

**SOCIAL IMPACT ASSESSMENT  
(DRAFT REPORT)**

**S-KOL PHOTOVOLTAIC PLANT,  
KEIMOE, NORTHERN CAPE PROVINCE  
(DRAFT REPORT)**

**November 2011**

**Prepared for**

**SAVANNAH ENVIRONMENTAL (Pty) Ltd**

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# **EXECUTIVE SUMMARY**

## **INTRODUCTION AND LOCATION**

Savannah Environmental (Pty) Ltd have been appointed by NetWorx S28 Energy (Pty) Ltd (hereafter referred to as NetWorx S28 Energy) as the lead consultants to manage the Environmental Impact Assessment (EIA) process for the establishment of a proposed S-Kol photovoltaic solar energy facility and associated infrastructure on the Farm Geelkop 456, located ~ 10 km north-east of the town of Keimoes in the Northern Cape Province, South Africa.

Tony Barbour Consulting was appointed by Savannah Environmental (Pty) Ltd to undertake a specialist Social Impact Assessment (SIA) as part of an Environmental Impact Assessment (EIA) application process currently as part of the EIA process. This report contains the findings of the Draft SIA.

## **DESCRIPTION OF THE PROPOSED SOLAR ENERGY FACILITY**

NetWorx S28 Energy has identified the potential to establish a new PV plant with a generation capacity of 200 MW in the Kai! Garib Local Municipality (LM) in the Northern Cape Province of South Africa. The proposed site is located on Farm Geelkop 456 located ~ 10 km north-east of the town of Keimoes. An area of approximately 400 ha is being considered for the establishment of the proposed PV Plant and associated infrastructure. The energy will be linked via an on-site substation to the Oasis substation near Keimoes. The project is therefore an Independent Power Producer (IPP) project.

It is envisaged that the PV Plant will be developed over three phases, 30 MW to be developed during the first phase, up to 100 MW during the second phase and the final 100 MW during the third phase. The EIA will consider the components associated with the full 200 MW capacity of the project.

The components associated with a PV Plant include:

### **The Photovoltaic Cell**

A photovoltaic (PV) cell is made of silicone 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.

### **The Inverter**

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

### **The Support Structure**

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

The basic infrastructure associated with the proposed S-Kol PSEF would include:

- PV solar panels with a generating capacity of ~ 200 MW which will be developed in three phases. (i.e. 30 MW (phase 1); up to 100MW (phase 2); up to 200MW (phase 3));
- The PV panels will be linked together to form individual strings. An inverter will be situated at the end of each "string" in order to switch the power from direct current (DC) to alternating current (AC).
- Underground cabling of 33 kV in order to distribute the power to a central on-site substation.
- A transformer together with the on-site substation to step-up the power from 33 kV – 132kV to be distributed between the photovoltaic plant and the Eskom grid. An existing 132 kV distribution line runs between the Taaiputs Substation at Kakamas and the Oasis Substation at Keimoes south of the S-Kol site. This line crosses the site, and a loop-in/loop-out connection will be used.
- Foundations to support the PV panels;
- Internal access roads; and
- Workshop area for maintenance and storage and a possible education center for the public.

The construction phase for the full 200 MW is expected to extend over a period of 10-15 years and create approximately 400 employment opportunities. The capital expenditure associated with the construction of 200 MW is in the region of R 3 billion (current prices). The operational phase will create ~ 100-120 employment opportunities and will extend over a period of 20-25 years.

## **APPROACH TO THE STUDY**

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

- Describing and obtaining an understanding of the proposed intervention (type, scale, location), the communities likely to be affected and determining the need and scope of the SIA;
- Collecting baseline data on the current social environment and historical social trends;
- Identifying and collecting data on the key social issues related to the proposed development. This requires consultation with affected individuals and communities;
- Assessing and documenting the significance of social impacts associated with the proposed intervention;
- Identifying alternatives and mitigation measures.

In this regard the study involved:

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

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

## **SUMMARY OF KEY FINDINGS**

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

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

The potential health impacts associated with PV Plant plants are also discussed.

## **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);
- Northern Cape Provincial Growth and Development Strategy (2004-2014)
- Siyanda District Municipality Integrated Development Plan 2009-2012;
- Kai! Garib Municipality Integrated Development Plan (2009).

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

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

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

At a provincial level the NCPGDP notes that availability of inexpensive energy is a key requirement in order to promote economic growth in the Northern Cape. The NCGDS goes on to indicate that "the development of energy sources such as **solar energy**, the natural gas fields, bio-fuels, etc, could be some of the means by which new economic opportunity and activity is generated in the Northern Cape".

At a local level the Kai! Garib IDP lists a number of strategies aimed at addressing poverty and unemployment in the region. These include, skills development and capacity building programmes especially amongst the youth, promotion of private sector and business partnerships as well as community partnerships, and promotion

of BBBEE and support for small business. The establishment of the proposed PV Plant therefore has the potential to support a number of key strategies listed in the IDP.

The findings of the review of the relevant policies and documents pertaining to the energy sector therefore indicate that solar energy and the establishment of solar energy plants are supported at a national, provincial, and local level. It is therefore the opinion of the authors that the establishment of a solar energy plant on the proposed site is supported by national, provincial and local policies and planning documents. However, the provincial and local policy and planning documents also make reference to the importance of tourism and the regions natural resources. Care therefore needs to be taken to ensure that the development of large renewable energy projects, such as the proposed solar energy facility do not impact on the region's natural resources and the tourism potential of the Province.

## **CONSTRUCTION PHASE**

The key social issues associated with the construction phase include:

### **Potential positive impacts**

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

The construction phase for the 200 MW PV Plant is expected to extend over a period of 10-15 years and create approximately ~ 400 employment opportunities. It is anticipated that approximately 70 % (280) of the employment opportunities will be available to low skilled (construction labourers, security staff etc.) and semi-skilled workers (drivers, equipment operators etc.) and 30% (120) to skilled personnel (engineers, land surveyors, project managers etc.). The majority of the employment opportunities, specifically the low and semi-skilled opportunities, are likely to be available to local residents in the area, specifically residents from the towns of Keimoes and Kakamas and the other small settlements located next to the Gariep River. The majority of the beneficiaries are likely to be historically disadvantaged (HD) members of the community. This would represent a significant positive social benefit in an area with limited employment opportunities. However, the low education and skills levels in the area will hamper potential opportunities for local communities.

The capital expenditure associated with the construction of the 200 MW PV Plant phase will be in the region of R 3 billion . The total wage bill for the 3-4 year construction phase will be in the region of R 152 million. A percentage of the wage bill will be spent in the local economy which will create opportunities for local businesses in Keimoes, Kakamas and Upington. The sector of the local economy that is most likely to benefit from the proposed development is the local service industry. The potential opportunities for the local service sector would be linked to accommodation, catering, cleaning, transport and security, etc. associated with the construction workers on the site. The benefits to the local economy will however be confined to the construction period (10-15 years).

The contractors appointed during the construction phase are also likely to provide on-site training and skills development opportunities. However, the majority of benefits are likely to accrue to personnel employed by the relevant contractors. In the absence of specific commitments from the developer to employ local contractors the potential for meaningful skills development and training for members from the local communities may be limited.

The construction phase will also support a number of key strategies listed in the Kai! Garib IDP that are aimed at addressing poverty and unemployment in the region. These include, skills development and capacity building programmes especially amongst the youth, promotion of private sector and business partnerships as well as community partnerships, and promotion of BBEE and support for small business.

**Potential negative impacts**

- Impacts associated with the presence of construction workers on site
- Influx of job seekers to the area;
- Loss of farm labour to the construction phase;
- Increased risk of stock theft, poaching and damage to farm infrastructure associated with presence of construction workers on the site;
- Increased risk of veld fires;
- Impact of heavy vehicles, including damage to roads, safety, noise and dust;
- Potential loss of grazing 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. In addition, given that the majority of the low and semi-skilled construction workers can be sourced from the local area the potential risk to local family structures and social networks is regarded as low. However, the impact on individuals who are directly impacted on by construction workers and or job seekers (i.e. contract HIV/ AIDS) was assessed to be of Medium-High negative significance.

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

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

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

<b>Increased risk of veld fires</b>	Medium (Negative impact)	Low (Negative impact)
<b>Impact of heavy vehicles and construction activities</b>	Low (Negative impact)	Low (Negative impact)
<b>Loss of farmland</b>	Medium (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;
- The establishment of infrastructure to generate renewable energy.

The operational phase will create approximately 100-120 full time jobs. Of this total approximately 10% of employment opportunities will be for skilled personnel (technicians, plant operators and management), ~20% for semi-skilled personnel (administrative, drivers etc.), and 70% for low skilled personnel (cleaning, security, support staff, etc.). The wage bill associated with the operational phase is estimated to be in the region of R25 million per year (current value). The majority of the employment opportunities associated with the operational phase are likely to benefit HD members of the community. The benefits to the local economy will extend over the 25-30 year operational lifespan of the project. However, given that the solar energy sector in South Africa is relatively new, the skilled positions may need to be filled by people from other parts of South Africa or even overseas.

The establishment of a number of solar energy facilities in the Kai! Garib region will also create significant economic opportunities for the area. The significance of this impact is rated as High Positive. 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 High social benefit for society as a whole.

Due the large number of renewable energy facilities proposed in the area is it recommended that the Kai! Garib Municipal investigate the Community Development Trust / Fund model developed by the Theeswaterskloof LM in the Western Cape. In this regard the the Theeswaterskloof LM has made it a requirement for all potential renewable energy operators to contribute to a Community Development Trust / Fund. In terms of the structure of the Trust, a percentage of the revenue from the renewable energy operations is allocated to projects identified in the Theeswaterskloof IDP. Of this total, 50% of the revenue is allocated to infrastructure projects and the remaining 50% to social projects and initiatives, such as skills development and training.

### **Potential negative impacts**

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

The significance of the potential negative impacts with mitigation was assessed to be of Low significance. 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 job seekers (i.e. contract HIV/ AIDS) was assessed to be of Medium-High negative significance.

The visual impacts on landscape character associated with large renewable energy facilities, such as PV 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 large, solar energy plants on the landscape is therefore likely to be a key issue in South Africa, specifically given South African's strong attachment to the land and the growing number of solar energy applications. However, the impact of the proposed Ofir-ZX PV Plant on the landscape character of the area is likely to be limited.

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

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

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

### **Cumulative impacts**

The cumulative impacts associated with solar energy facilities, such as the proposed S-Kol PV Plant, are largely linked to the potential visual impacts and impact on the areas sense of place and landscape character. In the case of the proposed S-Kol PV Plant the significance of the potential cumulative social impacts, specifically the impact on the areas sense of place, was rated to be low. This is due to the existing power line that traverses the site and the screening provided by the natural topography.

However, it is recommended that the environmental authorities consider the overall cumulative impact on the areas sense of place before a final decision is taken with regard to the optimal number of PV Plants 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.

In addition to the potential negative impacts, the establishment of a number of solar energy facilities in the area, including the S-Kol PV Plant, has the potential to result in significant positive cumulative socio-economic impacts for the Kai! Garib Municipality. The positive cumulative impacts include creation of employment, skills development and training opportunities, creation of downstream business opportunities and stimulation of the local property market. These benefits represent a significant positive social benefit.

### **Power lines**

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

### **Potential health impacts**

The primary environmental, health, and safety issues associated with solar energy involve how they are manufactured, installed, and ultimately disposed of. In particular, the manufacturing of photovoltaic cells often requires hazardous materials such as arsenic and cadmium. Even relatively inert silicon, a major material used in solar cells, can be hazardous to workers if it is breathed in as dust. Workers involved in manufacturing photovoltaic modules and components must consequently be protected from exposure to these materials. However, none of these potential hazards is much different in nature and or magnitude from the innumerable hazards people face routinely in an industrial society. Through effective regulation, the dangers can very likely be kept at a very low level. In addition, the relevant risks essentially concern workers at the cell manufacturing plant and therefore fall outside the scope of the EIA.

### **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 PV Plant. This represents a significant negative social cost for the Kai! Garib Municipality. However, at a provincial and national level, it should be noted that the NetWorx S28 Energy PV Plant development proposal is not unique. In this regard, a significant number of solar energy projects are currently proposed in the Northern Cape Province. Foregoing the proposed PV Plant development would therefore not necessarily compromise the development of renewable energy facilities in South Africa.

### **Decommissioning**

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 PV Plants 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 25-30 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.

Due to the relatively large number of people employed during the operational phase (~ 100-120), the decommissioning of the facility will have a negative social impact on the local community. However, these impacts can be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be Low (negative).

NetWorx S28 Energy should also investigate the option of establishing an Environmental Rehabilitation Trust Fund to cover the costs of decommissioning and rehabilitation of disturbed areas. The Trust Fund should be funded by a percentage of the revenue generated from the sale of energy to the national grid over the 25-30 year operational life of the facility. The rationale for the establishment of a Rehabilitation Trust Fund is linked to the experiences with the mining sector in South Africa and failure of many mining companies to allocate sufficient funds during the operational phase to cover the costs of rehabilitation and closure.

## **RECOMMENDATIONS**

The findings of the SIA indicate that the development of the proposed S-Kol NetWorx S28 Energy PV Plant will create employment and business opportunities for locals during both the construction and operational phase of the project. In addition, the proposed establishment of a number of renewable energy facilities in the Kai! Garib Municipality, including the proposed S-Kol NetWorx S28 Energy PV Plant, will create significant socio-economic opportunities, which, in turn, will result in a positive social benefit. The significance of this impact is rated as High Positive.

NetWorx S28 Energy, in consultation with the Kai! Garib Municipality, should also investigate the opportunities for establishing a Community Development Trust / Fund that is linked to other proposed renewable energy projects in the area. The revenue for the trust / fund would be derived from the income generated from the sale of energy from the plant. The Community Trust / Fund should be linked to funding and supporting projects and initiatives identified in the Kai! Garib IDP. The mitigation measures listed in the report to address the potential negative impacts during the construction phase should also be implemented. 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 S-Kol NetWorx S28 Energy PV Plant is therefore supported by the findings of the SIA. However, the potential impacts associated with large, solar energy facilities on an areas sense of place and landscape cannot be ignored. These impacts are an issue that will need to be addressed by the relevant environmental authorities, specifically given the large number of applications for solar facilities in the area.

## **IMPACT STATEMENT**

The findings of the SIA undertaken for the proposed S-Kol NetWorx S28 Energy PV Plant indicate that the development will create employment and business opportunities for locals during both the construction and operational phase of the project. In doing so the establishment of the proposed PV Plant will support a number of key strategies listed in the IDP aimed at addressing poverty and

unemployment. The establishment of a number of solar energy facilities in the area also has the potential to create significant socio-economic opportunities for the Kai! Garib Municipality. 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.

## ACRONYMS

CBO	Community-based Organization
CSP	Concentrated Solar Power
DEA&DP	Department of Environmental Affairs and Development Planning (Western Cape)
DoA	Department of Agriculture
DoE	Department of Energy (National)
EIA	Environmental Impact Assessment
GW	Gigawatt
IDP	Integrated Development Plan
IPP	Independent Power Producer
IRP	Integrated Resource Plan
kV	Kilovolts
LED	Local Economic Development
MF	Monitoring Forum
Mtoe	Million tonnes of oil equivalent
MW	Megawatt
NGO	Non-governmental Organization
PV Plant	Photovoltaic Solar Energy Facility
RBS	Revised Balanced Scenario
REF	Renewable Energy Facility
SDF	Spatial Development Framework
SEF	Solar Energy Facility
SIA	Social Impact Assessment
WEF	Wind Energy Facility

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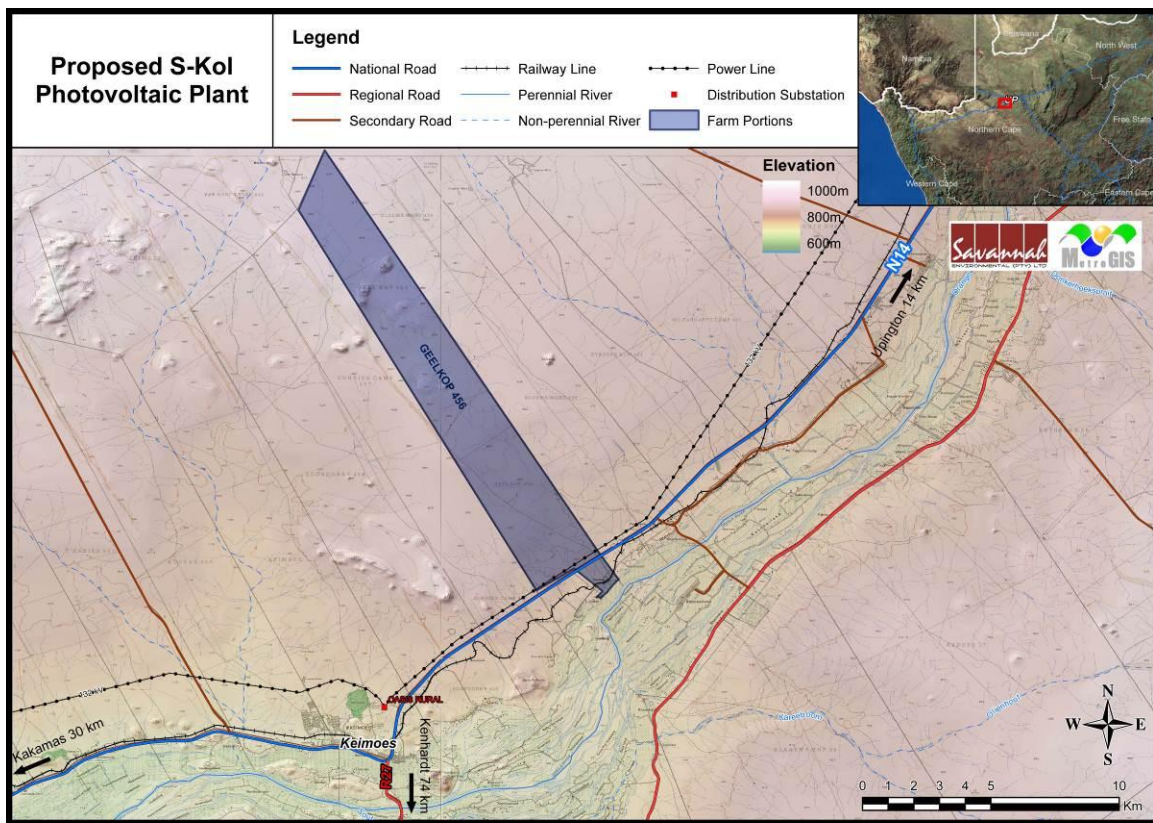
# SECTION 1: INTRODUCTION

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## 1.1 INTRODUCTION

Savannah Environmental (Pty) Ltd have been appointed by NetWorx S28 Energy (Pty) Ltd (hereafter referred to as NetWorx S28 Energy) as the lead consultants to manage the Environmental Impact Assessment (EIA) process for the establishment of a proposed S-Kol photovoltaic solar energy facility (PV Plant) and associated infrastructure on the Farm Geelkop 456, located ~ 10 km north-east of the town of Keimoes in the Northern Cape Province, South Africa (Figure 1.1).

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**Figure 1.1: Location of S-Kol photovoltaic solar energy facility (PV Plant)**

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

## 1.3 PROJECT DESCRIPTION

NetWorx S28 Energy has identified the potential to establish a new PV Plant with a generation capacity of 200 MW in the Kai! Garib Local Municipality (LM) in the Northern Cape Province of South Africa. Photograph 1.1 illustrates a typical PV Plant facility. The proposed site is located on remaining extent of Geelkop 456 located ~ 10 km north-east of the town of Keimoes. It is envisaged that the PV Plant will be developed over three phases, 30 MW to be developed during the first phase, up to 100 MW during the second phase and the final 100 MW during the third phase. The EIA will consider the components associated with the full 200 MW capacity of the project.

An area of approximately 400 ha is being considered for the establishment of the proposed PV Plant and associated infrastructure. The energy will be linked via an on-site substation to the Oasis substation at Keimoes south of the S-Kol site. The project is therefore an Independent Power Producer (IPP) project.



*Source: www.wapa.gov*

**Photograph 1.1: Photovoltaic array**

Photovoltaic (PV) solar energy facilities use solar energy 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.

Solar PV facilities comprise of the following components:

### **Photovoltaic Cells**

Silicon wafers which are the building blocks, act as semiconductors and when struck by light produce electricity. Individual photovoltaic cells are linked in circuit and placed behind a protective transparent cover sheet to collectively form a photovoltaic panel/array. Photovoltaic cells are highly sensitive to shading, and the output of an entire circuit can be significantly decreased when even a small portion of a cell, panel, or array is shaded, while the remainder is in sunlight. Dust or dirt can also affect the efficiency therefore require maintenance, the regularity of which depends on the characteristics of the site (i.e. predominant wind direction and dusty conditions).

### **The support structure**

The photovoltaic panels are fixed to support structures which are either bolted directly into the ground or fixed by means of concrete foundations. These structures can be adjusted in terms of their angle relative to the sun. Depending on the latitude of the proposed facility, the angle of the support structures may be adjusted to optimise for summer / winter solar radiation characteristics.

### **Inverter**

The photovoltaic effect produces electricity in direct current. However, in order to transmit this power within the Eskom grid it must be converted to alternating current which requires an inverter. When the photovoltaic panels are connected as separate strings, each string can be allocated its own inverter thereby ensuring the continued operation of the facility should one or more strings be comprised or require maintenance.

The basic infrastructure associated with the proposed S-Kol PSEF would include:

- PV solar panels with a generating capacity of ~ 200 MW which will be developed in three phases. (i.e. 30 MW (phase 1); up to 100MW (phase 2); up to 200MW (phase 3);
- The PV panels will be linked together to form individual strings. An inverter will be situated at the end of each "string" in order to switch the power from direct current (DC) to alternating current (AC).
- Underground cabling of 33 kV in order to distribute the power to a central on-site substation.
- A transformer together with the on-site substation to step-up the power from 33 kV – 132kV to be distributed between the photovoltaic plant and the Eskom grid. An existing 132 kV distribution line runs between the Taaiputs Substation at Kakamas and the Oasis Substation at Keimoes south of the S-Kol site. This line crosses the site, and a loop-in/loop-out connection will be used.
- Foundations to support the PV panels;
- Internal access roads; and
- Workshop area for maintenance and storage and a possible education center for the public.

The construction phase for the full 200 MW is expected to extend over a period of 10-15 years and create approximately 400 employment opportunities. The capital expenditure associated with the construction of 200 MW is in the region of R 3 billion (current prices). The overall aim of the design and layout of the facility is to maximise electricity production through exposure to the solar radiation, while minimising infrastructure, operation and maintenance costs, and social and

environmental impacts. The use of solar energy for power generation can be described as a non-consumptive use of natural resources which emits zero greenhouse gas emissions. The generation of renewable energy contributes to South Africa's electricity generating market which has been dominated by coal-based power generation.

#### **1.4 ALTERNATIVES**

The no development alternative is the only alternative being assessed. The "no development" alternative entails leaving the existing status quo unchanged. Potential negative impacts would therefore be avoided, but at the same time potential benefits to local communities and society would be forfeited.

#### **1.5 OTHER RENEWABLE PROJECTS IN THE STUDY AREA**

NetWorx S28 Energy is proposing to develop two additional 200 MW PV Plant in the vicinity to Keimoes, namely:

- Ofri-ZX 200 MW PV Plant located on Farm 616, located ~ 5 km north-west of Keimoes;
- Sonnenberg 200 MW PV Plant located on Farm Baviaanz Krantz 474/11, located ~ 5 km north-east of Kakamas.

In addition there are a number of other solar energy projects proposed in the vicinity of Upington and Kenhardt.

#### **1.6 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 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 issues related to the proposed intervention. This requires consultation with affected individuals and communities;
- Assessing and documenting the significance of social impacts associated with the proposed intervention;
- Identifying alternatives and mitigation measures.

In this regard the study involved:

- Review of demographic data from the 2001 Census Survey and other relevant data sources;
- Review of relevant planning and policy frameworks for the area;

- Site specific information collected during the site visit to the area and interviews with key stakeholders;
- Review of information from similar projects;
- Identification of social issues associated with the proposed project.

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

Annexure A contains a list of sources consulted for this social study. The methodology which was used in the Social Assessment presented in Section 5 is outlined in Annexure B of this SIA Report.

## **1.7 ASSUMPTIONS AND LIMITATIONS**

### **1.7.1 Assumptions**

#### **Identification of area for the solar energy facility**

It is assumed that the development site identified represents a technically suitable site for the establishment of a PV Plant.

#### **Strategic importance of the project**

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

### **1.7.2 Limitations**

#### **Demographic data**

The demographic data used in the study is largely based on the findings of the 2001 Census, or on sources based projections on the Census 2001 data. The writing of this report coincides with Census 2011 – the first comprehensive community level count undertaken since 2001. An interim Community Survey was undertaken by Statssa in 2007 (Local Municipal level). However, Census 2001 remains the most recent community/ ward level, actual count data currently available. Final data from Census 2011 will be available in early 2013. Therefore, it should be noted that the 2001 Census data is dated. Where possible this data has been up-dated.

## **1.8 SPECIALIST DETAILS**

The author of this report is an independent specialist with 22 years of 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 SIA's and is the author of the Guidelines for Social Impact Assessments for EIA's adopted by the Department of Environmental Affairs and Development Planning (DEA&DP) in the Western Cape in 2007.

## **1.9 DECLARATION OF INDEPENDENCE**

This confirms that Tony Barbour, the specialist consultant responsible for undertaking the study and preparing the Draft SIA Report, is independent and does not have vested or financial interests in the proposed S-Kol PV Plant being either approved or rejected.

## **1.10 REPORT STRUCTURE**

The report is divided into five sections, namely:

- Section 1: Introduction;
- Section 2: Overview of key applicable policy and planning documents;
- Section 3: Overview of key social baseline information;
- Section 4: Identification and assessment of key social issues;
- Section 5: Summary of key findings and recommendations.

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

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### **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>1</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. Furthermore, it also constitutes a key reporting requirement in terms of the applicable Western Cape Department of Environmental Affairs and Development Planning’s *Guidelines for Social Impact Assessment* (2007).

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

- The National Energy Act (2008)
- The White Paper on the Energy Policy of the Republic of South Africa (December 1998)
- The White Paper on Renewable Energy (November 2003)
- Integrated Resource Plan (IRP) for South Africa (2010-2030);
- Northern Cape Provincial Growth and Development Strategy (2004-2014)
- Siyanda District Municipality Integrated Development Plan 2009-2012;
- Kai! Garib Municipality Integrated Development Plan (2009).

The section also provides a summary some of the key social issues associated with solar facilities based on international experience.

### **2.2 NATIONAL LEVEL ENERGY POLICY**

#### **2.2.1 National Energy Act (Act No 34 OF 2008)**

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

“To ensure that diverse energy resources are available, in sustainable quantities, and at affordable prices, to the South African economy, in support of economic growth

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<sup>1</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.

and poverty alleviation, taking into account environmental management requirements (...); to provide for (...) increased generation and consumption of renewable energies..." (Preamble).

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

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

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

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

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

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

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

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

Firm commitment necessary now  
 Final commitment in IRP 2012

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

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

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

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

resulted in an increase in the contribution from renewables from 11,4 GW to 17,8 GW.

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

### **General**

- The dark shaded projects in Table 2.1 need to be decided before the next IRP iteration, with the identified capacities thereafter assumed as “committed” projects;
- The light shaded options should be confirmed in the next IRP iteration;
- 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 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;
- A solar PV programme as envisaged in the Policy-Adjusted IRP should be pursued (including decentralised generation).

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

### **2.3.1 Northern Cape Province Provincial Growth and Development Strategy**

The Northern Cape Provincial Growth and Development Strategy (NCPGDS) notes that the most significant challenge confronting government and its partners in terms of achieving growth and development is the **reduction of poverty**. All other societal challenges that the province faces emanate predominantly from the effects of poverty. The NCPGDS notes that the only effective way to reduce poverty is through long-term sustainable economic growth and development. The sectors where economic growth and development can be promoted include:

- Agriculture and Agro-processing;
- Fishing and Mariculture;
- Mining and mineral processing;
- Transport;

- Manufacturing;
- Tourism.

However, the NCPGDS also notes that economic development in these sectors also requires:

- Creating opportunities for lifelong learning
- Improving the skills of the labour force to increase productivity
- Increasing accessibility to knowledge and information

The achievement of these primary development objectives depends on the achievement of a number of related objectives that, at a macro-level, describe necessary conditions for growth and development. These are:

- Developing requisite levels of human and social capital
- Improving the efficiency and effectiveness of governance and other development institutions
- Enhancing infrastructure for economic growth and social development

Of specific relevance to the SIA the NCPGDS make reference to the need to ensure the availability of inexpensive energy. The section notes that in order to promote economic growth in the Northern Cape the availability of electricity to key industrial users at critical localities at rates that enhance the competitiveness of their industries must be ensured. At the same time, the development of new sources of energy through the promotion of the adoption of energy applications that display a synergy with the province's natural resource endowments must be encouraged. In this regard the NCPGDS notes "the development of energy sources such as **solar energy**, the natural gas fields, bio-fuels, etc., could be some of the means by which new economic opportunity and activity is generated in the Northern Cape". The NCPGDS also highlights the importance of close co-operation between the public and private sectors in order for the economic development potential of the Northern Cape to be realised.

The NCPGDS also highlights the importance of enterprise development, and notes that the current levels of private sector development and investment in the Northern Cape are low. In addition, the province also lags in the key policy priority areas of SMME Development and Black Economic Empowerment. The proposed solar energy facility therefore has the potential to create opportunities to promote private sector investment and the development of SMMEs in the Northern Cape Province.

In this regard care will need to be taken to ensure that the proposed PV Plant and other renewable energy facilities do not negatively impact on the regions natural environment. In this regard the NCPGDS notes that the sustainable utilisation of the natural resource base on which agriculture depends is critical in the Northern Cape with its fragile eco-systems and vulnerability to climatic variation. The document also indicates that due to the provinces exceptional natural and cultural attributes, it has the potential to become the preferred adventure and ecotourism destination in South Africa. Care therefore needs to be taken to ensure that the development of large renewable energy projects, such as the proposed solar energy facility, do not affect the tourism potential of the province.

### **2.3.2 Siyanda District Municipality Integrated Development Plan (2007-2012)**

The key priority issues listed in the SDM IDP include:

- Basic Service Deliver;
- Municipal Institutional Development and Transformation;
- Local Economic Development;
- Municipal Financial Viability and Management;
- Good Governance and Public Participation.

The vision of the SDM is:

“To be a model, economically developed district with a high quality of life for all inhabitants”

Linked to this vision the mission statement is to:

“To promote economic development to the advantage of the community within the boundaries of the SDM” This will be done by the establishment and maintenance of an effective administration and a safe environment in order to attract tourists and investors to the region”.

The development goals listed in the IDP that are relevant to the proposed PV Plant include:

- To deliver a positive contribution to the sustainable growth and development within its boundaries and the rest of the Northern Cape;
- The creation of a healthy and environmentally friendly environment within and outside of the Councils’ district boundaries, must be attempted;
- The promotion of a safe and tourism friendly environment should be furthered in order to promote tourism and investor interest in the region;
- The promotion of human resources within and outside the organization through training and the implementation of new technological aids.

Linked to the developmental goals are a number of developmental objectives. The following objectives are relevant to the proposed PV Plant:

- Promotion of SMMEs in order to strengthen the Local Economic Sector
- Promote the development of the tourism sector, with specific emphasis on community based tourism;
- Promote the infrastructure development, including electricity.

### **2.3.3 Kai! Garib Local Municipality Integrated Development Plan (2009)**

The Kai! Garib Local Municipality Integrated Development Plan (IDP) (2009) notes that the vision for the municipality is “Creating an economically viable and fully developed municipality, which enhances the standard of living of all the inhabitants / community of Kai !Garib through good governance, excellent service delivery and sustainable development.”

In order to achieve this vision the IDP identifies 6 Key Priority Areas (KPA) in line with the National standards to address the municipality’s development objectives:

- KPA 1: Spatial Development
- KPA 2: Service Delivery
- KPA 3: Economic Development and LED
- KPA 4: Financial Viability
- KPA 5: Institutional Arrangements and PMS
- KPA 6: Good Governance and Public Participation

With focus on these KPAs an analysis of the status quo across numerous sectors within the Municipality was undertaken highlighting 8 priority issues and their related or contributing factors. Those priority issues that are relevant to the proposed PV Plant include:

- Poverty alleviation and creation of employment,
- Health and HIV/AIDS
- Empowerment and capacity building across all sectors;
- Infrastructure development (including electricity, water and roads) and service delivery.

The key factors contributing towards poverty and unemployment in the area are identified as lack of youth development opportunities, crime, drug and alcohol abuse, lack of skills development and training opportunities, limited employment opportunities, lack of tourism development, lack of Local Economic Development, lack of infrastructure capacity of emerging farmers, lack of vision amongst the youth, and lack of land for agriculture and business development.

A SWOT analysis undertaken as part of the IDP identifies high unemployment and low skills levels as a threat to the development of the area the following opportunities and threats facing the municipality, Drug and alcohol abuse and HIV/AIDS are also identified as threats. In addition, the strong regional role played by Upington places reduces the potential for investment in the surrounding areas. The proposed PV Plant can assist to address some of these threats by creating employment and skills and training opportunities.

The strategies listed in the IDP to address the poverty and unemployment relevant to the proposed PV Plant includes:

- Skills development and capacity building programmes especially amongst the youth,
- Promote Private sector and business partnerships as well as community partnerships,
- Establish Local Economic Incentives,
- Promote BBBEE and support to small business (through SEDA and provincial Programmes);
- Promote cooperatives (through Dti and Provincial Programmes).

The proposed PV Plant has the potential to support all of the above strategies.

## **2.5 INTERNATIONAL EXPERIENCE WITH SOLAR ENERGY FACILITIES**

The proposed facility is a PV facility as opposed to a Concentrating Solar Power (CSP) plant. In this regard the majority of the international experience is based on CSPs as

opposed to PV facilities. In this regard the key differences in terms of potential impacts relate to the use of water and the visual impacts associated with the large tower structures associated with CSP plants. CSP plants (like most conventional power plants) require large volumes of cooling water, which make them less suited to arid, water scarce environments. PV facilities on the other hand, such as the proposed PV facility, do not require cooling water, and as such are more suited to areas where water is a scarce resource. In terms of visual impacts the parabolic troughs and power towers associated with CSP facilities, have a higher visual impact than the solar panels associated with PV facilities.

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## SECTION 3: OVERVIEW OF THE STUDY AREA

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### 3.1 INTRODUCTION

Section 3 provides an overview of:

- The administrative context;
- The provincial context;
- The policy and planning environment affecting the proposed PV facility;
- The local socio-economic environment;
- Surrounding land uses.

### 3.2 ADMINISTRATIVE CONTEXT

The proposed S-Kol PV Plant is located within the Kai! Garib LM, which forms part of the larger Siyanda District Municipality (Figure 3.1). The Siyanda District Municipality (SDM) consists of Local Municipalities namely, Mier; !Kai !Garieb; //Khara Hais; Tsantsabane, !Kheis and Kgatelopele. Upington, which is the largest town in the region, is the administrative capital of the SDM. Keimoes, which is located on the northern bank of the Gariep River (Orange River), is the administrative seat of the the Kai! Garib LM. The Kai! Garib LM is divided into 8 Wards.



**Figure 3.1: Location of Kai! Garib LM within the Northern Cape Province**

### 3.3 PROVINCIAL CONTEXT

The proposed solar energy facility is located in the Northern Cape Province, which is the largest province in South Africa and covers an area of 361,830 km<sup>2</sup>, and constitutes approximately 30% of South Africa. The province is divided into five district municipalities (DM), namely, Frances Baard, Karoo, Namakwa, Siyanda, and Kgalagadi DM, twenty-six Category B municipalities and five district management areas. The site itself is located in the Kai! Garib Local Municipality (LM) (NC082), which is one of eight local municipalities that fall within the greater Siyanda District Municipality (DC8).

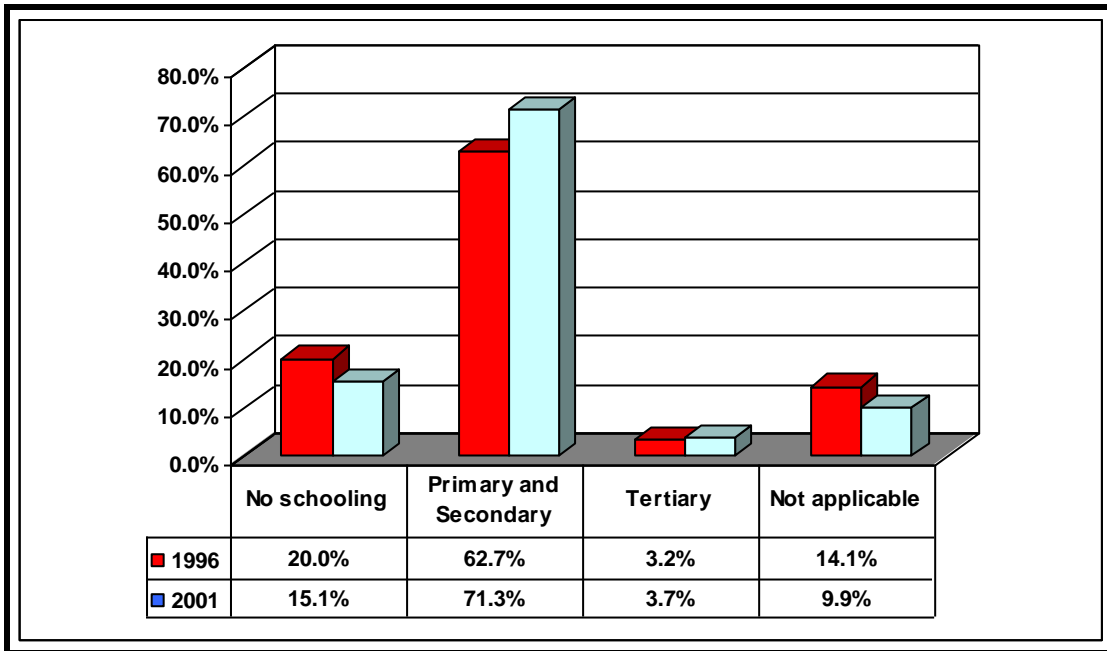
#### **Population**

Despite having the largest surface area, the Northern Cape has the smallest population of 822 727 (Census 2001) or 1.8% of the population of South Africa. The population has declined by 2.1% from 1996 (840 321) to 2001 (822 727), resulting in a decrease in the population density, of an already sparsely populated province, from 2.32 to 2.27 persons per km<sup>2</sup>. Of the five districts, Frances Baard has the largest population of 303 239. The other districts and their respective populations are Siyanda (209 889), Karoo (164 607), Kgalagadi (36 881) and Namakwa (108 111). The population can be classified as a young population with 57.7% of the population being younger than 30 years old. The female proportion makes up approximately 51.2% of the total with males making up the remaining 48.8%. The 2001 Census data indicates a significant shift in the 20 – 24 cohort occurs, which can possibly be attributed to, amongst others, people in this age group moving to other provinces in search of better career and job opportunities and tertiary education. Research indicates that approximately 36% of the migrants from the Northern Cape moved to the Western Cape, while 19.4% moved to the North West (19.4%), 18.5% to Gauteng and 12.8% to the Free State (12.8%). In addition, there has also been an increase in migration from the rural areas to the larger towns in the province over the last five years. This movement is in response to the improved access to opportunities and services within the larger urban centers. This trend is reflected in the increase in the proportion of people living in urban areas from 75.2% in 1996 to 82.7% in 2001

#### **Education**

In terms of education levels 15.1% of the population had no education at all, while 71.3% have primary or secondary education. Those with a higher educational qualification accounted for 3.7% of the population (Figure 2.1). These figures indicate an increase in all categories since 1996, except for the no schooling category, which decreased by 4.9% indicating a higher percentage of people attending school.

The information contained in Figure 3.1, indicates that, in general, there has been an improvement in the educational qualifications of the labour force in the Northern Cape. There has also been an increase in the proportion of the labour force that has a secondary and tertiary education. This would appear to be the result of an increase in access to education since 1994, in particular, amongst new entrants to the labour force.



**Figure 3.1: Percentage of people by level of education for 1996 and 2001**  
 (Source: Northern Cape Province PGDS)

### Economic development

The Human Development Index<sup>2</sup> (HDI) for the province, which covers four indexed factors – life expectancy, adult literacy, GDP per capita (adjusted for real income) and education attainment, for the Northern Cape as a whole is 0.58, which is substantially below the South African figure of 0.72.

For the Northern Cape, the areas of lowest Human Development Index include the South Eastern region (Noupoort and Richmond) and the hinterland of Kimberley (Griekwastad, Campbell and Douglas) – for these areas the HDI varies between 0.47 to 0.51. Over the past 8 years there has been little to no variance in the HDI figures, indicating no increase or decrease in the overall standard of living. In contrast, the Kimberley and Springbok areas have the highest HDI of 0.63 to 0.62 respectively, primarily due to the broader economic opportunities and access to services such as infrastructure, schools, and health facilities. Similarly, there has been no significant change over the past 8 years.

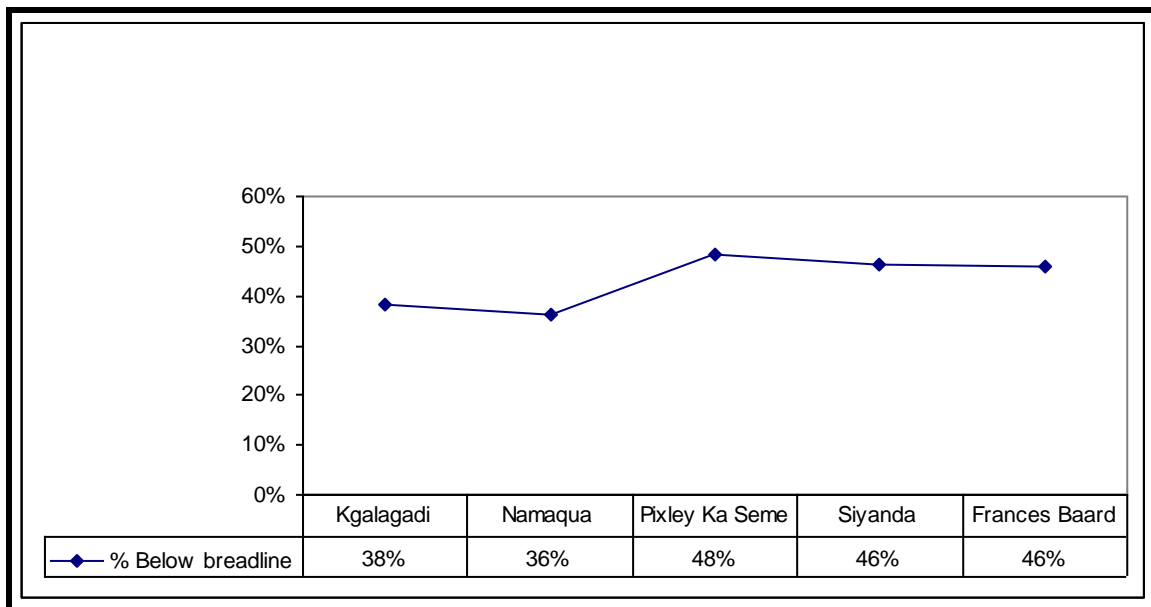
The above trend is unlikely to change in the foreseeable future, mainly due to the marginal economic base of the poorer areas, and the consolidation of the economic base in the relatively better off areas.

In terms of per capita income, the Northern Cape Province has the third highest per capita income of all nine provinces, however, income distribution is extremely skewed, with a high percentage of the population living in extreme poverty. The measure used in the PGDS document to measure poverty is the percentage of people living below the poverty line or breadline is used<sup>3</sup>. The poverty line indicates a lack of economic resources to meet basic food needs. Figure 3.2 indicates the percentage

<sup>2</sup> The closer the HDI to 1.0, the higher the level of "living condition". For example, Sweden has an index of 0.91 defined as high, South Africa at 0.72 is defined as middle and Lesotho at 0.47 is defined as low.

<sup>3</sup> In terms of the poverty line, a person is considered poor if his or her consumption or income level falls below some minimum level necessary to meet basic needs. The minimum level is usually called the poverty line. In South Africa the poverty income level is set at R800/month.

of household income below the poverty breadline of R800 in the Northern Cape Province, the highest being Karoo at 48% and the lowest being Namakwa at 36%.



**Figure 3.2: Percentage of household income below the poverty breadline by district** (Source: Northern Cape PGDS)

### Economic sectors

In terms of economic importance, the Northern Cape's share of the country's Gross Domestic Product (GDP) in 2002 was 2%, the lowest contribution of the nine provinces. However, although the Northern Cape Province has the smallest economy of the nine provinces, Gross Domestic Product of the Region (GDPR) per capita is higher than the national average. In terms of economic activities, the economy of Northern Cape is heavily dependent on the primary sectors of the economy, which in 2002 made up 31.0% of GDPR. The largest sector is mining which has declined in contribution to the GDPR from 25.8% in 1996 to 23.7% in 2002. Agriculture, on the other hand, increased in its contribution from 6.2% to 7.3%.

A worrying characteristic of the economy is the limited amount of processing of the primary commodity output in mining and agriculture that takes place in the Northern Cape. This is reflected in the fact that manufacturing contributes only 4.2% towards GDPR. All the industries in the secondary sector have decreased in their contribution to the GDPR, with electricity and water sector showing the greatest decrease of 0.7% and the construction industry making the lowest contribution of 1.9% to the GDPR of the Northern Cape. At the same time the contribution to regional GDPR by industries in the tertiary sector increased, with the exception of the wholesale and retail industry, which decreased by 1.1%. Figure 2.3 illustrates the percentage contribution of the various economic sectors to the GDPR of the Northern Cape

### Employment

Of the economically active population in the Northern Cape, 55.5% were employed while 26.1% could not find employment. This unemployment figure is lower than the national figure of 29.5%. Significant for this province, however, is that a third of the total population is younger than 15 years old and approximately 45% of the potential labour force is younger than 30 years. At the same time, unemployment is the highest among the youth with unemployment rates of 54% and 47% in the 15 - 19

and 20 – 24 year-old age groups. There has been an increase in the economically active population from 35.9% in 1996 to 38.1% in 2001. The unemployment rate for the same period has increased from 28.3% to 33.4%. In terms of employment there has been a decrease in the number of people that are formally employed from 196 219 in 1996 to 193 980 in 2001. The largest decrease was in the private household sector, showing a loss of 4 859 jobs.

The most important sectors in terms of employment in 2002 were agriculture, hunting, forestry and fishing (28.4%), community, social and personal services (19.8%), wholesale and retail trade (12.7%) and private households (11.4%) (Table 3.1).

<b>Sectors</b>	<b>1996</b>	<b>1996 % of persons employed per sector</b>	<b>2001</b>	<b>2001 % of persons employed per sector</b>
<b>Primary</b>				
Agriculture, hunting; forestry and fishing	48646	24.8	55016	28.4
Mining and quarrying	18556	9.5	15493	8.0
<b>Secondary</b>				
Manufacturing	8812	4.5	10598	5.5
Electricity; gas and water supply	2397	1.2	1385	0.7
Construction	10402	5.3	8971	4.6
<b>Tertiary</b>				
Wholesale and retail trade	23099	11.8	24671	12.7
Transport; storage and communication	9963	5.1	6366	3.3
Financial, insurance, real estate and business services	7733	3.9	10989	5.7
Community, social and personal services	39724	20.2	38463	19.8
Private Households	26887	13.7	22028	11.4
<b>Total</b>	<b>196219</b>		<b>193980</b>	

**Table 3.1: Formal employment by sector (Source: Northern Cape PGDS)**

### **3.4 SOCIO-ECONOMIC OVERVIEW OF THE PROPOSED PROJECT AREA**

As indicated in Section 1.5.2 Limitations, it is no longer possible to access Census 2001 data at Ward level via the Municipal Demarcation Board. As a result it was not

possible to obtain ward level data for the Kai! Garib LM. The social baseline for this part of the study area is therefore described at LM only. However, for the town of Upington, which falls within the //Khara Hais LM, it was possible to source ward level information from previous work undertaken by the consultants in the area.

### 3.4.1 Siyanda District Municipality

The Siyanda District Municipality (SDM) consists of Local Municipalities namely, Mier; !Kai !Garieb; //Khara Hais; Tsantsabane, !Kheis and Kgatelopele, and covers an area of more than 100 000 km<sup>2</sup> (almost 30% of the Northern Cape Province). Of this total, 65% (65 000 km<sup>2</sup>) is made up of the Kalahari Desert, Kgalagadi Transfrontier Park and the former Bushman Land. The largest town in the region is Upington, which also functions as the district municipal capital. The District Management Area (DMA) of Siyanda District Municipality consists mainly of areas in the Kalahari, private farmlands in the Kenhardt and surrounding areas as well as the Community of Riemvasmaak. The Riemvasmaak Community is located ~ 60 km west of Kakamas. The total population of the SDM is in the region of 200 000 people with a density of about 1.7 people per square kilometre. The //Khara Hais and Kai !Gariep LM are home to ~ 63 % of the SDM population (Table 3.3).

The Coloured population group make up the dominant group in the SDM (64%), followed by Black Afrikaans (24%) and Whites (12%). In terms of language, Afrikaans (82%), followed by Setswana (14%) and IsiXhosa (3%) are the three main languages spoken in the area.

Local Municipality	Population	Percentage
//Khara Hais	73 786	35.16%
Kai !Garib	57 689	27.49%
Tsantsabane	31 010	14.77%
!Kheis	16 029	7.64%
Kgatelopele	15 448	7.36%
Mier	6 850	3.26%
District Management Area	9 083	4.33%

**Table 3.3: Population of Local Municipalities within the SDM**

The SDM accounts for about 30% of the Northern Cape economy. Agriculture plays a key role in the local economy and is strongly linked to irrigation along the Gariep River (Orange River). The Orange River is perennial with a flow which varies between 50 and 1800 cubic meter per second (cum/s) depending on the season. The flow of the river is largely controlled by the releases of the dams upstream, like the Bloemhof, Gariep and Van der Kloof dams. Agriculture in the SDM is dominated by grape production for table grapes, which is mainly exported to Europe, as well as livestock and game farming. Livestock farming occurs mainly on large farms where farming is extensive. The majority of the farms are privately owned. The central parts of the region consist mainly of semi-desert areas and are therefore, with a few exceptions, mainly suitable for extensive livestock farming. In terms of employment, the most important economic sectors are Agriculture, followed by Community, Social and Personal, and Private Households.

Tourism represents one of the most important economic sectors in the Northern Cape as well as within the SDM. In this regard the SDM IDP indicates that tourism is the fastest growing component of the economy. Key tourism assets include the world

famous Kgalagadi Transfrontier Park, Augrabies National Park and Pitskop Nature Reserve near Upington.

Minerals and mining also plays an important role in the local economy of the SDM. Key mining activities include copper and zinc north of Upington. Various small concentrations of calcite, lead, fluorspar, barite, wolfram and amethyst. Salt is also being mined at two pans, namely Groot Witpan, 95 km northwest of Upington and at Witpan, 115km northwest of Upington. In terms of social well-being the SDM's greatest social problems are illiteracy and poverty. According to the last socio-economic survey in 2000, approximately 60% of the inhabitants have a monthly household income of between R0-R800. Education levels are also low. As a result there is a close correlation between education levels and poverty.

### **3.4.2 Kai! Garib Municipality**

The proposed facility is located in the Kai! Garib Municipality, a category-B municipality<sup>4</sup>, which forms part of the greater Siyanda District Municipality (DC8, category-C municipality). The municipality is located in the north-central portion of the Northern Cape, approximately 428 km west of the provincial capital of Kimberley.

The municipality is approximately 7 445 km<sup>2</sup> in size (~7.2% of the Siyanda District Municipality) and is bordered to the north, south and west by a District Management Area (NCDMA08) and in the east by the //Khara Hais and !Kheis Local Municipalities. In terms of land use, the Kai! Garib Local Municipality is largely rural and agricultural with three urban/semi-urban nodes at Kakamas, the designated administrative centre of the municipality, Keimoes and Kenhardt (Kai! Garib IDP, 2009).

The population the Kai! Garib Municipality is estimated at 56 501 (2007), which makes up approximately 10% of the total population of the greater Siyanda District Municipality (238 063 [2007]). The average population growth for the local municipality (2001-2007) is estimated at ~1.4% (Community Survey, 2007).

The majority of the population is Coloured (66.5%), followed by Black Africans (22.2%) and Whites (7.8%). The dominant language is Afrikaans (78.8%) followed by Setswana (20.2%) with the remainder made up of isiXhosa (0.4%), English (0.2%) and other African languages (0.2%).

In terms of education levels, based on the data from Census 2001, approximately 14.7% of the population has no formal education, while approximately 42% have less than a Grade 7 (standard 5). When these totals are added to figures for people with no formal education they indicate that over half of people in the Kai !Garib Local Municipality (~58%) have less than a Grade 7 (standard 5) qualification. Only 11.1% of the population have a matric qualification, while less than 4% having a tertiary qualification.

Employment data for Kai! Garib Local Municipality indicates that 57.8% of the population between the economically active ages of 15 and 65 are employed in the formal sector and the unemployment rate is 12%. The agricultural sector provides ~28% of the formal employment, followed by the community services, wholesale and retail sectors which employ ~6% and ~2% of the employed population in the area respectively. According to the 2001 Census data, the majority of employment is characterised as 'undetermined' (~62%).

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<sup>4</sup> A category-B municipality is defined as a municipality that shares executive and legislative authority in its area with a category- C municipality within whose area it falls.

Based on the data from the 2001 Census, 48.8% of the population have no formal income and 93.7% of the population earn less than R 800 per month (This is the figure used by the South African Government as the official breadline figure). The low-income levels reflect the limited formal employment opportunities highlighted above. According to the Kai! Garib Local Municipality IDP (2009), 22% of the population is dependent on social grants, of which 52% are child support grants. A total of 2 706 households are subsidised by the services subsidy scheme.

### 3.4.3 Upington

While the town of Upington falls outside of the Kai! Garib Local Municipality, it functions as a key economic center for the area and is the administrative center of the //Khara Hais Local Municipality which, along with the Kai! Garib Local Municipality is one of 6 Local Municipalities and one DMA that fall within the greater Siyanda District Municipality. The //Khara Hais Local Municipality is made up of 12 administrative wards. Wards 1-8 constitute the greater Upington area.

#### Population

According to Census 2001 data, the total population of Ward 1-8 was 56 400. It is assumed that the population would have increased substantially given the large positive population growth rate (33.4%) within the //Khara Hais Local Municipality between 2001 and 2007<sup>5</sup> (Community Survey, 2007)

Table 3.4 indicates that the Coloured population group make the dominant population group within the wards, accounting for ~65% of the total population. The Black African population group represents a sizable 22% of the total population while the White population group constitutes a minority 13.3%. The Asian population group accounts for only 0.1% of the total population in Wards 1-8.

**Table 3.4: Ward 1-8 - Population figures**

Population Group	//Khara Hais LM Ward 1-8 (%)
Black African	22.0
Coloured	64.6
Indian or Asian	0.1
White	13.3
Total	100

**Source: Census 2001**

#### Age distribution

Table 3.5 indicates that the <15 years age bracket in Ward 1-8 is relatively high at ~32%. The post retirement cohort (>64) is moderate at 5.5%. The dependency ratio<sup>6</sup> is 0.6, which means that approximately 2 working individuals support 1 non-working/unemployed individual.

<sup>5</sup> According to the StatsSA Community Survey of 2007, the population of the //Khara Hais Local Municipality increased from 75 671 in 2001 to 100 920 in 2007.

<sup>6</sup> The dependency ratio is calculated as the number of 0 to 14-year olds, plus the number of 65-year olds and older, divided by the number of people in the 15 to 64-year old age cohort. This is to give a rough indication of dependency.

**Table 3.5: Ward 1-8 - Age distribution**

Age Group	//Khara Hais LM Ward 1-8 (number)
0-4	5767
5-9	6135
10-14	6193
[Youthful dependents]	[18095]
15-19	6579
20-24	4731
25-29	4289
30-34	4273
35-39	3896
40-44	3396
45-49	2686
50-54	2152
55-59	1664
60-64	1518
65-69	1194
70-74	787
75-79	548
80 and over	592

**Source: Census 2001**

### Education levels

Table 3.6 indicates that, based on 2001 Census data, 28% (corresponding to an absolute total of 8 895 people) of the population of in Ward 1-8 aged 15 and older are estimated to be functionally illiterate/innumerate in 2001.

Approximately 36% of the population have less than a Standard 5/Grade 7 education and 22.1% of the school going age population have a matric qualification, while just over 6% have a tertiary qualification. Given the strong correlation between education and skills levels, it may be assumed that a significant portion of the study area's working age population have only sufficient skills for elementary jobs. However, with relatively high Matric and tertiary education qualifications a significant portion of the population will be employed in more skilled position with respect to the proposed facility.

**Table 3.6: Ward 1-8 - Education levels**

Description	//Khara Hais LM Ward 1-8 (number)
No schooling	3717
Some primary	5178
[% functional illiteracy/ innumeracy] <sup>7</sup>	28% [8895]
Complete primary	2621
Some secondary	11244
Std 10/Grade 12	7000
Higher	1967

**Source: Census 2001**

### Employment levels

The employment statistics (2001) presented in Table 3.7 indicates that 36.6% of Ward 1-8's population was employed. The unemployment rate was relatively high, estimated at ~23%. Approximately 40% of the population is not economically active<sup>8</sup>. According to StatsSA the unemployment figure for South Africa (4<sup>th</sup> Quarter 2009) is currently estimated at 24.3%.

**Table 3.7: Ward 1-8 - Employment levels (15 – 64 age groups)**

Description	//Khara Hais LM Ward 1-8 (%)
Employed <sup>9</sup>	36.6
Unemployed	23.1
Not Economically Active	40.3

**Source: Census 2001**

### Sectoral employment

Table 3.8 below provides an overview of proportional employment per economic sector by head of household for Ward 1-8 within the //Khara Hais Local Municipality. The largest employer in Ward 1-8 is the Community and Social Services sector which provides ~27% of the formal employment in the area. This sector is followed by the Wholesale and Retail trade sector (21.3%), Private Households (10%), the Financial, Real Estate and Business Services sector (8.9%), the Manufacturing sector (8.1%), the Transport, Storage and Communication sector (5.7%) and the Construction sector (5.4%). Agriculture, while a dominant activity in the //Khara Hais Local Municipality, accounts for only 3.7% of the employment opportunities in Wards 1-8.

<sup>7</sup> In the South African context, having obtained a primary qualification (i.e. having successfully passed Grade 7) is generally held as the absolute minimum requirement for functional literacy/ numeracy. The National Department of Education's ABET (Adult Basic Education and Training) programme provides education and training up to the equivalent of Grade 9. In this more onerous definition, Grade 9 is required as the minimum qualification for having obtained a basic education ([www.abet.co.za](http://www.abet.co.za)).

<sup>8</sup> The term "not economically active" refers to people of working age not actively participating in the economy, such as early retirees, students, the disabled and home-makers.

<sup>9</sup> Census 2001 official definition of *an unemployed person*: "A person between the ages of 15 and 65 with responses as follows: 'No, did not have work'; 'Could not find work'; 'Have taken active steps to find employment'; 'Could start within one week, if offered work'." ([www.statssa.gov.za](http://www.statssa.gov.za)).

**Table 3.8: Sectoral contribution to employment**

Description	//Khara Hais LM Ward 1-8 (%)
Agriculture, hunting, forestry and fishing	3.7
Mining and quarrying	0.4
Manufacturing	8.1
Electricity, gas and water supply	0.7
Construction	5.4
Wholesale and retail trade	21.3
Transport, storage and communication	5.7
Finance, real estate and business services	8.9
Community, social and personal services	27.4
Other and not adequately defined	8.5
Private households <sup>10</sup>	10

**Source: Census 2001**

### Household income

Census data on household income for 2001 (Table 3.9) indicates that the vast majority of households (~87%) in Ward 1-8 were living on less than the R800/month minimum subsistence level. Significantly, the 'no formal income' category is the most pronounced at ~65%. Only 12% of household heads were earning an income clustered in the R800-R3200/ month range.

**Table 3.9: Ward 1 - 8 - Household income (by head of household)**

Income per month	//Khara Hais LM Ward 1-8 (%)
No formal income	64.5
R 1 – R 400	4.4
R 401 – R 800	12.3
R 801 - R 1 600	6.1
[% households below minimum subsistence level]	[87.3]
R1 601 - R 3 200	5.9
R 3 201 – R 6 400	4.1
R 6 401 – R 12 800	1.8
R 12 801 – R 25 600	0.4
R 25 601 and higher	0.5

**Source: Census 2001**

<sup>10</sup> This category mainly comprises domestic workers and gardeners.

### **3.5 OVERVIEW OF SURROUNDING LAND USES**

The proposed S-Kol PV Plant is located on the northern bank of the Gariiep River (Orange River) within the Kai! Garib LM (Photograph 3.1). The town of Keimoes is located approximately 10 km south-west of the proposed site (Photograph 3.2). The main land uses in the area are linked to grape farming and agriculture along the Gariiep River and livestock farming away from the river (Photograph 3.3). The main crops grown in the area are grapes for export, raisins and wine. Lucern, cotton, corn, and nuts, are also cultivated under irrigation from the Orange River. A number of other solar energy projects are currently being proposed in the area.

The main access road is the N14, which runs along the northern bank of the Gariiep River from Upington in the east to Kakamas in the west. At Kakamas the N14 crosses the Gariiep. The N14 also functions as an important tourist route and functions as part of the wine route meander. The Augrabies Falls National Park is located ~ 40 km north-west of Kakamas. The southern section of the site is bordered by the N14 and an Eskom power line which links the Taaiputs substation (west of Kakamas) and Oasis substation (east of Keimoes) (Photograph 3.4).

The main settlements in the area are Keimoes and Kakamas. In addition to these towns there are also a number of smaller settlements located along the northern bank of the Gariiep River. These include Bloemsmond and Curries Camp to the east of Keimoes and Friersdale and Lutzburg between Keimoes and Kakamas (Photograph 3.5). There are also a number of farmsteads located adjacent to the N14, specifically in the area immediately to the west of Keimoes.

The site itself is relatively flat and slopes towards the Gariiep River towards the south (Photograph 3.6 and 3.7). The land uses on the site (Farm Geelkop 456), which is owned by Mr. J Snyman, include cattle, goat and sheep goat farming. Mr. Snyman currently has 120 head of cattle, 120 goats and 22 sheep. The farm is however located within 3 km of the settlement of Bloemsmond (to the south east) and stock theft is a problem, specifically theft of sheep.



**Photograph 3.1: Aerial view of Gariep River (Orange River) looking west.**



**Photograph 3.2: View of Keimoes with irrigation canal and vineyards**



**Photograph 3.3: Vineyards in the study area**



**Photograph 3.4: View of Oasis substation and Orange River Winery ~ 2 km north east of Keimoes**



**Photograph 3.5: View of Bloemsmond from N14**



**Photograph 3.6: View of entrance to Geelkop Farm looking north from N14**



**Photograph 3.7: View looking north over Geelkop Farm**

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

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### **4.1 INTRODUCTION**

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

- The Social Scoping Report prepared for the Scoping phase (Barbour and van der Merwe; 2011);
- Review of project related information, including other specialist studies;
- Interviews with key interested and affected parties;
- Experience/ familiarity of the authors with the area and local conditions;
- Experience with similar projects;

The assessment section is divided into the following sections:

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

Section 4 also comments on the potential health impacts associated with SEFs.

### **4.2 ASSESMENT OF POLICY AND PLANNING FIT**

As indicated in Section 2.1, the legislative and policy context plays an important role in identifying and assessing the potential social impacts associated with a proposed development. In this regard a key component of the SIA process is to assess the proposed development in terms of its fit with key planning and policy documents.

The review of the relevant planning and policy documents was undertaken as a part of the SIA. The key documents reviewed included:

- The National Energy Act (2008)
- The White Paper on the Energy Policy of the Republic of South Africa (December 1998)
- The White Paper on Renewable Energy (November 2003)
- Integrated Resource Plan (IRP) for South Africa (2010-2030);
- Northern Cape Provincial Growth and Development Strategy (2004-2014)
- Siyanda District Municipality Integrated Development Plan 2009-2012;
- Kai! Garib Municipality Integrated Development Plan (2009).

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

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

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

At a provincial level the NCPGDP notes that availability of inexpensive energy is a key requirement in order to promote economic growth in the Northern Cape. The NCGDS goes on to indicate that "the development of energy sources such as **solar energy**, the natural gas fields, bio-fuels, etc, could be some of the means by which new economic opportunity and activity is generated in the Northern Cape".

At a local level the Kai! Garib IDP lists a number of strategies aimed at addressing poverty and unemployment in the region. These include, skills development and capacity building programmes especially amongst the youth, promotion of private sector and business partnerships as well as community partnerships, and promotion of BBBEE and support for small business. The establishment of the proposed PV Plant therefore has the potential to support a number of key strategies listed in the IDP.

The findings of the review of the relevant policies and documents pertaining to the energy sector therefore indicate that solar energy and the establishment of solar energy plants are supported at a national, provincial, and local level. It is therefore the opinion of the authors that the establishment of a solar energy plant on the proposed site is supported by national, provincial and local policies and planning documents. However, the provincial and local policy and planning documents also make reference to the importance of tourism and the regions natural resources. Care therefore needs to be taken to ensure that the development of large renewable energy projects, such as the proposed solar energy facility do not impact on the region's natural resources and the tourism potential of the Province.

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

As indicated on Section 1.3, the proposed PV Plant will have a generation capacity of 200 MW, which will be developed over three phases. 30 MW to be developed during the first phase, up to 100 MW during the second phase and the final 100 MW during the third phase. The EIA will consider the components associated with the full 200 MW capacity of the project. The assessment of potential social impacts associated with the construction phase is for the full 200 MW and takes into account the proposed phasing.

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

### **Potential positive impacts**

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

### **Potential negative impacts**

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

Annexure C contains the management plan for addressing social impacts.

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

Based on the information provided by the proponent the construction phase for the first 30 MW (Phase 1) will extend over a period ~ 10 months and create approximately 50 - 100 employment opportunities during peak construction.

The work associated with the construction phase will be undertaken by contractors and will include the establishment of the PV Plant and the associated components, including, access roads, substation, services and power line. It is anticipated that approximately 70 % of the employment opportunities will be available to low skilled (construction labourers, security staff etc.) and semi-skilled workers (drivers, equipment operators etc) and 30% to skilled personnel (engineers, land surveyors, project managers etc). Members from the local communities are likely to be in a position to qualify for the majority of the low skilled and some of the semi-skilled employment opportunities. The majority of these employment opportunities are also likely to accrue to Historically Disadvantaged (HD) members from the local community, specifically residents of Keimoes and Kakamas. Given high local unemployment levels and limited job opportunities in the area, this will represent a significant, if localised, social benefit. The remainder of the semi-skilled and majority of the skilled employment opportunities are likely to be associated with the contractors appointed to construct the WEF and associated infrastructure.

In terms of business opportunities for local companies, expenditure during the construction phase will create business opportunities for the regional and local economy. However, given the technical nature of the project and high import content associated with PV Plants, the opportunities for the local economy and the towns of Keimoes and Kakamas are likely to be limited. However, opportunities are likely to exist for local contractors and engineering companies in Upington. Implementing the enhancement measures listed below can enhance these opportunities.

A percentage of the wage bill will be spent in the local economy and will create opportunities for local businesses in Keimoes, Kakamas and Upington. The sector of the local economy that is most likely to benefit from the proposed development is the local service industry. The potential opportunities for the local service sector would be linked to accommodation, catering, cleaning, transport and security, etc. associated with the construction workers on the site. The benefits to the local economy will however be confined to the construction period (10-15 years).

The implementation of the proposed enhancement measures listed below would also enable the establishment of the proposed PV Plant to support co-operation between the public and private sectors which would support local economic development in the Kai! Garib Municipality.

In terms of training and skills development, NetWorx S28 Energy has indicated that training and skills development will be provided by the contractors appointed to manage the construction phase. However, the majority of benefits are likely to accrue to personnel employed by the relevant contractors. In the absence of specific commitments from the developer to maximise local employment targets the potential for meaningful skills development and training for members from the local communities will be reduced.

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

However, based on comments from the local Kai! Garib planner the availability of rental housing stock in the Keimoes and Kakamas is limited (De Jager, pers comm.). This may result in non-local employees having to stay in Upington.

The construction phase will also support a number of key strategies listed in the Kai! Garib IDP aimed at addressing poverty and unemployment in the region. These include, skills development and capacity building programmes especially amongst the youth, promotion of private sector and business partnerships as well as community partnerships, and promotion of BBBEE and support for small business.

**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)	Local – Regional (4)
<b>Duration</b>	Short term (2)	Short term (2)
<b>Magnitude</b>	Moderate (6)	High (8)
<b>Probability</b>	Highly probable (4)	Highly probable (4)
<b>Significance</b>	Medium (40)	High (64)
<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.		
<b>Residual impacts:</b> Improved pool of skills and experience in the local area.		

### Assessment of No Go option

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

### Recommended enhancement measures

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

#### Employment

- Where reasonable and practical, NetWorx S28 Energy 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 NetWorx S28 Energy should meet with representatives from the Kai! Garib Local Municipality 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 NetWorx S28 Energy 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**

- NetWorx S28 Energy should liaise with the Kai! Garib Local Municipality with regards the establishment of a database of local companies, specifically BEE companies, which qualify as potential service providers (e.g. construction companies, catering companies, waste collection companies, security companies etc.) prior to the commencement of the tender process for construction contractors. These companies should be notified of the tender process and invited to bid for project-related work;
- Where possible, NetWorx S28 Energy should assist local BEE companies to complete and submit the required tender forms and associated information.
- The Kai! Garib Local Municipality, 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.

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

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

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

In terms of potentially impacts, local farm workers and residents of Keimoes, Kakamas and smaller settlements along the N14, such as Friersdale, Curries Camp, Bloemsmond and Lutzburg, are potentially at risk. It is estimated that approximately 50 % of the construction workers will be non-local and will need to be accommodated during the construction phase.

The potential risk to local residents in these settlements will be mitigated by NetWorx S28 Energy's commitment to implementing a local employment policy, specifically for the low and semi-skilled employment opportunities associated with the construction phase. Employing members from the local community to fill the low-skilled and semi-skilled job categories will reduce the risk and mitigate the potential impacts on the local communities. These workers will be from the local community and form part of the local family and social network and, as such, the potential impact will be low. The use of local residents to fill the low skilled job categories will also reduce the need to

provide accommodation and or house construction workers on the site. In this regard NetWorx S28 Energy has indicated that no construction personnel will be accommodated on the site. However, due to the potential mismatch of skills and low education levels, the potential employment opportunities for the members from these local communities may be low.

As indicated above, there is limited rental housing stock available in the area. A number of non-local construction workers will therefore need to be accommodated in Uppington. This will also reduce the potential risk to local communities in the area. This, combined with the commitment to employ local residents and the mitigation measures below, will reduce the risks posed by construction workers to local community members.

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

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

<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 2 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 STDs etc. (5)	Short term for community as a whole (2) Long term-permanent for individuals who may be affected by STDs etc. (5)
<b>Magnitude</b>	Low for the community as a whole (4) High-Very High for specific individuals who may be affected by STDs etc. (10)	Low for community as a whole (4) High-Very High for specific individuals who may be affected by STDs etc. (10)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Low for the community as a whole (28) Moderate-High for specific individuals who may be affected by STDs etc. (54)	Low for the community as a whole (24) Moderate-High for specific individuals who may be affected by STDs 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</b>	Yes, to some degree. However, the	

<b>mitigated?</b>	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 the current status quo would be maintained. The potential positive impacts on the local economy associated with the additional spending by construction workers in the local economy will also be lost.

### Recommended mitigation measures

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

- Where possible, NetWorx S28 Energy should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically for semi and low-skilled job categories;
- NetWorx S28 Energy should consider the establishment of a Monitoring Forum (MF) in order to monitor the construction phase and the implementation of the recommended mitigation measures. The MF should be established before the construction phase commences, and should include key stakeholders, including representatives from local communities, local Kai! Garib Councillors, farmers and the contractor(s). The MF should also be briefed on the potential risks to the local community associated with construction workers;
- NetWorx S28 Energy and the contractor(s) should, in consultation with representatives from the MF, develop a code of conduct for the construction phase. The code should identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code should be dismissed. All dismissals must comply with the South African labour legislation;
- NetWorx S28 Energy and the contractor should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase;
- The movement of construction workers on and off the site should be closely managed and monitored by the contractors. In this regard the contractors should be responsible for making the necessary arrangements for transporting workers to and from site over weekends or after hours;
- The contractors should make the necessary arrangements for allowing workers from outside the area to return home over weekends and/ or on a regular basis. This would reduce the risk posed to local family structures and social networks;
- The contractors should ensure that all non-local workers are provided with transport back to their home towns within 2 days of their contracts coming to an end. This would reduce the risk of them staying on in the area and the potential risk to local family structures and social networks;
- It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.

### 4.3.3 Influx of job seekers

Large construction projects tend to attract people to the area in the hope that they will secure a job, even if it is a temporary job. These job seekers can in turn become “economically stranded” in the area or decide to stay on irrespective of finding a job or not. While the proposed S-Kol PV Plant on its own does not necessarily constitute a large construction project, the proposed establishment of a number of other solar energy projects in the Kai! Garib Municipality, including two 200 MW PV Plant’s by NetWorx S28 Energy, is likely to attract job seekers to the area. As in the case of construction workers employed on the project, the actual presence of job seekers in the area does not in itself constitute a social impact. However, the manner in which they conduct themselves can impact on the local community.

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

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

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

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

The influx of job-seekers will also place pressure on existing services in the area, specifically housing, education and medical facilities.

The key lesson from other large construction projects is the importance of a developing and implementing a well-structured recruitment strategy aimed at employing locals and minimising the number of job seekers moving into the area. It is therefore recommended that the proponents of solar energy projects liaise with the representatives from the Kai! Garib Municipality to identify strategies to address the potential impacts associated with the influx of job seekers to the area.

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

<b>Nature:</b> Potential impacts on family structures, social networks and community services associated with the influx of job seekers		
	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (3)	Local (2)
<b>Duration</b>	Permanent (5) (For job seekers that stay on the town)	Permanent (5) (For job seekers that stay on the town)
<b>Magnitude</b>	Low for the community as a whole (4) High-Very High for specific individuals who may be affected by STD's etc. (10)	Minor for community as a whole (2) 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>	Medium for the community as a whole (36) Medium -High for specific individuals who may be affected by STD's etc. (54)	Low for the community as a whole (27) Medium-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. Impact on community services, such as housing, schools, clinics etc.		
<b>Residual impacts:</b> See cumulative impacts.		

**Recommended mitigation measures**

It is almost impossible to stop people from coming to the area in search of a job. However, as indicated above, NetWorx S28 Energy should ensure that the employment criteria favour local residents in the area. In addition NetWorx S28 Energy should:

- NetWorx S28 Energy, in consultation with the Kai! Garib Local Municipality, should investigate the option of establishing a Local Community Forum to monitor and identify potential problems that may arise due to the influx of job seekers to the area. The Forum should also include the other proponents of solar energy projects in the area;
- Implement a policy that no employment will be available at the gate.

#### **4.3.4 Loss of farm labour to the construction phase**

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

While the proposed S-Kol PV Plant on its own is unlikely to result in a significant loss of farm labour, the establishment of a number of other solar energy projects in the Kai! Garib Municipality, including two other 200 MW PV Plant's by NetWorx S28 Energy, has the potential to impact on the farming sector. However, at the end of the day farm labour can be replaced. The potential impacts on farm operations are therefore likely to be temporary. The local farmers interviewed during the SIA indicated that they did not regard the potential loss of farm labour as key issue of concern.

The potential impacts for the affected farmers associated with the loss of permanent farm labour to the construction phase are exacerbated by the security of tenure that permanent farm labourers enjoy in terms of the Extension of Security and Tenure Act (ESTA). Those farm labourers which are eligible under ESTA and who take up jobs during the construction phase will be entitled stay on in their houses on the farms in question. The net effect is that the farmer may have to incur the costs associated with the construction of new dwellings for new labour appointed to replace the labour lost to the construction phase. The farmer may also have to continue subsidizing services such as potable water to people who are no longer in his employ.

The farm workers that take up jobs during the construction phase are also at risk. While some farm workers may be re-employed once the construction has been completed, others may not be so fortunate. The low education levels associated with the farm worker community would effectively mean that alternative employment opportunities outside the agricultural sector will not be accessible to them. These farm workers and their families therefore stand to be negatively impacted upon in the medium to long term.

**Table 4.4: Assessment of loss of farm labour to the construction phase**

<b>Nature:</b> Potential impact on local farmers associated with loss of farm labour to the construction phase		
	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local and Regional (3)	Local and Regional (3)
<b>Duration</b>	Short term (2) (Assumed that farm labour can be replaced)	Short term (2) (Assumed that farm labour can be replaced)
<b>Magnitude</b>	Low (4)	Low (4)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Low (27)	Low (27)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes, if farm workers return or are replaced	Yes, if farm workers return or are replaced
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impact be mitigated?</b>	Yes, to some degree. However, the risk cannot be eliminated	
<b>Mitigation:</b> See below		
<b>Cumulative impacts:</b> Impacts on farm operations due to loss of experienced farm labour		
<b>Residual impacts:</b> See cumulative impacts.		

**Recommended mitigation measures**

While NetWorx S28 Energy could liaise with local farmers in the area and undertake not to employ farm worker were possible, it is not possible to prevent farm workers from applying for work in other sectors. There are therefore no recommended mitigation measures. Also it is assumed that farm labour can be replaced. The impacts would therefore be temporary.

Farm workers who apply for construction related work should also be informed that the nature of the work is temporary. In addition they should be informed of the potential negative consequences of their actions, which include the potential loss of

**4.3.5 Increased risk to livestock and farm infrastructure**

The potential risk applies to local farms located adjacent to the site. The presence on and movement of construction workers on and off the site poses a potential threat to farm infrastructure, such as fences and gates, which may be damaged. Stock losses may also result from gates being left open and/or fences being damaged. Plastic waste also poses a risk to livestock if ingested. The farm owner indicated that stock theft in the area is an on-going problem. This is largely due to the proximity of the site (Farm Geelkop 456) to Bloemsmond and the N14. In this regard the farm owner, Mr. Snyman, indicated that he was phasing out sheep on the farm due the high incidence of stock theft.

In terms of potential impact on adjacent farms, the impact is likely to be low with mitigation.

**Table 4.5: 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 (3)	Local (2)
<b>Duration</b>	Very short term (1)	Very short term (1)
<b>Magnitude</b>	Low (4)	Low (4)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Low (24)	Low (21)
<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

Key mitigation measures include:

- NetWorx S28 Energy should enter into an agreement with the local farmers in the area whereby damages to farm property etc. during the construction phase will be compensated for. The agreement should be signed before the construction phase commences;
- NetWorx S28 Energy should consider the option of establishing a MF (see above) that includes local farmers and develop a Code of Conduct for construction workers. This committee should be established prior to commencement of the construction phase. The Code of Conduct should be signed by the proponent and the contractors before the contractors move onto site;
- NetWorx S28 Energy should hold contractors liable for compensating farmers and communities in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. This should be contained in the Code of Conduct to be signed between the proponent, the contractors and neighbouring landowners. The agreement should also cover losses and costs associated with fires caused by construction workers or construction related activities (see below);

- The 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 NetWorx S28 Energy must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms.
- Contractors appointed by NetWorx S28 Energy must ensure that construction workers who are found guilty of stealing livestock and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation;
- The housing of construction workers on the site should be strictly limited to security personnel.

#### 4.3.6 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 potential risk of veld fires is heightened by windy conditions in the area, specifically during the dry, winter months.
- The dominant agricultural activity in the area is stock farming (beef cattle and sheep). As such, the livelihoods of the farmers in the area are dependent on grazing on their farms. Any loss of grazing due to a fire would therefore impact negatively on the affected farmers livelihoods;
- The risk of fire related damage is exacerbated by the distance to fire-fighting vehicles located in the nearest town of Keimoes and Kakamas.

**Table 4.6: 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 (3) (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)	Very Short Term (1)
<b>Magnitude</b>	Moderate due to importance of livestock for maintaining livelihoods (6)	Low (4)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Medium (33)	Low (21)
<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</b>	Yes	

<b>mitigated?</b>		
<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**

As indicated above, NetWorx S28 Energy 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 Good 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 also ensure that they join the local fire protection agency.

**4.3.7 Impact of construction vehicles**

The movement of heavy construction vehicles during the construction phase has the potential to damage roads and create noise, dust, and safety impacts for other road users and local communities in the area. Access to the site will be via the N14.

The findings of the SIA indicate that the N14 is heavily utilized, specifically during the grape harvesting season (December to January). However, unlike wind energy projects, the transportation requirements for PV Plant’s do not involve large, abnormal loads. The social impacts associated with the movement of construction related traffic can also be effectively mitigated. The significance of the impacts are therefore likely to be low.

**Table 4.7: 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.		
<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**

As indicated above, NetWorx S28 Energy should enter into an agreement with the affected landowners whereby the company will compensate for damages. This includes losses associated with damage to local internal farm roads that are affected by the site. In addition, the potential impacts associated with heavy vehicles and dust can be effectively mitigated. The aspects that should be covered include:

- The movement of heavy vehicles on the N14 and transport of equipment to the site should be timed to avoid the harvesting season (December – January);
- 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.

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

The farm covers an area of 4 700 ha and the current farming activities on the site identified for the PV Plant consist of 120 beef cattle, 120 goats and 202 sheep. A

total area of 400 ha is required for the 200 MW PV Plant. The farm owner, Mr. Synman, indicated that the loss of 400 ha will not impact on his current farming activities. In addition the rental income from the 20 year lease agreement with NetWorx S28 Energy more than compensates for any loss in farming related income.

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

**Table 4.8: 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 PV Plant and power lines will damage farmlands and result in a loss of farmland for future farming activities.		
	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (1)	Local (1)
<b>Duration</b>	Long term-permanent if disturbed areas are not effectively rehabilitated (5)	Short term if damaged areas are rehabilitated (2)
<b>Magnitude</b>	Minor (2)	Minor (2)
<b>Probability</b>	Highly Probable (4)	Highly Probable (4)
<b>Significance</b>	Moderate (32)	Low (20)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes, disturbed areas can be rehabilitated	Yes, disturbed areas can be rehabilitated
<b>Irreplaceable loss of resources?</b>	Yes, loss of farmland. However, disturbed areas can be rehabilitated	Yes, loss of farmland. However, disturbed areas can be rehabilitated
<b>Can impact be mitigated?</b>	Yes, however, loss of farmland cannot be avoided	Yes, however, loss of farmland cannot be avoided
<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 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 (Savannah Environmental);
- The implementation of the Rehabilitation Programme should be monitored by the ECO.

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

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

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

- Creation of employment and business opportunities. The operational phase will also create opportunities for skills development and training;
- The establishment of renewable energy infrastructure.

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

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

Annexure C contains the management plan for addressing social impacts.

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

Based on information from other PV Plant projects the proposed NetWorx S28 Energy 200 MW PV Plant will create approximately 100-120 full time jobs. Of this total approximately 10% of employment opportunities will be for skilled personnel (technicians, plant operators and management), ~20% for semi-skilled personnel (administrative, drivers etc.), and 70% for low skilled personnel (cleaning, security, support staff, etc.). The wage bill associated with the operational phase is estimated to be in the region of R25 million per year (current value). The majority of the employment opportunities associated with the operational phase are likely to benefit HD members of the community. However, given that the solar energy sector in South Africa is relatively new, the skilled positions may need to be filled by people from other parts of South Africa or even overseas.

It will 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 Kai! Garib IDP.

Given the location of the proposed facility the majority of permanent staff is likely to reside in the towns of Keimoes and Kakamas. In terms of accommodation options, a percentage of the non-local permanent employees may purchase houses in one of

these towns, while others may decide to rent. Both options would represent a positive economic benefit for the region. In addition, a percentage of the monthly wage bill earned by permanent staff would be spent in the regional and local economy, which will benefit local businesses in these towns. The benefits to the local economy will extend over the 20-30 year operational lifespan of the project.

The local hospitality industry in Keimoes and Kakamas 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.

Due the large number of PV Plants proposed in the Kai! Garib area it is recommended that the Kai! Garib LM follows the example of the Theeswaterskloof LM in the Western Cape and investigate the establishment of a Community Development Trust/Fund. In this regard the the Theeswaterskloof LM has made it a requirement for all potential renewable energy producers to become a member of and contribute to a Community Development Trust/Fund. In terms of the structure of the Trust, a percentage of the revenue from the operation is allocated to projects identified in the Theeswaterskloof IDP. Of this total, 50% of the revenue is allocated to infrastructure projects and the remaining 50% to social projects and initiatives, such as skills development and training. It is recommended that a similar model be investigated by the Emthanjeni LM. The establishment of a Community Development Trust/Fund would also be in line with the socio-economic development requirements set out in the request for proposal bid documents for renewable energy projects released by the Department of Energy.

The creation of sustainable employment opportunities has been identified as key priorities in the IDP. Current unemployment in the area is high and is exacerbated by seasonal unemployment in the agricultural sector, which is the main source of employment in the area. Remittances and social grants therefore represent important sources of income for local communities.

The Kai! Garib IDP also lists a number of strategies aimed at addressing poverty and unemployment in the region. These include, skills development and capacity building programmes especially amongst the youth, promotion of private sector and business partnerships as well as community partnerships, and promotion of BBBEE and support for small business. The establishment of the proposed PV Plant has the potential to support a number of key strategies listed in the IDP.

**Table 4.9: 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<sup>11</sup></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 (2)	Moderate (6)
<b>Probability</b>	Highly Probable (4)	Definite (5)
<b>Significance</b>	Medium (32)	High (65)
<b>Status</b>	Positive	Positive
<b>Reversibility</b>	N/A	
<b>Irreplaceable loss of resources?</b>	No	
<b>Can impact be enhanced?</b>	Yes	
<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:

- NetWorx S28 Energy 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;
- NetWorx S28 Energy in consultation with the Kai! Garib Municipality, should investigate the opportunities for establishing a Community Development Trust / Fund (see above comments).

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

There is no impact, as the current status quo will be maintained. The potential employment and economic benefits associated with the proposed PV Plant would however be forgone. The potential opportunity costs in terms of local capital

<sup>11</sup> This assumes the establishment of some form of Community Development Trust/Fund

expenditure, employment, skills development and opportunities for local business are therefore regarded as a negative.

#### 4.4.2 Development of infrastructure for the generation of clean, renewable energy

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

The overall contribution to South Africa’s total energy requirements of the proposed PV Plant is relatively small. However, the 200 MW produced will help to offset the total carbon emissions associated with energy generation in South Africa. Given South Africa’s reliance on Eskom as a power utility, the benefits associated with an IPP based on renewable energy are regarded as an important contribution.

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

<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>	Low (4)	Low (4)
<b>Probability</b>	Highly Probable (4)	Highly Probable (4)
<b>Significance</b>	Medium (48)	Medium (48)
<b>Status</b>	Positive	Positive
<b>Reversibility</b>	Yes	
<b>Irreplaceable loss of resources?</b>	Yes, impact of climate change on ecosystems	
<b>Can impact be mitigated?</b>	Yes	
<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 NetWorx S28 Energy should:

- Use the project to promote and increase the contribution of renewable energy to the national energy supply;
- Maximise the public's exposure to the project via an extensive communication and advertising programme;
- Implement a training and skills development programme for locals during the first 5 years of the operational phase. The aim of the programme should be to maximise the number of South African's employed during the operational phase of the project;
- Investigate the opportunities for establishing a Community Development Trust/Fund. The revenue for the trust should be derived from the income generated from the sale of energy from the plant. The Community Trust should be linked to funding and supporting projects and initiatives identified in the Kai! Garib IDP.

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

While the proposed S-Kol ZX PV Plant on its own is unlikely to result in an influx of job seekers during the operational phase, the proposed establishment of a number of solar energy projects in the Kai! Garib area is likely to attract job seekers to the area. These issues are similar to the concerns associated with the influx of jobs seekers during the construction phase and include:

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

The influx of job seekers will also place pressure on community services, such as housing, schools and clinics.

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

<b>Nature:</b> Potential impacts on family structures, social networks and community services associated with the influx of job seekers		
	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (3)	Local (2)
<b>Duration</b>	Permanent (5) (For job seekers that stay on the town)	Permanent (5) (For job seekers that stay on the town)
<b>Magnitude</b>	Low for the community as a whole (4) High-Very High for specific individuals who may be affected by STD's etc. (10)	Minor for community as a whole (2) 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>	Medium for the community as a whole (24) Medium -High for specific individuals who may be affected by STD's etc. (54)	Low for the community as a whole (27) Medium-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. Pressure on existing community services etc.		
<b>Residual impacts:</b> See cumulative impacts.		

### **Recommended mitigation measures**

It is almost impossible to stop people from coming to the area in search of a job. However, as indicated above, NetWorx S28 Energy should ensure that the employment criteria favour local residents in the area. In addition NetWorx S28 Energy should:

- NetWorx S28 Energy, in consultation with the Kai! Garib Municipality, should investigate the option of establishing a Local Community Forum to monitor and identify potential problems that may arise due to the influx of job seekers to the area. The Forum should also include the other proponents of solar energy projects in the area;
- Implement a policy that no employment will be available at the gate.

#### **4.4.4 Loss of farm labour**

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

While the proposed S-Kol PV Plant on its own is unlikely to result in a significant loss of farm labour, the proposed establishment of a number of solar energy projects in the Kai! Garib area has the potential to impact on the farming sector. However, at the end of the day farm labour can be replaced. The potential impacts on farm operations are therefore likely to be temporary.

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

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

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

<b>Nature:</b> Potential impact on local farmers associated with loss of farm labour to the operational phase		
	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local and Regional (3)	Local and Regional (2)
<b>Duration</b>	Short term (2) (Assumed that farm labour can be replaced)	Short term (2) (Assumed that farm labour can be replaced)
<b>Magnitude</b>	Low (4)	Low (4)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Low (27)	Low (24)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes, if farm workers return or are replaced	Yes, if farm workers return or are replaced
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impact be mitigated?</b>	Yes, to some degree. However, the risk cannot be eliminated	
<b>Mitigation:</b> See below		
<b>Cumulative impacts:</b> Impacts on farm operations due to loss of experienced farm labour		
<b>Residual impacts:</b> See cumulative impacts.		

#### **Recommended mitigation measures**

While NetWorx S28 Energy could liaise with local farmers in the area and undertake not to employ farm worker were possible, it is not possible to prevent farm workers from applying for work in other sectors. There are therefore no recommended mitigation measures. Also it is assumed that farm labour can be replaced. The impacts would therefore be temporary.

#### **4.4.5 Impact on productive agricultural land**

This issue relates to the potential long-term impact of the SEF and associated infrastructure on existing farming activities, specifically the loss of land for grazing. This loss may, in turn, impact on the viability of operations and the livelihoods of the affected farmers. As indicated above, the owner of the farm, Mr. Snyman, indicated that the loss of 400 ha will not impact on his current farming activities. In addition the rental income from the 20 year lease agreement with NetWorx S28 Energy more than compensates for any loss in farming related income.

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

<b>Nature:</b> Potential loss of productive agricultural land associated with the PV Plant footprint and associated potential impact on viability of operations		
	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (1)	Local (1)
<b>Duration</b>	Long term-permanent if disturbed areas are not effectively rehabilitated (5)	Short term if damaged areas are rehabilitated (1)
<b>Magnitude</b>	Minor (2)	Minor (2)
<b>Probability</b>	Highly Probable (4)	Highly Probable (4)
<b>Significance</b>	Medium (32)	Low (16)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes, disturbed areas can be rehabilitated	Yes, disturbed areas can be rehabilitated
<b>Irreplaceable loss of resources?</b>	Yes, loss of farmland. However, disturbed areas can be rehabilitated	Yes, loss of farmland. However, disturbed areas can be rehabilitated
<b>Can impact be mitigated?</b>	Yes, however, loss of farmland cannot be avoided	Yes, however, loss of farmland cannot be avoided
<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**

Recommendations for the construction phase should be implemented.

**4.4.6 Impact on sense of place and rural character of the landscape**

The components associated with the proposed facility will have a visual impact and, in so doing, impact on the landscape and rural sense of the place of the area. However, the proposed site is traversed by an Eskom power line and a rail way line. The visual integrity of the site has therefore been affected by existing infrastructure on the site. In terms of adjacent land owners, there are no farmsteads located in close proximity of the site that are likely to be visually impacted by the proposed facility. The PV panels on the site will also be screened from the N14 by the natural topography. The impact of the proposed PV Plant on the areas sense of place is therefore likely to be low.

The key findings of the specialist visual impact assessment (VIA) (MetroGIS, November, 2011) indicate that the PV plant is likely to be visually exposed to core area within and immediately surrounding the site for a distance of about 4km to the north, 2km to the east and west, and 1km to the south. Exposure to the far north and west is limited by the higher lying hilly terrain. These hills effectively screen

areas beyond from potential visual exposure. Beyond the core area, the river valley to the south west of the site is visually screened by virtue of the low lying incised topography. To the south, south east and east, however, the zone of potential visual exposure is concentrated within the river valley. Limited areas of visual exposure occur to the far north east and north-west, with the higher lying, hilly topography screening large areas. No towns or urban areas within the study area fall within the zone of potential visual exposure.

The specific findings of the VIA are summarised below.

**Potential visual impact on users of main and secondary roads in close proximity to the proposed PV plant**

Visual impacts on the N14 as it bypasses the site and on the secondary roads to the south east are expected to be of **high** significance, and may be mitigated to **moderate**.

**Potential visual impact on residents of farms and homesteads in close proximity to the proposed PV plant**

Visual impacts on residents of farms and homesteads within a radius of 4km of the site are expected to be of **high** significance, and may be mitigated to **moderate**.

**Potential visual impact on residents of urban areas in close proximity to the proposed PV plant**

Potential visual impacts on residents of this area are expected to be of **moderate** significance, and may be mitigated to **low**.

**Potential visual impact on sensitive visual receptors within the region**

The visual impact primarily on the R359 and R27, and to a lesser extent the N14 and secondary roads beyond the 4 km radius is expected to be of **moderate** significance before and after mitigation.

**Potential visual impact of the access roads on observers in close proximity to the proposed PV plant**

The visual impact is likely to be of **moderate** significance, but may be mitigated to **low**.

**Potential visual impact of the transformer, substation and other ancillary buildings on observers in close proximity to the proposed PV plant**

The visual impact is likely to be of **moderate** significance and may be mitigated to **low**.

**Potential visual impact of the proposed PV plant on the visual character of the landscape and the sense of place of the region**

The anticipated visual impact of the PV plant on the visual character of the landscape, and by implication, on the sense of place, is expected to be of **low** significance before and after mitigation.

**Table 4.14: 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 (3)	Local (1)
<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)	Low (27)
<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.

**4.4.7 Potential impacts on tourism**

The Kai! Garib IDP identifies tourism as a key development sector. However, as indicated above, the impact of the proposed PV Plant on the areas sense of place is likely to be low. The impact on the areas tourism potential and tourists travelling along the N14 is therefore likely to be low. In some instances the PV Plant may also attract tourists to the area. However, the significance of this potential benefit is also rated as low positive.

The VIA indicates that the study area is located within the Orange River region, which is a known tourist area. The N14 is an important tourist access routes on a national level, and within the region, it functions as part of the wine route meander. However, the findings of the VIA indicate that the visual impact on tourist access routes and tourist destinations within the region is likely to be of low significance both before and after mitigation.

**Table 4.15: Potential impact on tourism**

<b>Nature:</b> Potential impact of the PV 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> The proposed PV Plant is one of two SEFs proposed in the MM area. Due to size and height, of PV Plants, cumulative impacts are not rated significant.		
<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 ASSESSMENT POWER LINE OPTIONS**

The proposed facility includes the establishment of an overhead power (132kV) feeding into the Eskom electricity network at the existing Taiputs Substation. As indicated above, the area is impacted by an existing Eskom power line. The social impacts associated with the power line will therefore be low.

The VIA indicates that the potential visual impact of the power line connection between the Oasis / Oranje Switching Station 132kV power line and the on-site substation will occur as a result of the power line itself, as well as the associated servitude that will need to be cleared. The finding of the VIA is that the visual impact is likely to be of moderate significance. No mitigation is possible.

**Table 4.16: Assessment of transmission line**

<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.

**4.6 POTENTIAL HEALTH IMPACTS**

The primary environmental, health, and safety issues associated with solar energy involve how they are manufactured, installed, and ultimately disposed of. In particular, the manufacturing of photovoltaic cells often requires hazardous materials such as arsenic and cadmium. Even relatively inert silicon, a major material used in solar cells, can be hazardous to workers if it is breathed in as dust. Workers involved in manufacturing photovoltaic modules and components must consequently be protected from exposure to these materials. However, none of these potential hazards is much different in quality or magnitude from the innumerable hazards people face routinely in an industrial society. Through effective regulation, the dangers can very likely be kept at a very low level. In addition, the relevant risks essentially concern workers at the cell manufacturing plant (in this case likely overseas), and therefore this issue falls outside the scope of the EIA.

## **4.7 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 25 - 30 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.

Due to the relatively large number of people employed during the operational phase (~ 100-120), the decommissioning of the facility will have a negative social impact on the local community. However, these impacts can be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be Low (negative).

### **Recommended mitigation measures**

The following mitigation measures are recommended:

- NetWorx S28 Energy 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;
- NetWorx S28 Energy 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.

## **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 PV 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 PV 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, a number of PV Plants have been proposed for the Kai! Garib area. The relevant Environmental Authorities should therefore be aware of the potential cumulative impacts when evaluating applications. However, as indicated above, the potential impact of the proposed site on the areas sense of place and landscape character is low.

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

<b>Nature:</b> Visual impacts associated with the establishment of more than one PV 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 solar facilities in the area does have the potential to have a negative cumulative impact on the areas sense of place and the landscape. The environmental authorities should consider the overall cumulative impact on the rural character and the areas sense of place before a final decision is taken with regard to the optimal number of such plants in an area.

In addition to the potential negative impacts, the proposed S-Kol PV Plant also has the potential to result in significant positive cumulative impacts, specifically the establishment of a number of solar energy facilities in Kai! Garib area will create a number of socio-economic opportunities, which in turn, will result in a positive social benefit. The positive cumulative impacts include creation of employment, skills development and training opportunities, creation of downstream business opportunities and stimulation of the local property market.

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

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

**Assessment of No-Go option**

There is no impact as it maintains the current status quo. This would represent a lost socio-economic opportunity for the Kai! Garib Municipality.

**Recommended mitigation measures**

The proposed establishment of proposed PV Plant should be supported.

**4.9 ASSESSMENT OF NO-DEVELOPMENT OPTION**

As indicated above, South Africa currently relies on coal-powered energy to meet more than 90% of its energy needs. As a result South Africa is one of the highest per capita producers of carbon emissions in the world and Eskom, as an energy utility, has been identified as the world's second largest producer carbon emissions (Cape Times, 15 November 2007). The No-Development option would represent a lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy. The no-development option would also represent a significant lost socio-economic opportunity for the Kai! Garib Municipality. This would represent a High negative social cost.

However, at a provincial and national level, it should be noted that the NetWorx S28 Energy PV Plant development proposal is not unique. In that regard, a significant number of solar energy developments are currently proposed in the Northern Cape Province. Foregoing the proposed project development would therefore not

necessarily compromise the development of renewable energy facilities in South Africa.

**Table 4.19: 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		
	<b>Without Mitigation</b>	<b>With Mitigation<sup>12</sup></b>
<b>Extent</b>	Local-International (5)	Local-International (5)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	Moderate (6)	Moderate (6)
<b>Probability</b>	Highly Probable (4)	Highly Probable (4)
<b>Significance</b>	High (60)	High (60)
<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. 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.

<sup>12</sup> Assumes establishment of some form of Community Trust / Development Fund as discussed above.

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

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### **5.1 INTRODUCTION**

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

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

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

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

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

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);
- Northern Cape Provincial Growth and Development Strategy (2004-2014)
- Siyanda District Municipality Integrated Development Plan 2009-2012;
- Kai! Garib Municipality Integrated Development Plan (2009).

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

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

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

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

At a provincial level the NCPGDP notes that availability of inexpensive energy is a key requirement in order to promote economic growth in the Northern Cape. The NCGDS goes on to indicate that “the development of energy sources such as **solar energy**, the natural gas fields, bio-fuels, etc, could be some of the means by which new economic opportunity and activity is generated in the Northern Cape”.

At a local level the Kai! Garib IDP lists a number of strategies aimed at addressing poverty and unemployment in the region. These include, skills development and capacity building programmes especially amongst the youth, promotion of private sector and business partnerships as well as community partnerships, and promotion of BBEE and support for small business. The establishment of the proposed PV Plant therefore has the potential to support a number of key strategies listed in the IDP.

The findings of the review of the relevant policies and documents pertaining to the energy sector therefore indicate that solar energy and the establishment of solar energy plants are supported at a national, provincial, and local level. It is therefore the opinion of the authors that the establishment of a solar energy plant on the proposed site is supported by national, provincial and local policies and planning documents. However, the provincial and local policy and planning documents also make reference to the importance of tourism and the regions natural resources. Care therefore needs to be taken to ensure that the development of large renewable energy projects, such as the proposed solar energy facility do not impact on the region’s natural resources and the tourism potential of the Province.

### **5.1.1 Construction phase impacts**

The key social issues associated with the construction phase include:

#### **Potential positive impacts**

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

The construction phase for the 200 MW PV Plant is expected to extend over a period of 10-15 years and create approximately ~ 400 employment opportunities. It is anticipated that approximately 70 % (280) of the employment opportunities will be available to low skilled (construction labourers, security staff etc.) and semi-skilled workers (drivers, equipment operators etc.) and 30% (120) to skilled personnel (engineers, land surveyors, project managers etc.). The majority of the employment opportunities, specifically the low and semi-skilled opportunities, are likely to be available to local residents in the area, specifically residents from the towns of Keimoes and Kakamas and the other small settlements located next to the Gariep River. The majority of the beneficiaries are likely to be historically disadvantaged (HD) members of the community. This would represent a significant positive social benefit in an area with limited employment opportunities. However, the low education and skills levels in the area will hamper potential opportunities for local communities.

The capital expenditure associated with the construction of the 200 MW PV Plant phase will be in the region of R 3 billion . The total wage bill for the 3-4 year construction phase will be in the region of R 152 million. A percentage of the wage bill will be spent in the local economy which will create opportunities for local businesses in Keimoes, Kakamas and Upington. The sector of the local economy that is most likely to benefit from the proposed development is the local service industry. The potential opportunities for the local service sector would be linked to accommodation, catering, cleaning, transport and security, etc. associated with the construction workers on the site. The benefits to the local economy will however be confined to the construction period (10-15 years).

The contractors appointed during the construction phase are also likely to provide on-site training and skills development opportunities. However, the majority of benefits are likely to accrue to personnel employed by the relevant contractors. In the absence of specific commitments from the developer to employ local contractors the potential for meaningful skills development and training for members from the local communities may be limited.

The construction phase will also support a number of key strategies listed in the Kai! Garib IDP that are aimed at addressing poverty and unemployment in the region. These include, skills development and capacity building programmes especially amongst the youth, promotion of private sector and business partnerships as well as community partnerships, and promotion of BBEE and support for small business.

#### **Potential negative impacts**

- Impacts associated with the presence of construction workers on site
- Influx of job seekers to the area;
- Loss of farm labour to the construction phase;
- Increased risk of stock theft, poaching and damage to farm infrastructure associated with presence of construction workers on the site;
- Increased risk of veld fires;
- Impact of heavy vehicles, including damage to roads, safety, noise and dust;
- Potential loss of grazing 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. In addition, given that the majority of the low and semi-skilled construction workers can be sourced from the local area the potential risk to local family structures and social networks is regarded as low. However, the impact on individuals who are directly impacted on by construction workers and or job seekers (i.e. contract HIV/ AIDS) was assessed to be of Medium-High negative significance.

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

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

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

### 5.2.2 Operational phase

The key social issues affecting the operational phase include:

#### Potential positive impacts

- Creation of employment and business opportunities. The operational phase will also create opportunities for skills development and training;
- The establishment of infrastructure to generate renewable energy.

The operational phase will create approximately 100-120 full time jobs. Of this total approximately 10% of employment opportunities will be for skilled personnel (technicians, plant operators and management), ~20% for semi-skilled personnel (administrative, drivers etc.), and 70% for low skilled personnel (cleaning, security, support staff, etc.). The wage bill associated with the operational phase is estimated to be in the region of R25 million per year (current value). The majority of the employment opportunities associated with the operational phase are likely to benefit HD members of the community. The benefits to the local economy will extend over the 25-30 year operational lifespan of the project. However, given that the solar energy sector in South Africa is relatively new, the skilled positions may need to be filled by people from other parts of South Africa or even overseas.

The establishment of a number of solar energy facilities in the Kai! Garib region will also create significant economic opportunities for the area. The significance of this

impact is rated as High Positive. 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 High social benefit for society as a whole.

Due the large number of renewable energy facilities proposed in the area is it recommended that the Kai! Garib Municipal investigate the Community Development Trust / Fund model developed by the Theeswaterskloof LM in the Western Cape. In this regard the the Theeswaterskloof LM has made it a requirement for all potential renewable energy operators to contribute to a Community Development Trust / Fund. In terms of the structure of the Trust, a percentage of the revenue from the renewable energy operations is allocated to projects identified in the Theeswaterskloof IDP. Of this total, 50% of the revenue is allocated to infrastructure projects and the remaining 50% to social projects and initiatives, such as skills development and training.

### **Potential negative impacts**

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

The significance of the potential negative impacts with mitigation was assessed to be of Low significance. 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 job seekers (i.e. contract HIV/ AIDS) was assessed to be of Medium-High negative significance.

The visual impacts on landscape character associated with large renewable energy facilities, such as PV 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 large, solar energy plants on the landscape is therefore likely to be a key issue in South Africa, specifically given South African's strong attachment to the land and the growing number of solar energy applications. However, the impact of the proposed Ofir-ZX PV Plant on the landscape character of the area is likely to be limited.

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

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

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

### 5.2.3 Assessment of cumulative impacts

The cumulative impacts associated with solar energy facilities, such as the proposed S-Kol PV Plant, are largely linked to the potential visual impacts and impact on the areas sense of place and landscape character. In the case of the proposed S-Kol PV Plant the significance of the potential cumulative social impacts, specifically the impact on the areas sense of place, was rated to be low. This is due to the existing power line that traverses the site and the screening provided by the natural topography.

However, it is recommended that the environmental authorities consider the overall cumulative impact on the areas sense of place before a final decision is taken with regard to the optimal number of PV Plants 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.

In addition to the potential negative impacts, the establishment of a number of solar energy facilities in the area, including the S-Kol PV Plant, has the potential to result in significant positive cumulative socio-economic impacts for the Kai! Garib Municipality. The positive cumulative impacts include creation of employment, skills development and training opportunities, creation of downstream business opportunities and stimulation of the local property market. These benefits represent a significant positive social benefit.

### 5.2.4 Transmission line options

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

### **5.2.5 Potential health impacts**

The primary environmental, health, and safety issues associated with solar energy involve how they are manufactured, installed, and ultimately disposed of. In particular, the manufacturing of photovoltaic cells often requires hazardous materials such as arsenic and cadmium. Even relatively inert silicon, a major material used in solar cells, can be hazardous to workers if it is breathed in as dust. Workers involved in manufacturing photovoltaic modules and components must consequently be protected from exposure to these materials. However, none of these potential hazards is much different in nature and or magnitude from the innumerable hazards people face routinely in an industrial society. Through effective regulation, the dangers can very likely be kept at a very low level. In addition, the relevant risks essentially concern workers at the cell manufacturing plant and therefore fall outside the scope of the EIA.

### **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 PV Plant. This represents a significant negative social cost for the Kai! Garib Municipality.

However, at a provincial and national level, it should be noted that the NetWorx S28 Energy PV Plant development proposal is not unique. In this regard, a significant number of solar energy projects are currently proposed in the Northern Cape Province. Foregoing the proposed PV Plant development would therefore not necessarily compromise the development of renewable energy facilities in South Africa.

### **5.2.7 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 PV Plants 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 25-30 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.

Due to the relatively large number of people employed during the operational phase (~ 100-120), the decommissioning of the facility will have a negative social impact on the local community. However, these impacts can be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be Low (negative).

NetWorx S28 Energy should also investigate the option of establishing an Environmental Rehabilitation Trust Fund to cover the costs of decommissioning and rehabilitation of disturbed areas. The Trust Fund should be funded by a percentage of the revenue generated from the sale of energy to the national grid over the 25-30

year operational life of the facility. The rationale for the establishment of a Rehabilitation Trust Fund is linked to the experiences with the mining sector in South Africa and failure of many mining companies to allocate sufficient funds during the operational phase to cover the costs of rehabilitation and closure.

### **5.3 CONCLUSIONS AND RECOMMENDATIONS**

The findings of the SIA indicate that the development of the proposed S-Kol NetWorx S28 Energy PV Plant will create employment and business opportunities for locals during both the construction and operational phase of the project. In addition, the proposed establishment of a number of renewable energy facilities in the Kai! Garib Municipality, including the proposed S-Kol NetWorx S28 Energy PV Plant, will create significant socio-economic opportunities, which, in turn, will result in a positive social benefit. The significance of this impact is rated as High Positive.

NetWorx S28 Energy, in consultation with the Kai! Garib Municipality, should also investigate the opportunities for establishing a Community Development Trust / Fund that is linked to other proposed renewable energy projects in the area. The revenue for the trust / fund would be derived from the income generated from the sale of energy from the plant. The Community Trust / Fund should be linked to funding and supporting projects and initiatives identified in the Kai! Garib IDP. The mitigation measures listed in the report to address the potential negative impacts during the construction phase should also be implemented.

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 Ofir-ZX NetWorx S28 Energy PV Plant is therefore supported by the findings of the SIA.

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

### **5.4 IMPACT STATEMENT**

The findings of the SIA undertaken for the proposed S-Kol NetWorx S28 Energy PV Plant indicate that the development will create employment and business opportunities for locals during both the construction and operational phase of the project. In doing so the establishment of the proposed PV Plant will support a number of key strategies listed in the IDP aimed at addressing poverty and unemployment. The establishment of a number of solar energy facilities in the area also has the potential to create significant socio-economic opportunities for the Kai! Garib Municipality. 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: LIST OF SOURCES

### Interviews<sup>13</sup>

- Ali Diteme, Dept. Energy NC, 07/09/2010;
- Mr. J Synman, owner of Geelkop 456, 01/11/2011;
- Mr J. MacKay, Kai !Garib LM Municipal Manager, 07/09/2010;
- Mr G. Present, Siyanda DM IDP Officer, 06/09/2010;
- Ms. C. Titus, Kai !Garib LM IDP Officer, 06/09/2010;
- Ms. Tanya Andersen, WESSA NC, 06/09/2010
- Ms Yolandi de Jager, Planner Kai !Garib, 02/11/2011;

### Documents

- Australian Environment Protection and Heritage Council (EPHC), *National Wind Farm Development Guidelines DRAFT* - July 2010;
- Barbour (2011). *Social Assessment for Scoping of Ofir-ZX PV Plant*. Prepared for the Savannah Environmental Consulting;
- Barbour and Rogatschnig (March, 2010). *Social Impact Assessment for Upington Solar Thermal Plant*. Prepared for Savannah Environmental;
- MetroGIS (Pty) Ltd. Visual Impact Assessment Proposed S-Kol PV Plant (November, 2011).
- Northern Cape Provincial Growth and Development Strategy (2004-2014)
- Pixley ka Seme District Municipality Integrated Development Plan 2009-2012;
- Kai! Garib Municipality Integrated Development Plan (2009).
- Republic of South Africa: *Department of Energy (2011). Draft Integrated Electricity Resource Plan for South Africa – 2010 to 2030: IRP 2010*.
- Republic of South Africa (2008). *National Energy Act, Act nr. 34 of 2008*.
- Republic of South Africa (2003). *White Paper on Renewable Energy*.
- Warren, Charles R. and Birnie, Richard V.(2009) 'Re-powering Scotland: Wind Farms and the 'Energy or Environment?' Debate', *Scottish Geographical Journal*, 125: 2, 97 – 126;

### Internet

- [www.capegaetway.gov.za](http://www.capegaetway.gov.za) (Municipal profile information).
- [www.demarcation.org.za](http://www.demarcation.org.za) (Census 2001 data).
- Google Earth 2010.

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<sup>13</sup> The interviews undertaken in 2010 related to the McTaggart's Camp Solar Energy Facility which is located ~ 40 km north-east of Keimoes. This site is also located within the Kai! Garib Municipality and the interviews are therefore relevant.

## ANNEXURE B: ASSESSMENT METHODOLOGY

### 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 PLAN

### 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 wind energy 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>	NetWorx S28 Energy, in consultation with the Kai! Garib Local Municipality, 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. NetWorx S28 Energy 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>• Ensure that 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>• NetWorx S28 Energy and contractors</li> <li>• NetWorx S28 Energy</li> <li>• NetWorx S28 Energy</li> <li>• NetWorx S28 Energy</li> <li>• NetWorx S28 Energy</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</li> </ul>

	commences.
<b>Performance Indicator</b>	<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>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>• NetWorx S28 Energy 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**

<b>Project component/s</b>	Construction and establishment activities associated with the establishment of the wind energy facility, including infrastructure etc.	
<b>Potential Impact</b>	The presence of construction workers who live outside the area and who are housed in local towns can impact on family structures and social networks.	
<b>Activity/risk source</b>	The presence of construction workers can impact negatively on family structures and social networks, especially in small, rural communities.	
<b>Mitigation: Target/Objective</b>	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.	
<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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 undertake the required work;</li> </ul>	<ul style="list-style-type: none"> <li>• NetWorx S28 Energy and contractors</li> <li>• NetWorx S28 Energy</li> <li>• NetWorx S28 Energy</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> <li>• MF established before construction phase commences.</li> </ul>

<ul style="list-style-type: none"> <li>• Establish a Monitoring Forum (MF) consisting of representatives from the local community, local police, local farming community and the contractor prior to the commencement of the construction phase;</li> <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>• NetWorx S28 Energy</li> <li>• NetWorx S28 Energy and contractors</li> <li>• NetWorx S28 Energy and contractors and CLC</li> <li>• Contractors</li> <li>• Contractors</li> <li>• Contractors</li> <li>• Contractors</li> </ul>	<ul style="list-style-type: none"> <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>
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**Performance Indicator**

- Employment policy and tender documents that sets out local employment and targets completed before construction phase

	<ul style="list-style-type: none"> <li>commences;</li> <li>80 % of semi and unskilled labour locally sourced;</li> <li>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 construction phase;</li> <li>Briefing session with construction workers held at outset of construction phase</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>NetWorx S28 Energy 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 wind energy 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 also 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>The housing of construction workers on the site should be limited to security personnel;</li> <li>Establish 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</li> </ul>	<ul style="list-style-type: none"> <li>NetWorx S28 Energy and contractors</li> <li>NetWorx S28 Energy</li> <li>NetWorx S28 Energy and contractor</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 NetWorx S28 Energy and the contractors before the contractors move onto site;</li> <li>Inform all construction workers of Code of Conduct requirements before</li> </ul>

<p>conduct for workers. All dismissals must be in accordance with South African labour legislation.</p> <ul style="list-style-type: none"> <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>• Contractors</li> <li>• Contractors</li> </ul>	<p>construction phase commences.</p> <ul style="list-style-type: none"> <li>• Compensate Farmers / community members within 1 month of claim being verified by NetWorx S28 Energy and or Contractor/s.</li> </ul>
<p><b>Performance Indicator</b></p>	<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> <li>• Compensation claims settled within 1 month of claim being verified by Community MF.</li> </ul>	
<p><b>Monitoring</b></p>	<ul style="list-style-type: none"> <li>• NetWorx S28 Energy 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.**

<p><b>Project component/s</b></p>	<p>Construction and establishment activities associated with the establishment of the wind energy facility, including infrastructure etc.</p>	
<p><b>Potential Impact</b></p>	<p>Heavy vehicles can generate noise and dust impacts. Movement of heavy vehicles can also damage roads.</p>	
<p><b>Activity/risk source</b></p>	<p>The movement of heavy vehicles and their activities on the site can result in noise and dust impacts and damage roads.</p>	
<p><b>Mitigation: Target/Objective</b></p>	<p>To avoid and or minimise the potential noise and dust impacts associated with heavy vehicles, and also minimise damage to roads.</p>	
<p><b>Mitigation: Action/control</b></p>	<p><b>Responsibility</b></p>	<p><b>Timeframe</b></p>
<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</li> </ul>	<ul style="list-style-type: none"> <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</li> </ul>

<ul style="list-style-type: none"> <li>• 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> </ul>	<p>the construction phase commences.</p> <ul style="list-style-type: none"> <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>
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<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>• NetWorx S28 Energy 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 wind energy facility and associated infrastructure.
<b>Potential Impact</b>	The footprint of the solar energy facility 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 facility and associated infrastructure.
<b>Mitigation: Target/Objective</b>	To minimise the loss of land taken up by the solar energy facility and associated infrastructure and to enable farming activities to continue where possible, specifically grazing.

Mitigation: Action/control	Responsibility	Timeframe
<ul style="list-style-type: none"> <li>Minimise the footprint of the solar energy 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>ECO And NETWORKX S28 ENERGY</li> <li>ECO and Contractors</li> </ul>	<ul style="list-style-type: none"> <li>Footprint for wind energy facility should be defined in the Construction EMP before construction phase commences.</li> <li>Rehabilitation should be on-going and completed within 3 months of the completion of the construction phase.</li> </ul>
<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>Footprint of solar energy 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 solar energy 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 solar energy facility will create approximately 80 full time employment opportunities.	
<b>Mitigation: Target/Objective</b>	In the medium to long term employ as many locals as possible to fill the 80 full time employment opportunities.	
<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
<ul style="list-style-type: none"> <li>NetWorx S28 Energy should commit to implementing a 5-year training and skills development and training programme.</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>NetWorx S28 Energy</li> <li>NetWorx S28 Energy</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>NetWorx S28 Energy 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 solar energy 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 (80) 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 solar energy facility.	
<b>Mitigation: Target/Objective</b>	To avoid and or minimise the potential social impacts associated with decommissioning phase of the solar energy 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>NetWorx S28 Energy</li> </ul>	<ul style="list-style-type: none"> <li>When solar energy 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>NetWorx S28 Energy and Department of Labour.</li> </ul>	