated.

The No-Development option would also result in a loss in employment opportunities associated with both the construction and operational phase. In addition, the benefits for the local community in the area associated with the establishment of a Community Trust funded by revenue generated from the sale of energy from the PVSEF would be forfeited. The revenue from the proposed PVSEF plant can be used to support a number of social and economic initiatives in the area. These benefits would be forgone if the proposed PVSEF plant is not developed. Given the limited economic opportunities in the area this would represent a negative social cost for the local community.

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

<b>Nature:</b> The no-development option would result in the lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy. The No-Development option would also result in the loss of the benefits to the local community and economy associated with the creation of employment opportunities and the establishment of a Community Trust.		
	<b>Without Mitigation</b>	<b>With Enhancement<sup>29</sup></b>
<b>Extent</b>	Local-International (3)	Local-International (4)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	Low (4)	Low (4)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Medium(33)	Medium (36)
<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	
<b>Enhancement:</b> See below		
<b>Cumulative impacts:</b> Reduce carbon emissions via the use of renewable energy and associated benefits in terms of global warming and climate change.		
<b>Residual impacts:</b> 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.

<sup>29</sup> Enhancement assumes development of the proposed PVSEF

However, the impact of large solar facilities on the sense of place and landscape are issues need to be addressed in the location, design and layout of the proposed plant.

#### 4.8 ASSESSMENT OF CUMULATIVE IMPACTS

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

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

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

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

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

with and affinity for the large, undisturbed open spaces that are characteristic of the South African landscape. The concerns raised with regard to wind farms and the impact on landscapes are also likely to apply to solar facilities.

The impact of solar facilities on the landscape is therefore likely to be a key issue in South Africa, specifically given South African's strong attachment to the land and the growing number of solar plant applications. With regard to the area, there do not appear to any other PVSEF projects proposed in the immediate vicinity of the site. The potential for significant cumulative impacts is therefore likely to be low. In addition, the site is located adjacent to De Beers Venetia diamond mine. The areas sense of place has therefore already been negatively impacted. However, the Limpopo Environmental Authorities should be aware of the potential cumulative impacts associated with the establishment of renewable energy facilities in the area when evaluating applications.

Representatives from Venetia Mine have indicated that the potential exists for potential cumulative light and visual impacts associated with the PVSEF and the Venetia Mine. These impacts would affect game farms in the general area and the Vhembe Biosphere Reserve. Based on the observations during the site visit it would appear that the potential for cumulative visual impacts is limited.

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

<b>Nature:</b> Visual impacts associated with the establishment of more than one solar thermal plant and the potential impact on the areas rural sense of place and character of the landscape.		
	<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	
<b>Enhancement:</b> See below		
<b>Cumulative impacts:</b> 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.		
<b>Residual impacts:</b> See cumulative impacts		

#### Assessment of No-Go option

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

#### Recommended mitigation measures

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



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

#### 4.9 ASSESSMENT OF DECOMMISSIONING PHASE

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

In addition, the social impacts associated with final decommissioned are likely to be limited due to the relatively small number of permanent employees (60) affected. The potential impacts associated with the decommissioning phase can also be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be Low (negative).

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

**Table 4.15: Social impacts associated with decommissioning**

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

### **Recommended mitigation measures**

The following mitigation measures are recommended:

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

---

## **SECTION 5: KEY FINDINGS AND RECOMMENDATIONS**

---

### **5.1 INTRODUCTION**

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

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

### **5.2 SUMMARY OF KEY FINDINGS**

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

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

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

#### **5.2.1 Policy and planning issues**

The key documents reviewed included:

- The National Energy Act (2008);
- The White Paper on the Energy Policy of the Republic of South Africa (December 1998);
- The White Paper on Renewable Energy (November 2003);
- Integrated Resource Plan (IRP) for South Africa (2010-2030);
- Limpopo Provincial Growth and Development Strategy (2009-2014);
- Musina Local Municipality Integrated Development Plan (2012/2013-2017);
- Musina Local Municipality Local Economic Development Strategy (2007).
- Musina Local Municipality Spatial Development Framework (2011).

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

#### **5.2.2 Construction phase**

The key social issues associated with the construction phase include:

### **Potential positive impacts**

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

Based on the information from other solar energy projects the construction phase for a 75MW PVSEF is expected to extend over a period of 18-24 months and create approximately 291 employment opportunities, depending on the final design. Of this total ~ 68% (198) will be available to low-skilled workers (construction labourers, security staff etc.) and semi-skilled workers (drivers, equipment operators etc.) and 32% (93) to skilled personnel (engineers, land surveyors, project managers etc.). The total wage bill for the construction phase is estimated to be in the region of R 60 million. A percentage of the wage bill will be spent in the local economy and will create opportunities for local businesses in the MLM.

The work associated with the construction phase will be undertaken by contractors and will include the establishment of the PVSEF and the associated components, including, access roads, services and power line. Given the proximity of the site to Musina the majority of the low and semi-skilled employment opportunities are likely to benefit members from the local community. The majority of the beneficiaries are also likely to be historically disadvantaged (HD) members of the community.

The capital expenditure on completion is anticipated to be in the region of R1.35 billion for a 75MW facility. However, given the technical nature of the project and high import content associated with solar energy projects the potential opportunities for the MLM economy will be limited. Opportunities are, however, likely to exist for local contractors and engineering companies in Musina. The sector of the local economy that is most likely to benefit from the proposed development is the local service industry. The potential opportunities for the local service sector would be linked to accommodation, catering, cleaning, transport and security, etc. associated with the construction workers on the site. The majority of non-local construction workers are likely to be accommodated in Musina and on local guest farms in the area. This will create opportunities for local hotels, B&Bs and guest farms owners.

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

### **Potential negative impacts**

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

The significance of the potential negative impacts with mitigation was assessed to be of Low significance. The majority of the potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented. However, the impact on individuals who are directly impacted on by construction

workers and or job seekers (i.e. contract HIV/ AIDS) was assessed to be of Medium-High negative significance. However, at a community level the risk posed by construction workers to local family structures and social networks is regarded as low. Table 5.1 summarises the significance of the impacts associated with the construction phase.

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

<b>Impact</b>	<b>Significance No Mitigation</b>	<b>Significance With Mitigation</b>
<b>Creation of employment and business opportunities</b>	Low (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>Risk of stock theft, poaching and damage to farm infrastructure</b>	Medium (Negative impact)	Low (Negative impact)
<b>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>	High (Negative impact)	Low (Negative impact)

### 5.2.3 Operational phase

The key social issues affecting the operational phase include:

#### Potential positive impacts

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

The total number of permanent employment opportunities is estimated to be in the region of 60. Of this total approximately 80% will be low and medium-skilled and 20% high skilled positions. The majority of the beneficiaries are therefore likely to be historically disadvantaged (HD) members of the community. Over time it will also be possible to increase the number of local employment opportunities through the implementation of a skills development and training programme linked to the operational phase. Such a programme would support the strategic goals of promoting local employment and skills development contained in the MLM IDP and the LPGDP.

The establishment of a Community Trust funded by revenue generated from the sale of energy from the proposed PVSEF also creates an opportunity to support local economic development in the area. BioTherm has indicated that they are committed to establishment of a community trust. Community Trusts provide an opportunity to generate a steady revenue stream that is guaranteed for a 20 year period. The revenue

from the proposed PVSEF plant can be used to support a number of social and economic initiatives in the area, including:

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

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

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

#### **Potential negative impacts**

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

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

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

<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>Benefits associated with the establishment of a community trust</b>	Medium (Positive impact)	High (Positive impact)
<b>Establishment of infrastructure for the generation of renewable energy</b>	Medium (Positive impact)	Medium (Positive impact)
<b>Visual impact and impact on sense of place</b>	Low (Negative impact)	Low (Negative impact)
<b>Impact on tourism</b>	Low (Positive and Negative)	Low (Positive and Negative)

#### **5.2.4 Assessment of cumulative impacts**

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

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

#### **5.2.5 Transmission line options**

Two power line alternatives are proposed with regard to the Eskom grid.

A new on-site substation to connect via a loop in loop out to the Soutpan/Venetia 1 132 kV power line to evacuate the power from the facility into the Eskom grid. The alternative would be to construct a 132kV connection line (up to 2 km), parallel to existing power line to the Venetia substation. (Figure 1.8).

There is very little difference between Alternative 1 and 2. However, Alternative 1 is the preferred alternative due to the potential for reduced impact on movement of vehicles associated with Venetia Mine.

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

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

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

#### **5.2.7 Decommissioning phase**

Due to the relatively small number of people affected (~60) the social impacts associated with the decommissioning of the facility are likely to be low. In addition, the potential impacts can be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be Low (negative).

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

companies to allocate sufficient funds during the operational phase to cover the costs of rehabilitation and closure. BioTherm have indicated that the sale of scrap metal etc. will be used to cover the costs of rehabilitation.

### **5.3 CONCLUSIONS AND RECOMMENDATIONS**

The findings of the SIA indicate that the development of Phase 1 (75MW) of the proposed BioTherm Alldays PVSEF plant will create employment and business opportunities for locals during both the construction and operational phase of the project. The establishment of a Community Trust funded by revenue generated from the sale of energy from the proposed PVSEF also creates an opportunity to support local economic development in the area. This represents a significant social benefit for an area where there are limited opportunities.

The findings of the SIA also indicate that a number of concerns identified by De Beers (Venetia Diamond Mine) need to be addressed in consultation with BioTherm. It is therefore recommended that BioTherm meet with representatives from De Beers to discuss these issues.

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

### **5.4 IMPACT STATEMENT**

The findings of the SIA undertaken for Phase 1 (75MW) of the proposed BioTherm Alldays PVSEF indicate that the development will create employment and business opportunities for locals during both the construction and operational phase of the project. The establishment of a Community Trust also creates an opportunity to support local economic development in the area. The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the challenges created by climate change, represents a positive social benefit for society as a whole.

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





## ANNEXURE A

### Personal

- Botes, Mr Pieter and Ms Cecile (17, 18-10-12). Owners: Manula Lodge, Alldays.
- Coetzer, Mr Hennie (17-10-12). Owner: Ceon Farm.
- Davies, Mr. Allan (18-10-12). Head Electrical Engineer: De Beers Venetia.
- Daneel, Ms. Franci (17-10-12). Manager: Ceon Farm.
- Dzebu, Mr. Albert (19-10-12). LED Manager: Musina Local Municipality.
- Heinlein, Ms. Marthie (18-10-12). Owner: Gotha Farm, Abend Ruhe Lodge, Brombeek Farm.
- Maree, Mr. Ralton (18-10-12). Head Environmental Management: De Beers Venetia.
- Nyabane, Bonani (18-10-12). Public and Corporate Affairs Coordinator: De Beers Venetia.
- Vissser, Mr. PP (18-10-12). Environmental Control Officer: De Beers Venetia.
- Willem (17-10-12). Co-owner/ manager: At se Gat, Alldays.

### References

- Erasmus, BJP (1995). *Oppad in Suid-Afrika* (Johannesburg, Jonathan Ball).
- IDC of SA, DBSA, TIP (2011). *Green Jobs. An Estimate of the Direct Employment Potential of a Greening South African Economy.*
- Limpopo Provincial Government (2009-2014). *Limpopo Growth and Development Strategy.*
- Musina Local Municipality (2012). *Integrated Development Plan – 2012/ 2013-2017.*
- Musina Local Municipality (2011). *Musina Local Municipality Spatial Development Framework.*
- Musina Local Municipality (2007). *Local Economic Development Strategy.*
- Republic of South Africa (2011). *White Paper on National Climate Change Reponse Strategy.*
- 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*;
- Savannah Environmental (Pty) Ltd (August 2012). *Proposed Alldays Photovoltaic (PV)/ Concentrated Photovoltaic (CPV) Solar Energy Facility on Gotha Farm, Phase 1, Limpopo Province.*
- University of the Free State: Centre for Development Support (2007). *The Arid Areas Programme – Volume 1: District Socio-Economic Profile and Development Plans.*
- Zone Land Solutions (April, 2012). *Visual Impact Assessment for Alldays PVSEF*

### Internet sources

- [www.debeersgroup.com/Operations/Mining/Mining-Operations/De-Beers-Consolidated-Mines/Venetia/](http://www.debeersgroup.com/Operations/Mining/Mining-Operations/De-Beers-Consolidated-Mines/Venetia/)
- [www.dehoopdam.co.za](http://www.dehoopdam.co.za)
- [www.environment.gov.za/projprog/tfcas/limpopo\\_shashe.htm](http://www.environment.gov.za/projprog/tfcas/limpopo_shashe.htm)
- [www.golimpopo.com](http://www.golimpopo.com)
- [www.krugerpark.co.za/africa\\_venda.html](http://www.krugerpark.co.za/africa_venda.html)
- [www.limpopobusiness.co.za](http://www.limpopobusiness.co.za)
- [www.Limpopo.gov.za](http://www.Limpopo.gov.za)
- [www.mining-technology.com/projects/de\\_beers/](http://www.mining-technology.com/projects/de_beers/)

- [www.safarinow.com/destinations/musina\(messina\)/NatureReserves/Venetia-Limpopo-Nature-Reserve.aspx](http://www.safarinow.com/destinations/musina(messina)/NatureReserves/Venetia-Limpopo-Nature-Reserve.aspx)
- [www.sanparks.org/parks/mapungubwe/](http://www.sanparks.org/parks/mapungubwe/)
- [www.saexplorer.co.za/south-africa/distance/travel\\_distance\\_calculator](http://www.saexplorer.co.za/south-africa/distance/travel_distance_calculator)
- [www.sa-venues.com/attractions/m/musina.php](http://www.sa-venues.com/attractions/m/musina.php)
- [www.southafrica.info/about/geography/limpopo.htm](http://www.southafrica.info/about/geography/limpopo.htm)
- [http://www.til.co.za/doing\\_busi.php](http://www.til.co.za/doing_busi.php)
- [www.unesco.org](http://www.unesco.org)
- [www.vhembe.gov.za](http://www.vhembe.gov.za)
- [www.en.wiki.org](http://www.en.wiki.org)
- 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).

## ANNEXURE C

### ENVIRONMENTAL MANAGEMENT PROGRAMME: SIA

#### CONSTRUCTION PHASE

##### Creation of employment and business opportunities

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

<b>Project component/s</b>	Construction and establishment activities associated with the establishment of the PV facility, including infrastructure etc.		
<b>Potential Impact</b>	The opportunities and benefits associated with the creation of local employment and business should be maximised.		
<b>Activity/risk source</b>	The employment of outside contractors to undertake the work and who make use of their own labour will reduce the employment and business opportunities for locals. Employment of local labour will maximise local employment opportunities.		
<b>Mitigation: Target/Objective</b>	BioTherm, in discussions with the MLM, should aim to employ a minimum of 80% of the low-skilled workers from the local area. This should also be made a requirement for all contractors. BioTherm should also develop a database of local BEE service providers		
<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>	
<ul style="list-style-type: none"> <li>Attempt to employ a minimum of 80% of the low-skilled workers are sourced from the local area;</li> <li>Where required, implement appropriate training and skills development programmes prior to the initiation of the construction phase to ensure that 80% target is met.</li> <li>Skills audit to be undertaken to determine training and skills development requirements;</li> <li>Develop a database of local BEE service providers and ensure that they are informed of tenders and job opportunities;</li> <li>Identify potential opportunities for local businesses</li> </ul>	<ul style="list-style-type: none"> <li>BioTherm &amp; contractors</li> <li>BioTherm</li> <li>BioTherm</li> <li>BioTherm</li> <li>BioTherm</li> </ul>	<ul style="list-style-type: none"> <li>Employment and business policy document that sets out local employment targets to be in place before construction phase commences.</li> <li>Where required, training and skills development programmes to be initiated prior to the initiation of the construction phase.</li> <li>Skills audit to determine need for training and skills development programme undertaken within 1 month of commencement of construction phase commences.</li> <li>Database of potential local BEE services providers to be completed before construction phase commences.</li> </ul>	

Performance Indicator	<ul style="list-style-type: none"> <li>• Employment and business policy document that sets out local employment and targets completed before construction phase commences;</li> <li>• 80% of semi and unskilled labour locally sourced.</li> <li>• Database of potential local BEE services providers in place before construction phase commences.</li> <li>• Skills audit to determine need for training and skills development programme undertaken within 1 month of commencement of construction phase.</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>• BioTherm and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.</li> </ul>

### Impact associated with presence of construction workers

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

Project component/s	Construction and establishment activities associated with the establishment of the PV facility, including infrastructure etc.	
Potential Impact	The presence of construction workers who live outside the area and who are housed in local towns can affect family structures and social networks.	
Activity/risk source	The presence of construction workers can affect negatively on family structures and social networks, especially in small, rural communities.	
Mitigation: Target/Objective	To avoid and or minimise the potential impact of construction workers on the local community. This can be achieved by maximising the number of locals employed during the construction phase and minimising the number of workers housed on the site.	
Mitigation: Action/control	Responsibility	Timeframe
<ul style="list-style-type: none"> <li>• Attempt to ensure that a minimum of 80% of the low-skilled workers are sourced from the local area. This should be included in the tender documents. Construction workers should be recruited from the local area in and around the Musina.</li> <li>• Local construction workers should be able to provide proof of having lived in the area for five years or longer.</li> <li>• Identify local contractors who are qualified to</li> </ul>	<ul style="list-style-type: none"> <li>• BioTherm and contractors</li> <li>• BioTherm</li> <li>• BioTherm</li> </ul>	<ul style="list-style-type: none"> <li>• Identify suitable local contractors prior to the tender process for the construction phase.</li> <li>• Tender documents for contractors include conditions set out in SIA, including transport of workers home over weekends, transportation of workers home on completion of construction phase, establishment of MF etc.,</li> </ul>

<p>undertaken the required work.</p> <ul style="list-style-type: none"> <li>• Develop a Code of Conduct to cover the activities of the construction workers housed on the site.</li> <li>• Ensure that construction workers housed attend a brief session before they commence activities. The aim of the briefing session is to inform them of the rules and regulations governing activities on the site as set out in the Code of Conduct.</li> <li>• Ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct.</li> <li>• Ensure that construction workers who are found guilty of breaching the Code of Conduct are dismissed. All dismissals must be in accordance with South African labour legislation.</li> <li>• Provide opportunities for workers to go home over weekends. The cost of transporting workers home over weekends and back to the site should be borne by the contractors.</li> <li>• On completion of the construction phase all construction workers must be transported back to their place of origin within two days of their contract ending. The costs of transportation must be borne by the contractor.</li> </ul>	<ul style="list-style-type: none"> <li>• BioTherm</li> <li>• BioTherm and contractors</li> <li>• BioTherm and contractors</li> <li>• Contractors</li> <li>• Contractors</li> <li>• Contractors</li> </ul>	<ul style="list-style-type: none"> <li>• MF established before construction phase commences.</li> <li>• Code of Conduct drafted before construction phase commences.</li> <li>• Briefing session for construction workers held before they commence work on site.</li> </ul>
<p><b>Performance Indicator</b></p>	<ul style="list-style-type: none"> <li>• Employment policy and tender documents that sets out local employment and targets completed before construction phase commences;</li> <li>• 80% of semi and unskilled labour locally sourced;</li> <li>• Local construction workers employed have proof that they have lived in the area for five years or longer;</li> <li>• Tender documents for contractors include recommendations for construction camp;</li> <li>• MF set up prior to implementation of construction phase;</li> <li>• Code of Conduct drafted before commencement of</li> </ul>	



	<p>construction phase;</p> <ul style="list-style-type: none"> <li>Briefing session with construction workers held at outset of construction phase;</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>BioTherm and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.</li> </ul>

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

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

Project component/s	Construction and establishment activities associated with the establishment of the PV facility, including infrastructure etc.	
Potential Impact	Impact on safety of farmers and communities (increased crime etc.) and potential loss of livestock due to stock theft by construction workers and also damage to farm infrastructure, such as gates and fences.	
Activity/risk source	The presence of construction workers on the site can pose a potential safety risk to local farmers and communities and may result in stock thefts. The activities of construction workers may also result in damage to farm infrastructure.	
Mitigation: Target/Objective	To avoid and or minimise the potential impact on local communities and their livelihoods.	
Mitigation: Action/control	Responsibility	Timeframe
<ul style="list-style-type: none"> <li>Consider establishing a MF with the adjacent farmers and develop a Code of Conduct for construction workers.</li> <li>Inform all workers of the conditions contained in the Code of Conduct.</li> <li>Dismiss all workers that do not adhere to the code of conduct for workers. All dismissals must be in accordance with South African labour legislation.</li> <li>Compensate farmers / community members at full market related replacement cost for any losses, such as livestock, damage to infrastructure etc.</li> </ul>	<ul style="list-style-type: none"> <li>BioTherm and contractors</li> <li>BioTherm</li> <li>BioTherm and contractor</li> <li>Contractors</li> </ul>	<ul style="list-style-type: none"> <li>Establish MF before construction phase commences.</li> <li>Develop Code of Conduct prior to commencement of construction phase. The Code of Conduct should be signed by BioTherm and the contractors before the contractors move onto site;</li> <li>Inform all construction workers of Code of Conduct requirements before construction phase commences.</li> <li>Compensate farmers / community members within 1 month of claim being verified by BioTherm and or Contractor/s.</li> </ul>
Performance Indicator	<ul style="list-style-type: none"> <li>Community MF in place before construction phase commences.</li> <li>Code of Conduct developed and approved prior to commencement of construction phase.</li> <li>All construction workers made aware of Code of Conduct within first week of being employed.</li> </ul>	

	<ul style="list-style-type: none"> <li>• Compensation claims settled within 1 month of claim being verified by Community MF.</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>• BioTherm and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.</li> </ul>

### Increase risk of veld fires

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

Project component/s	Construction and establishment activities associated with the establishment of PV facility, including infrastructure etc.	
Potential Impact	Veld fires can pose a personal safety risk to local farmers and communities, and their homes, crops, livestock and farm infrastructure, such as gates and fences.	
Activity/risk source	The presence of construction workers and their activities on the site can increase the risk of veld fires.	
Mitigation: Target/Objective	To avoid and or minimise the potential risk of veld fires on local communities and their livelihoods.	
Mitigation: Action/control	Responsibility	Timeframe
<ul style="list-style-type: none"> <li>• Ensure that open fires on the site for cooking or heating are not allowed except in designated areas.</li> <li>• Provide adequate fire fighting equipment onsite.</li> <li>• Provide fire-fighting training to selected construction staff.</li> <li>• Compensate farmers / community members at full market related replacement cost for any losses, such as livestock, damage to infrastructure etc.</li> <li>• Join Fire Protection Agency</li> </ul>	<ul style="list-style-type: none"> <li>• BioTherm and contractors</li> <li>• BioTherm and contractors</li> <li>• Contractors</li> <li>• Contractors</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure that these conditions are included in the Construction Phase EMP.</li> <li>• Ensure that designated areas for fires are identified on site at the outset of the construction phase.</li> <li>• Ensure that fire fighting equipment and training is provided before the construction phase commences.</li> <li>• Compensate Farmers within 1 month of claim being verified by MF.</li> </ul>
Performance Indicator	<ul style="list-style-type: none"> <li>• Conditions contained in the Construction EMP.</li> <li>• Designated areas for fires identified on site at the outset of the construction phase.</li> <li>• Fire fighting equipment and training provided before the construction phase commences.</li> <li>• Compensation claims settled within 1 month of claim being verified by Community MF.</li> </ul>	
Monitoring	<ul style="list-style-type: none"> <li>• BioTherm and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.</li> </ul>	

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

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

<b>Project component/s</b>	Construction and establishment activities associated with the establishment of the PV facility, including infrastructure etc.	
<b>Potential Impact</b>	Heavy vehicles can generate noise and dust impacts. Movement of heavy vehicles can also damage roads.	
<b>Activity/risk source</b>	The movement of heavy vehicles and their activities on the site can result in noise and dust impacts and damage roads.	
<b>Mitigation: Target/Objective</b>	To avoid and or minimise the potential noise and dust impacts associated with heavy vehicles, and minimise damage to roads.	
<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
<ul style="list-style-type: none"> <li>• Implement dust suppression measures for heavy vehicles such as wetting roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.</li> <li>• Ensure that all vehicles are road-worthy; drivers are qualified and are made aware of the potential noise, dust and safety issues.</li> <li>• Ensure that drivers adhere to speed limits. Vehicles should be fitted with recorders to record when vehicles exceed the speed limit.</li> <li>• Ensure that damage to roads is repaired before completion of construction phase;</li> </ul>	<ul style="list-style-type: none"> <li>• Contractors</li> <li>• Contractors</li> <li>• Contractors</li> <li>• Contractors</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure that these conditions are included in the Construction Phase EMP.</li> <li>• Ensure that dust suppression measures are implemented for all heavy vehicles that require such measures during the construction phase commences.</li> <li>• Ensure that drivers are made aware of the potential safety issues and enforcement of strict speed limits when they are employed.</li> <li>• Fit all heavy vehicles with speed monitors before they are used in the construction phase.</li> <li>• Assess road worthy status of heavy vehicles at the outset of the construction phase and on a monthly basis thereafter;</li> <li>• Ensure that damage to roads is repaired before completion of construction phase.</li> </ul>
<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>• Conditions included in the Construction Phase EMP.</li> <li>• Dust suppression measures implemented for all heavy vehicles that require such measures during the construction phase commences.</li> <li>• Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed.</li> <li>• All heavy vehicles equipped with speed monitors before they are used in the construction phase.</li> <li>• Road worthy certificates in place for all heavy vehicles at outset of construction phase and up-dated on a monthly basis.</li> </ul>	

<b>Monitoring</b>	<ul style="list-style-type: none"> <li>• BioTherm and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.</li> </ul>
-------------------	--

### Impact on farming activities

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

<b>Project component/s</b>	Construction phase activities associated with the establishment of the PV facility and associated infrastructure.	
<b>Potential Impact</b>	The footprint of the solar energy plant and associated infrastructure will result in a loss of land that will impact on farming activities on the site.	
<b>Activity/risk source</b>	The footprint taken up by the solar energy plant and associated infrastructure.	
<b>Mitigation: Target/Objective</b>	To minimise the loss of land taken up by the PV facility and associated infrastructure and to enable farming activities to continue where possible, specifically grazing.	
<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
<ul style="list-style-type: none"> <li>• Minimise the footprint of the PV facility and the associated infrastructure.</li> <li>• Rehabilitate disturbed areas on completion of the construction phase. Details of the rehabilitation programme should be contained in the EMP.</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor and BioTherm</li> <li>• ECO and Contractors</li> </ul>	<ul style="list-style-type: none"> <li>• Footprint for PV facility should be defined in the Construction EMP before construction phase commences.</li> <li>• Rehabilitation should be ongoing and completed within 3 months of the completion of the construction phase.</li> <li>• Meeting/s with local farmers to discuss lease options should take place during the construction phase.</li> </ul>
<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>• Footprint of PV facility included in the Construction Phase EMP.</li> <li>• Meeting/s held with farmers during construction phase.</li> </ul>	
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>• ECO must monitor indicators listed above to ensure that they have been met for the construction phase.</li> </ul>	

## OPERATIONAL PHASE

### Creation of employment and business opportunities

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

<b>Project component/s</b>	Day to day operational activities associated with the PV facility, including maintenance etc.	
<b>Potential Impact</b>	The opportunities and benefits associated with the creation of local employment and business should be maximised	
<b>Activity/risk source</b>	The operational phase of the PV facility will create approximately 20-25 full time employment opportunities.	
<b>Mitigation: Target/Objective</b>	In the medium to long term employ as many locals as possible to fill the full time employment opportunities.	
<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
<ul style="list-style-type: none"> <li>The workforce of 20-25 permanent staff is likely to be based in Musina. BioTherm should commit to implementing a 5-year training and skills development and training programme. The initial local content target is 30%; however, after 5 years the objective is to have all the employment opportunities taken up by locals.</li> <li>Identify local members of the community who are suitably qualified or who have the potential to be employed full time.</li> </ul>	<ul style="list-style-type: none"> <li>BioTherm</li>   <li>BioTherm</li> </ul>	<ul style="list-style-type: none"> <li>Develop 5 year training and skills development programme during the construction phase</li> <li>Identify local members of the community who are suitably qualified or who have the potential to be employed full time during the construction phase.</li> </ul>
<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>5 year training and skills development programme developed and designed before construction phase completed.</li> <li>Potential locals identified before construction phase completed.</li> </ul>	
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>BioTherm must monitor indicators listed above to ensure that they have been met for the operational phase.</li> </ul>	

## DECOMMISSIONING PHASE

### Impact of decommissioning

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

<b>Project component/s</b>	Decommissioning phase of the PV facility	
<b>Potential Impact</b>	Decommissioning will result in job losses, which in turn can result in a number of social impacts, such as reduced quality of life, stress, depression etc. However, the number of people affected (20-25) is relatively small. Decommissioning is also similar to the construction phase in that it will also create temporary employment opportunities.	
<b>Activity/risk source</b>	Decommissioning of the PV facility	
<b>Mitigation: Target/Objective</b>	To avoid and or minimise the potential social impacts associated with decommissioning phase of the PV facility.	
<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
<ul style="list-style-type: none"> <li>Retrenchments should comply with South African Labour legislation of the day</li> </ul>	<ul style="list-style-type: none"> <li>BioTherm</li> </ul>	<ul style="list-style-type: none"> <li>When PV facility is decommissioned</li> </ul>
<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>South African Labour legislation relevant at the time</li> </ul>	
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>BioTherm and Department of Labour</li> </ul>	