

# **SOCIAL IMPACT ASSESSMENT**

## **BRYPAAL 100 MW PHOTOVOLTAIC SOLAR POWER FACILITY**

### **NORTHERN CAPE PROVINCE**

**MAY 2017**

**Prepared**

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# **EXECUTIVE SUMMARY**

## **INTRODUCTION AND LOCATION**

Bosica Environmental Solutions (Bosica) was appointed by Vintage Energy (Pty) Ltd to manage the Environmental Impact Assessment (EIA) process for the proposed 100 MW Brypaal Photovoltaic Power Facility (PVPF)<sup>1</sup> located in the Kai !Garib Local Municipality, ± 52 km south west of the town of Kakamas.

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

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

The proposed Solar Facility will have a peak power generating capacity of approximately 100 MW, and will consist of the following:

- Module Mounting structures 2 tier;
- String Inverters – 60 KVA;
- PV Modules – 250 WP;
- Meteor stations;
- Power reducer Boxes;
- Power Plant Controllers;
- Cluster Controllers;
- LV Substations;
- MV Substations;
- Access roads (temporary & permanent roads);
- Permanent office/workshop building.

A temporary laydown area was identified [workshops, mobile offices, mobile ablution facilities, material storage area, vehicle parking area, water tanks for drinking, construction and dust suppression) fencing, etc.]. The main activities during the construction phase area:

- Permanent living quarters for operational phase workers (only for residential staff). The rest of the staff will stay in Kakamas;

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<sup>1</sup> The term Photovoltaic Power Facility (PVPF) and Solar Energy Facility (SEF) are used interchangeably in the report.

- Equipment (Trucks & front-end loaders, excavators, cranes, etc.);
- Topsoil/Overburden stockpiles/fill material. Topsoil stripping and stockpiling will be required only for the service roads and sub-station foundations. No concrete slabs or foundations are required for the screw-in pylons;
- Opencast quarries/excavations for cut and fill material. Very limited for roads and sub-station only, the rest of the construction site will follow a non-destructive-surface-topography approach because no foundations are required for the screw-in pylons;
- Water storage facilities (reservoir, tanks, etc.) mainly for construction phase;
- Water Desalination plant (pipelines towards water storage and power plant). Very small, just for standby water supply. The rest of the operational water will be transported from Kakamas or extracted from boreholes. Limited water is required for the washing of the PV-panels because nano-technology will be applied to the surface of the panels, which keeps it virtually clean for very long periods of time and washing of the panels will be required only once a year or even longer intervals;
- Waste handling facilities (for construction & operational phase). Solid, hydrocarbon and liquid waste to be sorted on site and keep in certified appropriate containers and to be removed to certified land fill sites.
- Surface run-off control systems. A non-destructive surface topography will be followed during the construction phase, drainage systems will be avoided, therefore surface runoff structures for instance trenches, canals, etc. will not be implemented and no large scale desalination plants and evaporation ponds will be constructed because of low water requirements for operational phase.
- A 400kV high voltage overhead grid connection of approximately 500 m between the substation at the solar facility and the Aries – Kokerboom 400 KV line.

Total footprint of the 100 MW PV solar farm will be approximately 320 ha. The terms of the land owner agreement for this project provides allowance for a 36 month construction period and foresees the use as a PV Solar facility for up to 25 years.

During this period, it is anticipated that the PV modules may be replaced, however the primary plant and electrical infrastructure would be suitable for this intended project life.

### **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 have been endorsed by the national Department of Environmental Affairs (DEA), and 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.

### **SUMMARY OF KEY FINDINGS**

The assessment section is divided into:

- 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 power line alignments;
- Assessment of the "no development" alternative;
- Assessment of cumulative impacts.

## **POLICY AND PLANNING ISSUES**

The findings of the review indicate that renewable, including solar energy, is strongly supported at a national, provincial 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 development of and investment in renewable energy is also supported by the National Development Plan (NDP), New Growth Path Framework and National Infrastructure Plan, which all refer to renewable energy.

The proposed SEF also supports a number of objectives contained in the NCP Provincial Growth and Development Strategy and the ZFMDM and KGLM IDP, specifically promotion of socio-economic development, SMME's, job creation and private sector investment. The findings of the SIA also indicate that unemployment and poverty levels in the study area are high. In this regard, the proposed SEF has the potential to support local economic development and create employment opportunities. The proposed development therefore supports a number of key objectives contained in the KGLM IDP. The KGLM also identifies solar energy as a growth opportunity within the local economy.

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 suitably sited solar energy facilities is supported at a national, provincial, and local level. It is therefore the opinion of the authors that the establishment of a SEF in the area is supported by national, provincial and local policies and planning documents.

## **CONSTRUCTION PHASE**

The key social issues associated with the construction phase include:

### **Potential positive impacts**

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

Based on information from other SEF projects, the construction phase for a 100 MW PVPF is expected to extend over a period of 18-24 months and create approximately 300 employment opportunities, depending on the final design. Of this total  $\pm$  60% (180) will be available to low-skilled workers (construction labourers, security staff etc.), 25% (75) to semi-skilled workers (drivers, equipment operators etc.) and 15% (45) to skilled personnel (engineers, land surveyors, project managers etc.). The total wage bill for the construction phase is estimated to be in the region of R 50 million (2017 rand value). 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 Keimoes and Kakamas. The majority of the beneficiaries are likely to be historically disadvantaged (HD) members of the

community. This would represent a significant positive social benefit in an area with limited employment opportunities. However, in the absence of specific commitments from the developer to employ local contractors the potential for meaningful skills to local employment targets the benefits for members from the local communities may be limited. In addition, the low education and skills levels in the area may also hamper potential opportunities for local communities.

The potential benefits for local communities is confirmed by the findings of the Overview of the Independent Power Producers Procurement Programme (IPPPP) undertaken by the Department of Energy, National Treasury and DBSA (30 September 2016). The study found that employment opportunities created during the construction phase of the projects implemented to date had created 61% more jobs than anticipated. The study also found that significantly more people from local communities were employed during construction than was initially planned. In this regard, the expectation for local community participation was 6 771 job years. To date 15 215 job years have been realised (i.e. 125% greater than initially planned). Black South African citizens, youths and rural or local communities have been the major beneficiaries during the construction phases, as they respectively represent 80%, 41% and 52% of total job opportunities created by IPPs to date.

The capital expenditure associated with the construction phase will be in the region of R 2.5 billion (2017 rand value). A percentage of the wage bill will also be spent in the local economy which will create opportunities for local businesses in Kakamas, Keimoes 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.

### **Potential negative impacts**

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

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

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

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

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

## **OPERATIONAL PHASE**

### **Potential positive impacts**

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

### ***Development of renewable energy infrastructure***

The establishment of renewable energy infrastructure, such as the proposed Brypaal PVPF, should be viewed, firstly within the context of the South Africa's current reliance on coal powered energy to meet the majority of its energy needs, and secondly, within the context of the success of the REIPPPP.

The Green Jobs study (2011) notes that South Africa has one of the most carbon-intensive economies in the world, thus making the greening of the electricity mix a national imperative. The Greenpeace Report (Powering the future: Renewable Energy Roll-out in South Africa, 2013), notes that within a broader context of climate change, coal energy does not only have environmental impacts, it also has socio-economic impacts. Acid mine drainage from abandoned mines in South Africa impacts on water quality and poses the biggest threat to the country's limited water



resources. Huge volumes of water are also required to wash coal and cool operating power stations.

The Green Jobs study (2011) identifies a number of advantages associated with wind power as a source of renewable energy, including zero carbon dioxide (CO<sub>2</sub>) emissions during generation and low lifecycle emissions. Greenhouse gases (GHG) associated with the construction phase are offset within a very short period of time compared with the project's lifespan. Wind power therefore provides an ideal means for reaching emission reduction targets in a relatively easy manner. In addition, and of specific relevance to South Africa, wind as energy source is not dependent on water (as compared to the massive water requirements of conventional power stations), has a limited footprint and therefore does not impact on large tracts of land, poses limited pollution and health risks, specifically when compared to coal and nuclear energy plants.

In terms of investment, the REIPPPP has attracted R53.4 billion in foreign investment and financing in the six bid windows (BW1 – BW4 and 1S2). This is more than double the inward FDI attracted into South Africa during 2015 (R22.6 billion). In terms of local equity shareholding, 47% (R31.5 billion) of the total equity shareholding (R66.7 billion) was held by South African's across BW1 to BW4 and BW1S2. As far as Broad Based Black Economic Empowerment is concerned, Black South Africans own, on average, 31% of projects that have reached financial close. The combined (construction and operations) procurement value for BW1 to BW4 and 1S2 is projected as R142.9 billion, of which R44.3 billion has been spent to date. In terms of employment, a total of 28 4842 job years<sup>2</sup> have been created for South African citizens, of which 26 207 were in construction and 2 276 in operations.

The establishment of renewable energy facilities, such as the Brypaal PV, therefore not only address the environmental issues associated with climate change and consumption of scarce water resources, but also creates significant socio-economic opportunities and benefits, specifically for historically disadvantaged, rural communities.

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

The total number of permanent employment opportunities is estimated to be in the region of 20. Of this total ~ 12 are low skilled workers, 6 semi-skilled and 2 skilled. The annual wage bill for the operational phase will be ~ R 3 million (2017 Rand value). The majority of the low and semi-skilled beneficiaries are likely to be historically disadvantaged (HD) members of the community. Given the location of the proposed facility the majority of permanent staff is likely to reside in the towns of Kakamas and Keimoes.

Procurement during the operational phase will also create opportunities for the local economy and businesses. In this regard, the overview of the IPPPPP (2016) notes that the procurement spend over the 20 year operational phase for BW1 to BW4 and 1S2 will be in the region of R 70 billion. The Green Jobs study (2011) also found that energy generation is expected to become an increasingly important contributor to

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<sup>2</sup> The equivalent of a full-time employment opportunity for one person for one year

green job creation over time, as projects are constructed or commissioned. The study notes that largest gains are likely to be associated with operations and maintenance (O&M) activities. In this regard, operations and maintenance employment linked to renewable energy generation plants will also be substantial in the longer term.

### **Community Trust**

The establishment of a community benefit structure (typically, a Community Trust) also creates an opportunity to support local economic development in the area. The requirement for the project to allocate funds to socio-economic contributions (through structures such as Community Trusts) provides an opportunity to advance local community projects, which is guaranteed for a 20 year period (project lifespan). The revenue from the proposed SEF can be used to support a number of social and economic initiatives in the area, including but not limited to:

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

The 2016 IPPP Overview notes that to date (across 6 bid windows) a total contribution of R19.3 billion has been committed to Socio-economic Development (SED) initiatives linked to Community Trusts. Of this total commitment, R15.2 billion has been specifically allocated to local communities where the IPPs operate. The Green Jobs study (2011), found that the case for wind power is enhanced by the positive effect on rural or regional development. Wind farms located in rural areas create an opportunity to benefit the local and regional economy through the creation of jobs and tax revenues.

The long term duration of the contributions from the SEF also enables local municipalities and communities to undertake long term planning for the area. Experience has, however, shown that Community Trusts can be mismanaged. This issue will need to be addressed in order to maximise the potential benefits associated with the establishment of a Community Trust or other community benefit structure (entity). The REIPPP programme does however have stringent audit requirements in place to try and prevent the mismanagement of trusts.

### **Potential negative impacts**

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

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

The visual impacts on landscape character associated with large renewable energy facilities, such as SEFs, are highlighted in the research undertaken by Warren and

Birnie (2009). In the South African context, the majority of South Africans have a strong connection with and affinity for the large, undisturbed open spaces that are characteristic of the South African landscape. The impact of large, solar energy plants on the landscape is therefore likely to be a key issue in South Africa, specifically given South African's strong attachment to the land and the growing number of solar energy applications. However, in the case of the proposed PVPF the impact on the areas sense of place with mitigation is likely to be low. The significance of the impacts associated with the operational phase are summarised in Table 2.

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

<b>Impact</b>	<b>Significance No Mitigation</b>	<b>Significance With Mitigation</b>
<b>Promotion of renewable energy projects</b>	High (Positive impact)	High (Positive impact)
<b>Creation of employment and business opportunities</b>	Low (Positive impact)	Medium (Positive impact)
<b>Establishment of Community Trust</b>	Medium (Positive impact)	High (Positive impact)
<b>Generate income for affected landowner/s</b>	Low (Positive impact)	Medium (Positive impact)
<b>Impact on agricultural land</b>	Low (Negative impact)	Low (Negative impact)
<b>Visual impact and impact on sense of place</b>	Medium (Negative impact)	Low (Negative impact)
<b>Impact on tourism</b>	Low (Positive and Negative)	Low (Positive and Negative)

## **CUMULATIVE IMPACTS**

### ***Cumulative impact on sense of place***

In addition to the proposed PVPF, one other SEF is proposed in the immediate vicinity of the site. In addition, a number of other SEFs are proposed to the vicinity of Kenhardt. The potential for cumulative impacts associated with combined visibility (whether two or more solar facilities will be visible from one location) and sequential visibility (e.g. the effect of seeing two or more solar facilities along a single journey, e.g. road or walking trail) does therefore exist. However, with careful planning, the visual impacts associated with SEFs tend to be low. The visibility of the proposed SEFs will also be mitigated by the low-scale nature of SEFs. The potential cumulative impacts associated with combined visibility (whether two or more wind farms (solar facilities) will be visible from one location) and sequential visibility (e.g. the effect of seeing two or more wind farms (solar facilities) along a single journey, e.g. road or walking trail) are therefore likely to be low.

However, the potential impact of solar facilities on the landscape is an issue that does need to be considered, specifically given South African's strong attachment to the land and the growing number of solar plant applications. With regard to the area, a number of SEFs have been proposed in the NCP. The Northern Cape Environmental

Authorities should therefore be aware of the potential cumulative impacts when evaluating applications.

### ***Cumulative impact on services***

The establishment of the proposed SEF and the other renewable energy facilities in the KGLM will place pressure on local services in the towns of Kakamas and Keimoes, specifically medical, education and accommodation. This pressure will be associated with the influx of workers to the area associated with the construction and operational phases of the renewable energy projects proposed in the area, including the proposed SEF. The potential impact on local services can be mitigated by employing local community members. The presence of non-local workers during both the construction and operation phase will also place pressure on property prices and rentals. As a result, local residents, such as government officials, such as municipal workers, school teachers and the police, may no longer be able to buy or afford to rent accommodation in Kakamas and Keimoes. With effective mitigation the impact is rated as **Low Negative**.

However, as indicated below, this impact should also be viewed within the context of the potential positive cumulative impacts for the local economy associated with the establishment of a renewable energy hub in the KGLM. These benefits will create opportunities for investment in Kakamas and Keimoes, including the opportunity to up-grade and expand existing services and the construction of new houses. In this regard, the establishment of a renewable energy hub will create a unique opportunity for the KGLM to develop. It should also be noted that it is the function of national, provincial and local government to address the needs created by development and provide the required services. The additional demand for services and accommodation created by the establishment of development renewable energy projects in the KGLM should therefore be addressed in the Integrated Development Planning process undertaken by the KGLM and ZFMDM.

### ***Cumulative impact on local economies***

In addition to the potential negative impacts, the establishment of the proposed PVPF and other renewable energy projects in the area also has the potential to create a number of socio-economic opportunities for the KGLM and ZFMDM, 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. This benefit is rated as **High Positive** with enhancement.

## **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 SEFs decommissioning phase is likely to involve the disassembly and replacement of the existing components with more modern technology. This is likely to take place in the 20-25 years post commissioning. The decommissioning phase is therefore likely to create additional, construction type jobs, as opposed to the jobs losses typically associated with decommissioning.

Given the relatively small number of people employed during the operational phase ( $\pm 20$ ), the potential negative social impact on the local economy associated with decommissioning will be limited. In addition, the potential impacts associated with the decommissioning phase can also be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be Low (negative).

In terms of closure costs, the revenue from the sale of scrap metal from the PV plant should be allocated to cover the costs associated with closure and the rehabilitation of disturbed areas.

## **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 SEF, and the benefits associated with the establishment of a Community Trust. This also represents a negative social cost.

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

## **CONCLUSIONS AND RECOMMENDATIONS**

The findings of the SIA indicate that the development of the proposed Brypaal PVPF will create employment and business opportunities for locals during both the construction and operational phase of the project.

The establishment of a Community Trust will also benefit the local community. The enhancement measures listed in the report should be implemented in order to maximise the potential benefits. The significance of this impact is rated as **High Positive**. The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the negative environmental and socio-economic impacts associated with a coal based energy economy and the challenges created by climate change, represents a significant positive social benefit for society as a whole. The findings of the SIA also indicate that the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) has resulted in significant socio-economic benefits, both at a national level and at a local, community level. These benefits are linked to foreign Direct Investment, local employment and procurement and investment in local community initiatives. The establishment of the proposed Brypaal PVPF is therefore supported by the findings of the SIA.

Due the number of other renewable energy projects proposed in the KGLM, it is recommended that the KGLM liaise with the proponents to investigate how best the Community Trusts can be established and managed to promote and support local, socio-economic development in the region as a whole.

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.

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## ACRONYMS

DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning
DM	District Municipality
HD	Historically Disadvantaged
EIA	Environmental Impact Assessment
KGLM	Kai !Garib Local Municipality
KHLM	//Khara Hais Local Municipality
IDP	Integrated Development Plan
IPP	Independent Power Producer
kV	Kilovolts
LED	Local Economic Development
LM	Local Municipality
NC	Northern Cape
NCPPGDS	Northern Cape Province Provincial Growth and Development Strategy
NCSDF	Northern Cape Spatial Development Framework
MW	Megawatt
PGDS	Provincial Growth and Development Strategy
SDF	Spatial Development Framework
SEF	Solar Energy Facility
SIA	Social Impact Assessment
ZFMDM	ZF MCGAWU District Municipality

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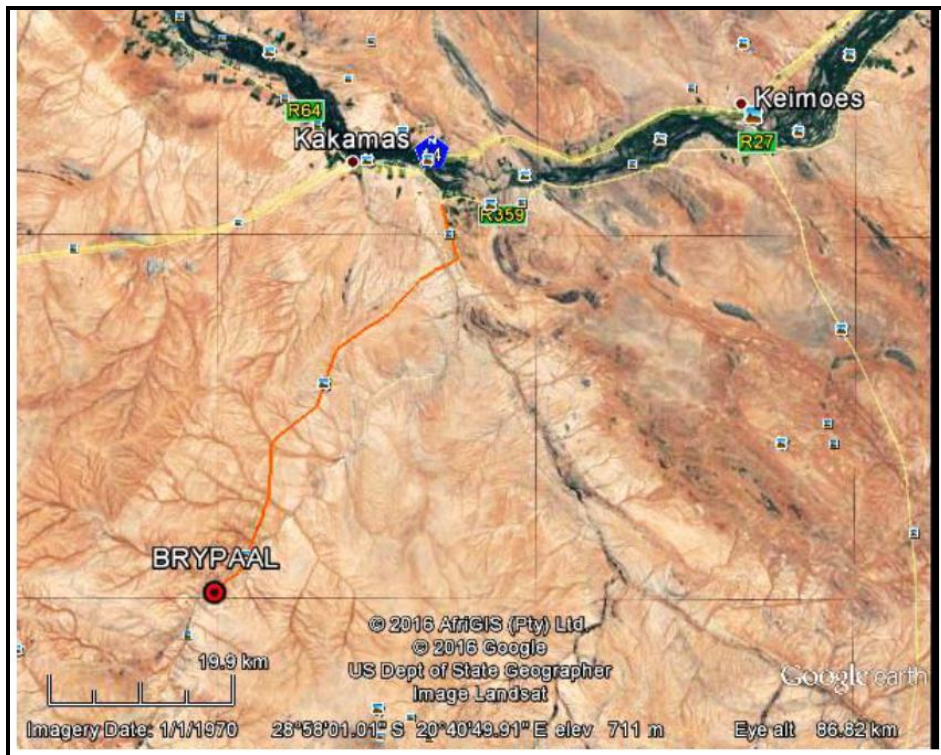
# SECTION 1: INTRODUCTION

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## 1.1 INTRODUCTION

Bosica Environmental Solutions (Bosica) was appointed by Vintage Energy (Pty) Ltd to manage the Environmental Impact Assessment (EIA) process for the proposed 100 MW Bypaal Photovoltaic Power Facility (PVPF)<sup>3</sup> located in the Kai!Garib Local Municipality (KGLM), ~ 52 km south of the town of Kakamas.

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



**Figure 1.1: Regional location of Brypaal Photovoltaic Power Facility**

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<sup>3</sup> The term Photovoltaic Power Facility (PVPF) and Solar Energy Facility (SEF) are used interchangeably in the report to describe the project.

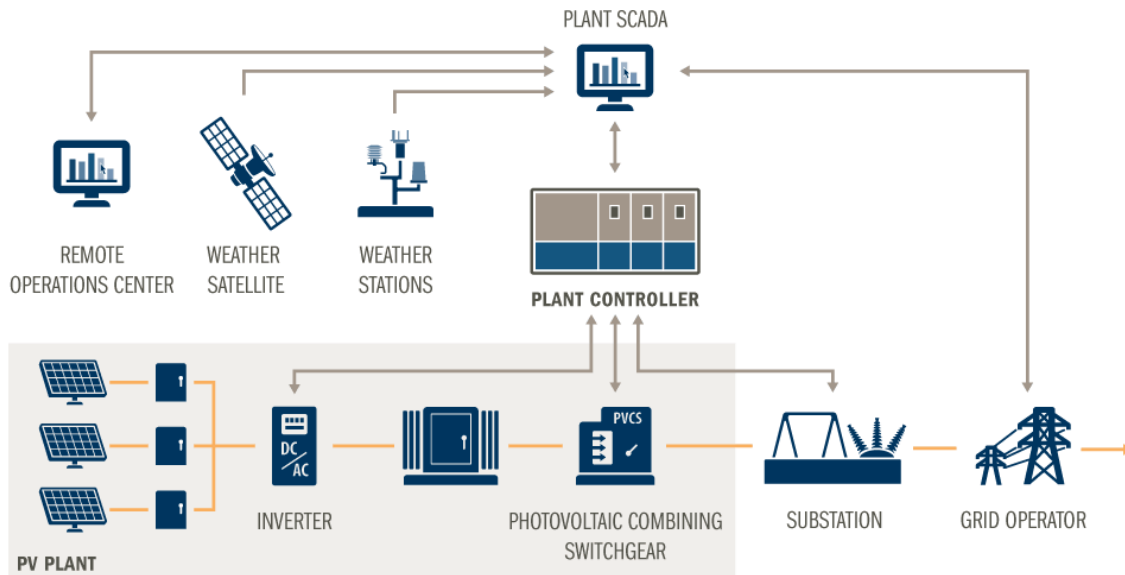
## 1.2 TERMS OF REFERENCE

The terms of reference for the SIA require:

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

## 1.3 PROJECT DESCRIPTION

Photovoltaic solar power (also called PV) systems uses crystalline silicon cells that forms a p-n junction ('p' for positive and 'n' for negative) by diffusing phosphorous into the silicon and introducing a small quantity of boron. This then results in an electric field being formed. When photons are absorbed by a PV cell, electrons under the influence of the field move out towards the surface. This flow or current is harnessed by an external circuit with a load. Figure 1.2 shows the components typically associated with a PV plant.



**Figure 1.2: Components associated with PV facility**



**Figure 1.3: Photograph of PV facility (Borthakur, 2017).**

The initial area under discussion was 1032 ha surface area and the second phase of evaluation identified approximately 650+ha in total. The actual project footprint will cover an area of  $\pm$  320 ha and depends on the surface areas required for the different components of the project. The proposed Solar Facility will have a peak power generating capacity of approximately 100 MW, and will consist of the following:

- Module Mounting structures 2 tier;
- String Inverters – 60 KVA;
- PV Modules – 250 WP;
- Meteor stations;
- Power reducer Boxes;
- Power Plant Controllers;
- Cluster Controllers;
- LV Substations;
- MV Substations;
- Access roads (temporary & permanent roads);
- Permanent office/workshop building.

A temporary laydown area was identified [workshops, mobile offices, mobile ablution facilities, material storage area, vehicle parking area, water tanks for drinking, construction and dust suppression) fencing, etc.]. The main activities during the construction phase area:

- Permanent living quarters for operational phase workers (only for residential staff). The rest of the staff will stay in Kakamas;
- Equipment (Trucks & front-end loaders, excavators, cranes, etc.);
- Topsoil/Overburden stockpiles/fill material. Topsoil stripping and stockpiling will be required only for the service roads and sub-station foundations. No concrete slabs or foundations are required for the screw-in pylons;
- Opencast quarries/excavations for cut and fill material. Very limited for roads and sub-station only, the rest of the construction site will follow a non-destructive-surface-topography approach because no foundations are required for the screw-in pylons;
- Water storage facilities (reservoir, tanks, etc.) mainly for construction phase;
- Water Desalination plant (pipelines towards water storage and power plant). Very small, just for standby water supply. The rest of the operational water will be transported from Kakamas or extracted from boreholes. Limited water is required for the washing of the PV-panels because nano-technology will be applied to the surface of the panels, which keeps it virtually clean for very long periods of time and washing of the panels will be required only once a year or even longer intervals;
- Waste handling facilities (for construction & operational phase). Solid, hydrocarbon and liquid waste to be sorted on site and keep in certified appropriate containers and to be removed to certified land fill sites.
- Surface run-off control systems. A non-destructive surface topography will be followed during the construction phase, drainage systems will be avoided, therefore surface runoff structures for instance trenches, canals, etc. will not be implemented and no large scale desalination plants and evaporation ponds will be constructed because of low water requirements for operational phase.
- A 400kV high voltage overhead grid connection of approximately 500 m between the substation at the solar facility and the Aries – Kokerboom 400 KV line.

Total footprint of the 100 MW PV solar farm will be approximately 320 ha. The terms of the land owner agreement for this project provides allowance for a 36 month construction period and foresees the use as a PV Solar facility for up to 25 years. During this period, it is anticipated that the PV modules may be replaced, however the primary plant and electrical infrastructure would be suitable for this intended project life. The constructional phase will create approximately 300 employment opportunities. The operational phase will employ approximately 20 people full time for a period of up to 20 years. The capital expenditure on completion is anticipated to be in the region of R 2.5 billion. The energy will be linked via an on-site substation to the Eskom grid. The project is therefore an Independent Power Producer (IPP) project.

## 1.4 SITE DESCRIPTION AND SURROUNDING LAND USES

The proposed Brypaal PVPF is located approximately 52 km south of the town of Kakamas, which is located on the southern banks of the Orange (Gariiep) River in the KGLM. Access to the site is via the gravel road to Loeriesfontein which joins the gravel road to Kenhardt approximately 9 km south of Kakamas and the R359. The Loeriesfontein Road provides the only access to the site and the farms located in the area.

The western boundary of the site is formed by the gravel road to Loeriesfontein, which runs along the eastern bank of the Sout River near the site (Figure 1.4). The general topography of the area is relatively flat, with no prominent features in the immediate vicinity of the site (Photograph 1.1). The site itself is located on a gently sloping area that slopes down towards the Sout River to the west. The site is bisected by two large drainage features that drain in a north westerly direction towards the Sout River (Figure 1.4).

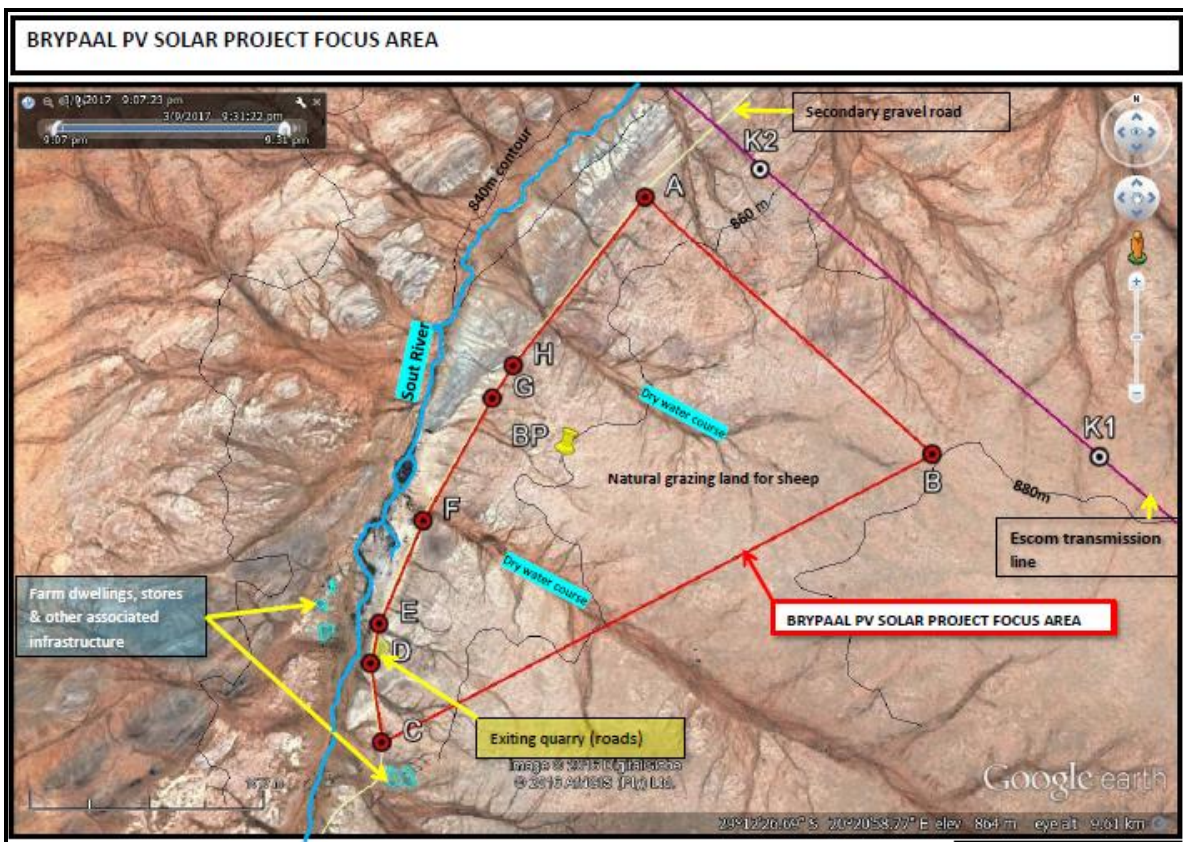


Figure 1.4: Site location of Brypaal PV facility



**Photograph 1.1: Gravel road to Loeriesfontein with site located on right and Eskom transmission line in the distance**



**Photograph 1.2: View north east wards towards site from Mr and Mrs Stadler's farmhouse**

Five farmsteads are located in the immediate vicinity of the site, namely the farmhouse inhabited by Mr and Mrs Human, located on the eastern bank of the Sout River, ~ 2 km to the north west of the site (Photograph 1.3), the farm houses occupied by Mr and Mrs Stadler and Mr Spangenberg (the current farm owner), located on the western bank of the Sout River, ~ 500 m from the south western boundary of the site (Photograph 1.4), and the farm house occupied by Mr and Mrs van Zyl, located approximately 300 m from the southern boundary of the site (Figure 1.4 and Photograph 1.5).

The main land use in the area is sheep farming, with some cattle. The water in the Sout River has very high salt content and is not suitable for livestock and or human consumption. All of the farm houses rely on rain water for drinking water. The water quality in the majority of the boreholes is poor and not suitable for human consumption.

An Eskom Transmission line that links with Namibia in the north, is located 800 m to the north of the site and runs in a north-west direction (Photograph 1.6).



**Photograph 1.3: Entrance to Mr and Mrs Human's farm**

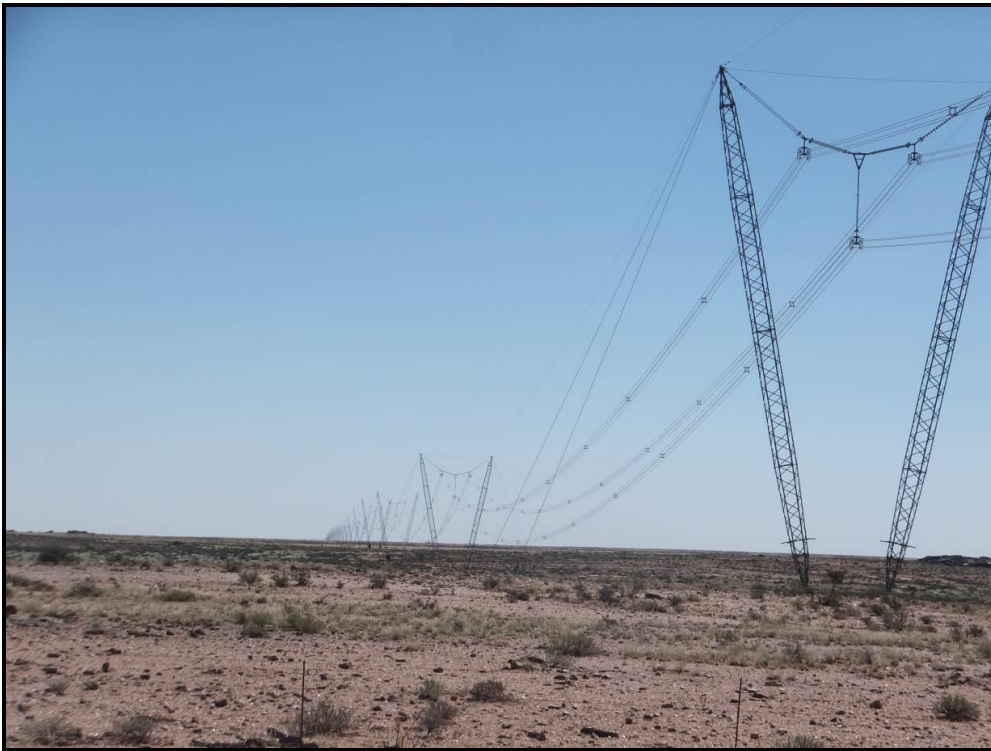




**Photograph 1.4: Mr and Mrs Stadler's farm house**



**Photograph 1.5: Entrance to Mr and Mrs van Zyl's farm house**



**Photograph 1.6: Eskom transmission line to the north of the site**

The study area is located in a region known as Bushmanland. Bushmanland encompasses a vast area south of the Orange River Valley east of Namaqualand, and north of Calvinia. Bushmanland is characterised by its extreme aridity, long, hot summers and its generally flat, sandy and rocky landscapes. Soils are generally shallow, and support mainly annual grasses and karroid scrub. The tree element is limited to suitable micro-environments, and generally occurs as solitary trees or in small groups. Quiver trees are endemic and distinctive of the region. The general lack of trees is also responsible for the characteristic sociable weaver nests on telephone poles along roads in the region.

Bushmanland is a summer rainfall region. Rainfall is however low ( $\sim 100$  mm/a), evaporation rates high, and episodic droughts frequent. Infrequent exceptional rainfall years are a further characteristic. The study area is drained by the ephemeral Hartebees River system. Due to the flat topography of the area, drainage lines are broad and shallow. In consequence, surface water sources are very limited.

As pointed out by the historian Nigel Penn, the term "Bushmanland" has less to do with the fact that the region was originally favoured by the Bushmen (San), than the fact that this extremely marginal area was a last refuge from colonial expansion when the term was coined. As Penn shows, until well into the 19<sup>th</sup> century, the region was generally considered too marginal for European settlement and was mainly used for grazing during exceptional rainfall years only (Penn, 2005). Sedentary farming only really became possible and widespread thanks to windpumps and boreholes during the first decades of the 20<sup>th</sup> century. All farming operations are completely reliant on borehole water and associated infrastructure.

Today, this marginality is still reflected in the region's sparse settlement pattern, and it's almost total economic reliance on stock production. The key – and essentially only – agricultural resource in the study area is grazing. Much of the veld is palatable, but biomass production is very low. As in many arid areas, biomass production is tied to "boom and bust" cycles associated with exceptional rainfall years and droughts. The study area soils are too poor and water too scarce to enable cropping agriculture, including fodder cropping for own use.

## **1.5 APPROACH TO STUDY**

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

- Describing and obtaining an understanding of the proposed intervention (type, scale, and location), the settlements, and communities likely to be affected by the proposed project.
- Collecting baseline data on the current social and economic environment.
- Identifying the key potential social issues associated with the proposed project. This requires a site visit to the area and consultation with affected individuals and communities. As part of the process a basic information document was prepared and made available to key interested and affected parties. The aim of the document was to inform the affected parties of the nature and activities associated with the construction and operation of the proposed development to enable them to better understand and comment on the potential social issues and impacts.
- 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 socio-economic 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 interested and affected parties;
- Review of information from similar studies, including the EIAs undertaken for other renewable energy projects;
- Identification and assessment of the social issues associated with the proposed project.

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

### **1.5.1 Definition of social impacts**

Social impacts can be defined as "The consequences to human populations of any public or private actions (these include policies, programmes, plans and/or projects)

that alter the ways in which people live, work, play, relate to one another, organise to meet their needs and generally live and cope as members of society. These impacts are felt at various levels, including individual level, family or household level, community, organisation or society level. Some social impacts are felt by the body as a physical reality, while other social impacts are perceptual or emotional” (Vanclay, 2002).

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

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

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

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

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

## **1.6 ASSUMPTIONS AND LIMITATIONS**

### **1.6.1 Assumptions**

#### **Technical suitability**

It is assumed that the development site represents a technically suitable site for the establishment of a solar energy facility.

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

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

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

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

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

### **1.6.2 Limitations**

#### **Demographic data**

Some of the provincial documents do not contain data from the 2011 Census. However, where required the relevant 2011 Census data has been provided.

## **1.7 SPECIALIST DETAILS**

Tony Barbour, the author of this report is an independent specialist with 24 years' experience in the field of environmental management. In terms of SIA experience Tony Barbour has undertaken in the region of 200 SIA's and is the author of the Guidelines for Social Impact Assessments for EIA's adopted by the Department of Environmental Affairs and Development Planning (DEA&DP) in the Western Cape in 2007. Tony Barbour has also undertaken the specialist SIA studies for ~ 100 renewable energy projects, including SEFs. A Copy of Tony Barbour's CV is contained in Annexure C.

## **1.8 DECLARATION OF INDEPENDENCE**

This confirms that Tony Barbour, the specialist consultant responsible for undertaking the study and preparing the report, is independent and does not have a vested or financial interest in proposed project being either approved or rejected. A copy of a signed declaration of independence is provided in Annexure D

## **1.9 REPORT STUCTURE**

The report is divided into five sections, namely:

- Section 1: Introduction
- Section 2: Summary of key policy and planning documents relating to solar energy and the area in question
- Section 3: Overview of the study area
- 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 ENVIRONMENT**

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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>4</sup>” of the proposed development therefore constitutes a key aspect of the Social Impact Assessment (SIA). In this regard, assessment of “planning fit” conforms to international best practice for conducting SIAs.

Section 2 provides an overview of the policy and planning environment affecting the proposed project. 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);
- The National Development Plan (2011);
- Astronomy Geographic Advantage Act (Act No 21 of 2007)
- Northern Cape Provincial Growth and Development Strategy (2004-2014);
- Northern Cape Climate Change Response Strategy (in progress);
- Northern Cape Spatial Development Framework (2012);
- ZF MCGAWU District Municipality Integrated Development Plan (2016);
- Kai! Garib Local Municipality Integrated Development Plan (IDP) (2016/17);
- //KHARA HAIIS Integrated Development Plan (2016).

Due to the important economic and social role played by the town Upington information on the //Khara Hais Local Municipality is also provided. Section 2 also provides a review of the Renewable Energy Programme in South Africa.

### **2.2 NATIONAL POLICY ENVIRONMENT**

#### **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 wind:

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<sup>4</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.

“To ensure that diverse energy resources are available, in sustainable quantities, and at affordable prices, to the South African economy, in support of economic growth and poverty alleviation, taking into account environmental management requirements (...); to provide for (...) increased generation and consumption of renewable energies...” (Preamble).

### **2.2.2 White Paper on the Energy Policy of the Republic of South Africa**

Investment in renewable energy initiatives, such as the proposed WEF, is supported by the White Paper on Energy Policy for South Africa (December 1998). In this regard the document notes:

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

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

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

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

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

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

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

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

Disadvantages include:

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



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

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

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

The White Paper notes that while South Africa is well endowed with renewable energy resources that have the potential to become sustainable alternatives to fossil fuels, these have thus far remained largely untapped. As signatory to the Kyoto Protocol<sup>5</sup>, Government is determined to make good the country's commitment to reducing greenhouse gas emissions. To this purpose, Government has committed itself to the development of a framework in which a national renewable energy framework can be established and operate.

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

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

Government's long-term goal is the establishment of a renewable energy industry producing modern energy carriers that will offer in future years a sustainable, fully non-subsidised alternative to fossil fuels.

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

The current iteration of the Integrated Resource Plan (IRP) for South Africa, initiated by the Department of Energy (DoE) after a first round of public participation in June 2010, led to the Revised Balanced Scenario (RBS) that was published in October 2010 and later up-dated in November 2013. 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

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<sup>5</sup> The Kyoto Protocol is a protocol to the United Nations Framework Convention on Climate Change (UNFCCC), aimed at fighting global warming. The UNFCCC is an international environmental treaty with the goal of achieving "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system". The Protocol was initially adopted on 11 December 1997 in Kyoto, Japan and entered into force on 16 February 2005. As of November 2009, 187 states have signed and ratified the protocol (Wikipedia)

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 (2140 million tons of carbon dioxide per year after 2024) was maintained; and
- Energy efficiency demand-side management (EEDSM) measures were maintained at the level of the RBS.

Figure 2.1 indicates the new capacities of the Policy commitment. The dates shown in Table 2.1 indicate the capacity is required in order to avoid security of supply concerns. The document notes that projects could be concluded earlier than indicated. In terms of allocation, wind was allocated between 600 and 800MW per year and solar between 500 and 700MW. With Round 4 announcement in April 2015 the allocation for wind and solar was doubled in the so called Round 4b and even an expedited Round 4c with an additional 1 800MW was introduced for bidding in October 2015. Furthermore, the department announced that the current REIPPPP will be extended with an additional 63 000MW for the upcoming years. To date, there have been four (4) volumes or bidding windows under the REIPPPP. In April 2015, the DoE announced additional preferred bidders for the REIPPPP Bid Window 4 contributing 1 121MW to the national grid contributing to a total of 5 243MW procured since the implementation of the programme to date (DoE, 2015).

The key conclusions that are relevant to the renewable energy sector is that an accelerated roll-out of renewable energy options should be allowed in order to derive the benefits of these technologies.

	New build options								Committed					Non IRP
	Coal (PF, FBC, imports, own build)	Nuclear	Import hydro	Gas – CCGT	Peak – OCGT <sup>1</sup>	Wind	CSP	Solar PV	Coal	Other	DoE Peaker	Wind <sup>2</sup>	Other Renew.	Co-generation
	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW
2010	0	0	0	0	0	0	0	0	380	260	0	0	0	0
2011	0	0	0	0	0	0	0	0	679	130	0	0	0	0
2012	0	0	0	0	0	0	0	300	303	0	0	400	100	0
2013	0	0	0	0	0	0	0	300	823	333	1020	400	25	0
2014	500	0	0	0	0	400	0	300	722	999	0	0	100	0
2015	500	0	0	0	0	400	0	300	1444	0	0	0	100	200
2016	0	0	0	0	0	400	100	300	722	0	0	0	0	200
2017	0	0	0	0	0	400	100	300	2168	0	0	0	0	200
2018	0	0	0	0	0	400	100	300	723	0	0	0	0	200
2019	250	0	0	237	0	400	100	300	1446	0	0	0	0	0
2020	250	0	0	237	0	400	100	300	723	0	0	0	0	0
2021	250	0	0	237	0	400	100	300	0	0	0	0	0	0
2022	250	0	1 143	0	805	400	100	300	0	0	0	0	0	0
2023	250	1 600	1 183	0	805	400	100	300	0	0	0	0	0	0
2024	250	1 600	283	0	805	800	100	300	0	0	0	0	0	0
2025	250	1 600	0	0	805	1 600	100	1 000	0	0	0	0	0	0
2026	1 000	1 600	0	0	0	400	0	500	0	0	0	0	0	0
2027	250	0	0	0	0	1 600	0	500	0	0	0	0	0	0
2028	1 000	1 600	0	474	690	0	0	500	0	0	0	0	0	0
2029	250	1 600	0	237	805	0	0	1 000	0	0	0	0	0	0
2030	1 000	0	0	948	0	0	0	1 000	0	0	0	0	0	0
Total	6 250	9 600	2 609	2 370	3 910	8 400	1 000	8 400	10133	1722	1020	800	325	800

2011 Determinations
  2012 Determinations
  Eskom commitments (pre IRP)

Notes: 1. OCGT is seen as natural gas in the determination  
2. Includes Sere (100MW)

Source: IRP 2010-2030 Update Report November 2013

**Figure 2.1: IRP2010 Policy Adjusted Plan with Ministerial Determinations**

### 2.2.5 National Development Plan

The National Development Plan (NDP) contains a plan aimed at eliminating poverty and reducing inequality by 2030. The NDP identifies 9 key challenges and associated remedial plans. Managing the transition towards a low carbon national economy is identified as one of the 9 key national challenges. Expansion and acceleration of commercial renewable energy is identified as a key intervention strategy.

### 2.2.6 The New Growth Path Framework

Government released the New Economic Growth Path Framework on 23 November 2010. The aim of the framework is to enhance growth, employment creation and equity. The policy's principal target is to create five million jobs over the next 10 years and reflects government's commitment to prioritising employment creation in all economic policies. The framework identifies strategies that will enable South Africa to grow in a more equitable and inclusive manner while attaining South Africa's developmental agenda. Central to the New Growth Path is a massive investment in

infrastructure as a critical driver of jobs across the economy. In this regard the framework identifies investments in five key areas namely: **energy**, transport, communication, water and housing.

The New Growth Path also identifies five other priority areas as part of the programme to create jobs, through a series of partnerships between the State and the private sector. The Green Economy is one of the five priority areas, including expansions in construction and the production of technologies for solar, wind and biofuels. In this regard clean manufacturing and environmental services are projected to create 300 000 jobs over the next decade.

### **2.2.7 National Infrastructure Plan**

The South African Government adopted a National Infrastructure Plan in 2012. The aim of the plan is to transform the economic landscape while simultaneously creating significant numbers of new jobs and strengthen the delivery of basic services. The plan also supports the integration of African economies. In terms of the plan Government will invest R827 billion over the next three years to build new and upgrade existing infrastructure. The aim of the investments is to improve access by South Africans to healthcare facilities, schools, water, sanitation, housing and electrification. The plan also notes that investment in the construction of ports, roads, railway systems, **electricity plants**, hospitals, schools and dams will contribute to improved economic growth.

As part of the National Infrastructure Plan, Cabinet established the Presidential Infrastructure Coordinating Committee (PICC). The Committee identified and developed 18 strategic integrated projects (SIPS). The SIPS cover social and economic infrastructure across all nine provinces (with an emphasis on lagging regions) and consist of:

- Five geographically-focussed SIPS;
- Three spatial SIPS;
- Three energy SIPS;
- Three social infrastructure SIPS;
- Two knowledge SIPS;
- One regional integration SIP;
- One water and sanitation SIP.

The three energy SIPS are SIP 8, 9 and 10.

#### **SIP 8: Green energy in support of the South African economy**

- Support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP 2010);
- Support bio-fuel production facilities.

#### **SIP 9: Electricity generation to support socio-economic development**

- Accelerate the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy and address historical imbalances;
- Monitor implementation of major projects such as new power stations: Medupi, Kusile and Ingula.

### **SIP 10: Electricity transmission and distribution for all**

- Expand the transmission and distribution network to address historical imbalances, provide access to electricity for all and support economic development.
- Align the 10-year transmission plan, the services backlog, the national broadband roll-out and the freight rail line development to leverage off regulatory approvals, supply chain and project development capacity.

#### **2.2.8 Astronomy Geographic Advantage Act**

The purpose of the Act (Act No 21 of 2007) is to preserve the geographic advantage areas that attract investment in astronomy. The entire Northern Cape Province, excluding the Tsantsabane Municipality, has been declared an astronomy advantage area. The Northern Cape optical and radio telescope sites were declared core astronomy advantage areas. The Act allowed for the declaration of the Southern Africa Large Telescope (SALT), Meerkat and Square Kilometre Array (SKA) as astronomy and related scientific endeavours that has to be protected.

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

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

The Northern Cape Provincial Growth and Development Strategy (NCPGDS) identifies poverty reduction as the most significant challenge facing the government and its partners. 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 STPs 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 Northern Cape Provincial Spatial Development Framework**

Northern Cape Provincial Spatial Development Framework (NCSDf) (2012) lists a number of sectoral strategies and plans are to be read and treated as key components of the PSDf. Of these there are a number that are relevant to the proposed STPs. These include:

- Sectoral Strategy 1: Provincial Growth and Development Strategy of the Provincial Government.
- Sectoral Strategy 2: Comprehensive Growth and Development Programme of the Department of Agriculture, Land Reform and Rural Development.
- Sectoral Strategy 5: Local Economic Development (LED) Strategy of the Department of Economic Development and Tourism.
- Sectoral Strategy 11: Small Micro Medium Enterprises (SMME) Development Strategy of the Department of Economic Development and Tourism.
- Sectoral Strategy 12: Tourism Strategy of the Department of Economic Development and Tourism.
- Sectoral Strategy 19: Provincial renewable energy strategy (to be facilitated by the Department of Economic Development and Tourism).

Under Section B 14.4, Energy Sector, the NCSDf (2012), notes the total area of high radiation in South Africa amounts to approximately 194 000 km<sup>2</sup> of which the majority

falls within the Northern Cape. It is estimated that, if the electricity production per km<sup>2</sup> of mirror surface in a solar thermal power station were 30.2 MW and only 1% of the area of high radiation were available for solar power generation, then generation potential would equate to approximately 64 GW. A mere 1.25% of the area of high radiation could thus meet projected South African electricity demand in 2025 (80 GW) (NCPSDF, 2012). However, the SDF does indicate that this would require large investments in transmission lines from the areas of high radiation to the main electricity consumer centres. The SDF also notes that the implementation of large photovoltaic (PV) plants has been proposed as one of the main contributors to greenhouse gas emission reductions in South Africa. In this regard various solar parks and PV plants have been proposed in the province with Upington being the hub of such developments (NCPSDF, 2012).

Section C8.2.3, Energy Objectives, sets out the energy objectives for the Northern Cape Province. The section makes specific reference to renewable energy. The objectives are listed below:

- Promote the development of renewable energy supply schemes. Large-scale renewable energy supply schemes are strategically important for increasing the diversity of domestic energy supplies and avoiding energy imports while minimizing detrimental environmental impacts.
- Enhance the efficiency of Eskom's power station at the Vanderkloof power station.
- In order to reinforce the existing transmission network and to ensure a reliable electricity supply in the Northern Cape, construct a 400 kV transmission power line from Ferrum Substation (near Kathu/Sishen) to Garona Substation (near Groblershoop). There is a national electricity supply shortage and the country is now in a position where it needs to commission additional plants urgently. Consequently, renewable energy projects are a high priority.
- Develop and institute innovative new energy technologies to improve access to reliable, sustainable and affordable energy services with the objective to realize sustainable economic growth and development. The goals of securing supply, providing energy services, tackling climate change, avoiding air pollution and reaching sustainable development in the province offer both opportunities and synergies which require joint planning between local and provincial government as well as the private sector.
- Develop and institute energy supply schemes with the aim to contribute to the achievement of the targets set by the White Paper on Renewable Energy (2003). This target relates to the delivery of 10 000 GWh of energy from renewable energy sources (mainly biomass, wind, solar, and small-scale hydro) by 2013.

Section C8.3.3, Energy Policy, sets out the policy guidelines for the development of the energy sector, with specific reference to the renewable energy sector.

- The construction of telecommunication infrastructure must be strictly regulated in terms of the spatial plans and guidelines put forward in the PSDF. They must be carefully placed to avoid visual impacts on landscapes of significant symbolic, aesthetic, cultural or historic value and should blend in with the surrounding environment to the extent possible.
- EIAs undertaken for such construction must assess the impacts of such activities against the directives listed in (a) above.
- Renewable energy sources such as wind, solar thermal, biomass and domestic hydroelectricity are to constitute 25% of the province's energy generation capacity by 2020.

- The following key policy principles for renewable energy apply:
  - Full cost accounting: Pricing policies will be based on an assessment of the full economic, social and environmental costs and benefits of energy production and utilisation.
  - Equity: There should be equitable access to basic services to meet human needs and ensure human well-being. Each generation has a duty to avoid impairing the ability of future generations to ensure their own well-being.
  - Global and international cooperation and responsibilities: Government recognises its shared responsibility for global and regional issues and act with due regard to the principles contained in relevant policies and applicable regional and international agreements.
  - Allocation of functions: Government will allocate functions within the framework of the Constitution to competent institutions and spheres of government that can most effectively achieve the objectives of the energy policy.
  - The implementation of sustainable renewable energy is to be promoted through appropriate financial and fiscal instruments.
  - An effective legislative system to promote the implementation of renewable energy is to be developed, implemented, and continuously improved.
  - Public awareness of the benefits and opportunities of renewable energy must be promoted.
  - The development of renewable energy systems is to be harnessed as a mechanism for economic development throughout the province in accordance with the Sustainable Development Initiative (SDI) approach (refer to Toolkit D10) or any comparable approach.
  - Renewable energy must, first, and foremost, be used to address the needs of the province before being exported.

### 2.2.3 Northern Cape Climate Change Response Strategy

The key aspects of the PCCRS Report are summarised in the MEC's (NCPG: Environment and Nature Conservation) 2011 budget speech: "The Provincial Climate Change Response Strategy will be underpinned by specific critical sector climate change adaptation and mitigation strategies that include the Water, Agriculture and Human Health sectors as the 3 key Adaptation Sectors, the Industry and Transport alongside the Energy sector as the 3 key Mitigation Sectors with the Disaster Management, Natural Resources and Human Society, livelihoods and Services sectors as 3 remaining key Sectors to ensure proactive long term responses to the frequency and intensity of extreme weather events such as flooding and wild fire, with heightened requirements for effective disaster management".

Key points from MEC Lucas' address include the NCPG's commitment to develop and implement policy in accord with the National Green Paper for the National Climate Change Response Strategy (2010), and an acknowledgement of the NCP's extreme vulnerability to climate-change driven desertification. The development and promotion of a provincial green economy, including green jobs, and environmental learnership is indented as an important provincial intervention in addressing climate change. The renewable energy sector, including **solar** and wind energy (but also biofuels and energy from waste), is explicitly indicated as an important element of the Provincial Climate Change Response Strategy. The MEC further indicated that the NCP was involved in the processing 7 WEF and 11 solar energy EIA applications (March 2011)<sup>6</sup>.

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<sup>6</sup> ([www.info.gov.za/speech/DynamicAction?pageid=461&sid=22143&tid=45200](http://www.info.gov.za/speech/DynamicAction?pageid=461&sid=22143&tid=45200)).



#### **2.2.4 ZF Mcgawu Integrated Development Plan**

The key priority issues listed in the ZFMDM IDP (2012-2017) 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 ZFMDM 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 promote economic development to the advantage of the community within the boundaries of the ZFMDM. 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 development 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 development:

- 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.

#### **2.2.5 Kai! Garib Local Municipality Integrated Development Plan**

The Vision set out in the Kai !Garib IDP 2016/17 Review for the KGLM 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." Simply put the vision is "Improved and sustainable standard of living for all". Linked to the Vision is the Mission statement, which is the "Provision of transparent, accountable and sustainable service delivery"

The IDP identifies a number of Key Performance Areas identified by communities during Phase 1 of the IDP Process. The KPAs that are relevant to the proposed project include:

- KPA 1: Service Delivery and Infrastructure Development
- KPA 2: Local Economic Development

The priority issues identified in the IDP that are relevant to the project and are linked to the KPAs include:

- Lack of Basic Services (KPA 1);
- Poverty & Unemployment (KPA 2);
- Lack of sport and recreational facilities and services (KPA 1);
- Lack of sufficient and proper health services (HIV/AIDS) (KPA 1).

The IDP identifies a number of priority issues and strategies of which the following are relevant to the proposed project:

***Poverty and unemployment***

- Skills development and capacity building programmes especially amongst the youth
- Promote Private sector and business partnerships as well as community partnerships
- Promote Gender equity, disabled and youth access to economic opportunities
- Establish Local Economic Incentives

***Business***

- Promote BBBEE and support to small business

Some of the key social challenges identified by the community during the IDP process include:

- Increase in drug abuse like Tik, "gom snuif", "dagga";
- Increase in young children (under 10 years) actively abusing alcohol;
- Increase in Teenage Pregnancies;
- Increase in crime linked to alcohol and drug abuse;
- High levels of youth unemployment;
- Increase in the prevalence of HIV & Aids.

The renewable energy sector is also recognized as a key sector and identified and strength. The IDP notes that a number of new opportunities have opened up for KGLM area since the need to facilitate the generation of sustainable energy was introduced in South Africa by Eskom and the South African government. The IDP notes that there are a number of solar projects proposed in the area and that the economic benefits from these projects are eagerly anticipated.

However, the IDP also identifies a number of weaknesses that are relevant to the propose development, including:

- Lack of formal sector employment opportunities;
- Lack of skills and knowledge;
- High unemployment rate;
- High number of people living in poverty;
- Low disposable household income;
- Lack of economic opportunity

The IDP identifies a number of strategies aimed at addressing the challenges. The strategies that are relevant to and that could potentially benefit from the Community Trust established as part of the project include:

### ***Basic Services***

- Upgrading of sanitation systems
- Provision of electricity

### ***Poverty and unemployment, and local economic development***

- 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);
- Upgrading of existing business centres;
- Provision of additional business facilities;
- Skills capacity building of emerging farmers, i.e. stock farming, financial management.

### ***Sports facilities***

- Maintenance of existing facilities;
- Development of new facilities.

### ***Community health and awareness***

- Assist with establishment of HIV/AIDS Forum;
- Training of Home Base Care Workers / volunteers.

## **2.4 OVERVIEW RENEWABLE ENERGY SECTOR IN SOUTH AFRICA**

The section below provides an overview of the potential benefits associated with renewable energy sector in South Africa. Given that South Africa supports the development of renewable energy at national level, the intention is not to provide a critical review of renewable energy. The focus is therefore on the contribution of renewable energy to supporting economic development in South Africa.

The following documents were reviewed:

- Independent Power Producers Procurement Programme (IPPPP): An Overview (30 September 2016), Department of Energy, National Treasury and DBSA;
- Green Jobs Study (2011), IDC, DBSA Ltd and TIPS;
- Powering the Future: Renewable Energy Roll-out in South Africa (2013), Greenpeace South Africa;
- WWF SA, Renewable Energy Vision 2030, South Africa, 2014
- Jacqueline M. Borel-Saladin, Ivan N. Turok, (2013). The impact of the green economy on jobs in South Africa, South African Journal of Science, *Volume 109 |Number 9/10, September/October 2013*;
- The potential for local community benefits from wind farms in South Africa, Louise Tait (2012), Master's Thesis, Energy Research Centre University of Cape Town
- Market Intelligence Report: Renewable Energy (2014). Mike Mulcahy, Greencape.

### **2.4.1 Independent Power Producers Procurement Programme (IPPPP): An Overview**

The document presents an overview of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) undertaken by the Department of Energy, National Treasury and the Development Bank of South Africa in September 2016. By the end of September 2016, the REIPPPP had made the following significant impacts:

#### ***Energy supply***

In terms of renewable energy 6 376 MW<sup>1</sup> of electricity had been procured from 102 RE Independent Power Producers (IPPs) in six bid rounds to date. Of this 2 738 MW of electricity generation capacity from 51 IPP projects has been connected to the national grid. To date 11 064 GWh of energy has been generated by renewable energy sources procured under the REIPPPP since the first project became operational (making a 15% contribution to morning and evening system peak periods).

#### ***Investment***

The document notes that the REIPPPP has attracted significant investment in the development of the REIPPs into the country. The total investment (total project costs<sup>1</sup>), including interest during construction, of projects under construction and projects in the process of closure is R194.1 billion (this includes total debt and equity of R192.9 billion, as well as early revenue and VAT facility of R1.3 billion).

The REIPPPP has attracted R53.4 billion in foreign investment and financing in the six bid windows (BW1 – BW4 and 1S2). This is more than double the inward FDI attracted into South Africa during 2015 (R22.6 billion).

#### ***South African citizen shareholding***

In terms of local equity shareholding, 47% (R31.5 billion) of the total equity shareholding (R66.7 billion) was held by South African's across BW1 to BW4 and BW1S2. This equates to substantially more than the 40% requirement. Foreign equity amounts to R35.2 billion and contributes 53% of total equity.

The REIPPPP also contributes to Broad Based Black Economic Empowerment and the creation of black industrialists. In this regard Black South Africans own, on average, 31% of projects that have reached financial close, which is slightly above the 30% target.

The REIPPPP has also ensured that black people in local communities have ownership in the IPP projects that operate in or nearby their vicinities. On average, black local communities own 11% of projects that have reached financial close. This is well above the 5% target. In addition, an average of 18% shareholding by black people in engineering, procurement and construction (EPC) contractors has been attained in projects that have reached financial close under the REIPPPP. This is slightly below the 20% target. The shareholding by black people in operating companies of IPPs has averaged 19% (against a targeted 20%) for the 47 projects in operation. The target for shareholding by black people in top management has been set at 40%, with an average 61% achieved to date.

#### ***Community shareholding and community trusts***

The regulations require a minimum ownership of 2.5% by local communities in IPP projects as a procurement condition. This is to ensure that a substantial portion of the

investments has been structured and secured as local community equity. An individual community's dividends earned will depend on the terms of each transaction corresponding with the relevant equity share. To date all shareholding for local communities have been structured through the establishment of community trusts. For projects in BW1 to BW4 and 1S2, qualifying communities will receive R29.2 billion net income over the life of the projects (20 years). The report notes that the bulk of the money will however only start flowing into the communities from 2028 due to repayment obligations in the preceding years (repayment obligations are mostly to development funding institutions). However, despite the delay this represents a significant injection of capital into mainly rural areas of South Africa.

### ***Procurement spend***

The total projected procurement spend for BW1 to BW4 and 1S2 during the construction phase was R73 billion, more than the projected operations procurement spend over the 20 years operational life (R70 billion). The combined (construction and operations) procurement value is projected as R142.9 billion of which R44.3 billion has been spent to date. For construction, of the R41.8 billion already spent to date, R32.5 billion is from the 51 projects which have already been completed. These 51 projects had planned to spend R30.1 billion. The actual procurement construction costs have therefore exceeded the planned costs by 8% for completed projects.

The majority of the procurement spend to date has been for construction purposes. Of the R41.8 billion spent on procurement during construction, R37.2 billion has reportedly been procured from BBBEE suppliers, achieving 89% of total procured. Actual BBBEE spend during construction for BW1 and BW2 alone was R25.5 billion. The R37.2 billion spent on BBBEE during construction already exceeded the R33.9 billion that had originally been anticipated by IPPs.

### ***Local Content<sup>7</sup>***

The report notes that the REIPPP programme represents the country's most comprehensive strategy to date in achieving the transition to a greener economy. Local content minimum thresholds and targets were set higher for each subsequent bid window. The report notes that for a programme of this magnitude, with construction procurement spend alone estimated at R73 billion, the result is a substantial stimulus for establishing local manufacturing capacity. Actual local content spend reported for IPPs that have started construction amounts to R33.8 billion against a corresponding project value (as realised to date) of R66.6 billion. This means 51% of the project value has been locally procured, exceeding the 45% commitment from IPPs and the thresholds for BW1 – BW4.

The report also notes that the strategy has prompted several technology and component manufacturers to establish local manufacturing facilities. The report also notes that this will improve with greater certainty relating to subsequent bid windows and further determinations will continue to build on these successes.

### ***Leveraging employment opportunities***

To date, a total of 28 4842 job years<sup>8</sup> have been created for South African citizens, of which 26 207 were in construction and 2 276 in operations. These job years should rise

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<sup>7</sup> Local content is expressed as % of total project value and not procurement or total project costs.

<sup>8</sup> The equivalent of a full time employment opportunity for one person for one year

further past the planned target as more projects enter the construction phase. The report also notes that by end September 2016, 51 projects had successfully completed construction and moved into operation. The projects had planned to deliver 13 069 job years during the construction phase but had achieved 20 987. This was 61% more than planned.

The report notes that employment thresholds and targets were consistently exceeded across the entire portfolio. The average share of South African citizens of total South Africa based employees for BW1 – BW3.51&2 was 89% during construction (against a target of 80%), while it was 96% during operations for BW1 – BW2 (against a target of 80%). The report notes that the construction phase offers a high number of opportunities over shorter durations, while the operations phase requires fewer people, but over an extended operating period.

In terms of benefits for local communities, significantly more people from local communities were employed during construction than was initially planned. The expectation for local community participation was 6 771 job years. To date 15 215 job years have been realised (i.e. 125% greater than initially planned), with 13 projects, which have reached financial close, still to reach COD. The number of black SA citizens employed during construction also exceeded the planned numbers by 65%.

Black South African citizens, youths and rural or local communities have been the major beneficiaries during the construction phases, as they respectively represent 80%, 41% and 52% of total job opportunities created by IPPs to date. However, woman and disabled people could still be significantly empowered as they represent a mere 8% and 0.5% of total jobs created to date, respectively.

The share of black citizens employed during construction (80%) and the early stages of operations (82%) has significantly exceeding the 50% target and the 30% minimum threshold. Likewise, the share of skilled black citizens (as a percentage of skilled employees) for both construction and operations has also exceeding the 30% target and is at least 3.5 times more than the minimum threshold of 18%. The share of local community members as a share of SA-based employees was 52% and 68% for construction and operations respectively – at least 4 times more than the minimum threshold of 12% and more than 2.5 times more than the target of 20%.

### ***Socio-economic development (SED) contributions***

An important focus of the REIPPPP is to ensure that the build programme secures sustainable value for the country and enables local communities to benefit directly from the investments attracted into the area. In this regard IPPs are required to contribute a percentage of projected revenues accrued over the 20 year project operational life toward SED initiatives. These contributions accrue over the 20 year project operation life and are used to invest in housing and infrastructure as well as healthcare, education and skills development. The minimum compliance threshold for SED contributions is 1% of revenue with 1.5% the targeted level over the 20 year project operational life. The 51 projects that are currently operational have contributed R256 to SED to date, which represents approximately 1.2% of total revenue generated to date. The 51 IPP projects have also committed 1.5% over the 20 year project operational life. Therefore, based on current projects average commitment level is 2.2% or 120% more than the minimum compliance threshold.

To date (across 6 bid windows) a total contribution of R19.3 billion has been committed to SED initiatives. Assuming an even, annual revenue spread, the average contribution per year would be R964 million. Of the total commitment, R15.2 billion is specifically allocated for local communities where the IPPs operate. With every new IPP on the grid, revenues and the respective SED contributions will increase.

### ***Enterprise development contributions***

The target for IPPs to spend on enterprise development is 0.6% of revenues over the 20 year project operational life. However, for the current portfolio, IPPs have committed an average of 0.7% or 14% more than the target. Enterprise development contributions committed for BW1 to BW4 and 1S2 amount to R6 billion. Again, assuming an equal distribution of revenue over the 20 year project operational life, enterprise development contributions would be R301 million per annum.

Of the total commitment, R4.5 billion is specifically committed directly within the local communities where the IPPs operate, contributing significantly to local enterprise development. To date a total contribution of R70.4 million has already been made to the local communities (i.e. 88% of the total R80.5 million enterprise development contributions made to date).

### **2.4.2 Green Jobs Study**

The study notes that South Africa has one of the most carbon-intensive economies in the world, thus making the greening of the electricity mix a national imperative. Within this context the study notes that the green economy could be an extremely important trigger and lever for enhancing a country's growth potential and redirecting its development trajectory in the 21<sup>st</sup> century. The attractiveness of wind and solar technologies is not only supported by local conditions, but also by the relatively mature stage of their technological development.

The aim of the Green Jobs study was to provide information on the net direct job creation anticipated to emerge in the formal economy across a wide range of technologies/activities that may be classified as green or contributing to the greening of the economy. The study looked at the employment potential for a number of green sectors, including power generation, over three consecutive timeframes, namely, the short term (2011 – 12), medium term (2013 – 17) and long term (2018 – 25). The analysis attempts to estimate the employment potential associated with: building, construction and installation activities; operations and maintenance services; as well as the possible localisation spin-offs for the manufacturing sector as the domestic production of equipment, parts and components benefits from preferential local procurement.

It is also worth noting that the study only considered direct jobs in the formal economy. Multiplier effects were not taken into account. As a result the analysis only captures a portion of the potential employment impact of a greening economy. International studies have indicated that there are considerable backward and forward linkages through various value chains of production, as well as of indirect and induced employment effects. The employment figures can therefore be regarded as conservative.

The analysis reveals the potential of an unfolding green economy to lead to the creation of approximately 98 000 new direct jobs, on average, in the short term, almost 255 000 in the medium term and around 462 000 employment opportunities in

the formal economy in the long term. The number of jobs linked to the power generation was estimated to be ~ 12 500 in the short term, 57 500 in the medium term and 130 000 in the long term. Power generation jobs therefore account for 28% of the employment opportunities created in the long term. However, the report notes that the contribution made by a progressively expanding green energy generation segment increases from 14% of the total in the short term, or just over 13 500 jobs, to more than 28% in the long term (166 400) (Table 2.1).

The study also found that energy generation is expected to become an increasingly important contributor to green job creation over time, as projects are constructed or commissioned.

The international wind power industry employed almost half a million workers worldwide in 2009 – a figure that is expected to grow to over a million in five years from now, according to forecasts by the Global Wind Energy Council.



**Table 2.1: Net direct employment potential estimated for the four broad types of activity and their respective segments in the long term, and an indication of the roll-out over the three timeframes**

Broad green economy category		Segment	Technology/product	Total net direct employment potential in the long-term	Net direct manufacturing employment potential in the long-term	Total net direct employment potential (ST, MT, LT)	Net direct manufacturing employment potential (ST, MT, LT)
ENERGY GENERATION	Renewable (non-fuel) electricity	Wind power	Onshore wind power	5 156	2 105	VL, L, M	L, M, H
			Offshore wind power				
		Solar power	Concentrated solar power	3 014	608	N, VL, M	N, VL, M
			Photovoltaic power	13 541	8 463	M, H, H	H, VH, VH
		Marine power	Marine power	197	0	N, N, VL	N, N, N
		Hydro power	Large hydro power	272	111	VL, VL, VL	VL, M, VL
	Micro-/small-hydro power		100	0	VL, VL, VL	N, N, N	
	Fuel-based renewable electricity	Waste-to-energy	Landfills	1 178	180	VL, VL, L	VL, VL, L
			Biomass combustion	37 270	154	VL, H, VH	VL, VL, L
			Anaerobic digestion	1 429	591	VL, VL, L	VL, L, M
			Pyrolysis/Gasification	4 348	2 663	VL, L, M	VL, H, H
			Co-generation	10 789	1 050	L, M, H	M, H, H
	Liquid fuel	Bio-fuels	Bio-ethanol	52 729	6 641	M, H, VH	L, H, VH
			Bio-diesel				
ENERGY GENERATION SUB-TOTAL				130 023	22 566		
ENERGY & RESOURCE EFFICIENCY	Green buildings	Insulation, lighting, windows	7 340	838	L, M, M	L, M, M	
		Solar water heaters	17 621	1 225	L, H, H	L, M, H	
		Rain water harvesting	1 275	181	VL, VL, L	VL, VL, L	
	Transportation	Bus Rapid Transport	41 641	350	VH, VH, VH	H, M, L	
	Industrial	Energy efficient motors	-566	4	VL, VL, VL	VL, VL, VL	
		Mechanical insulation	666	89	VL, VL, VL	VL, VL, VL	
ENERGY & RESOURCE EFFICIENCY SUB-TOTAL				67 977	2 686		
EMMISSIONS AND POLLUTION MITIGATION	Pollution control	Air pollution control	900	166	N, VL, VL	N, L, L	
		Electrical vehicles	11 428	10 642	VL, L, H	N, H, VH	
		Clean stoves	2 783	973	VL, VL, L	VL, L, M	
		Acid mine water treatment	361	0	VL, VL, VL	N, N, N	
	Carbon Capture and Storage		251	0	N, VL, VL	N, N, N	
	Recycling		15 918	9 016	M, H, H	H, VH, VH	
EMMISSIONS AND POLLUTION MITIGATION SUB-TOTAL				31 641	20 797		
NATURAL RESOURCE MANAGEMENT	Biodiversity conservation & eco-system restoration		121 553	0	H, VH, VH	N, N, N	
	Soil & land management		111 373	0	VH, VH, VH	N, N, N	
NATURAL RESOURCE MANAGEMENT SUB-TOTAL				232 926	0		
TOTAL				462 567	46 049		

Notes:

- VH = very high (total employment potential > 20 000 direct jobs; manufacturing employment potential > 3 000 direct jobs);
- H = high (total employment potential > 8 000 but < 20 000; manufacturing employment potential > 1 000 but < 3 000);
- M = medium (total employment potential > 3 000 but < 8 000; manufacturing employment potential > 500 but < 1 000);
- L = low (total employment potential > 1 000 but < 3 000; manufacturing employment potential > 150 but < 500);
- VL = very low (total employment potential > 0 but < 1 000; manufacturing employment potential > 0 but < 150);
- N = negligible/none (total employment potential = 0; manufacturing employment potential = 0).

Of relevance the study also notes that the largest gains are likely to be associated with operations and maintenance (O&M) activities, particularly those involved in the various natural resource management initiatives. In this regard, operations and maintenance employment linked to renewable energy generation plants will also be substantial in the longer term. The employment growth momentum related to building, construction and installation activities peaks in the medium term, largely propelled by mass transportation infrastructure, stabilising thereafter as green building methods become progressively entrenched.

In addition, as projects related to a greening economy are progressively commissioned, the potential for local manufacturing also become increasingly viable. Employment gains in manufacturing are also expected to be relatively more stable than construction activities, since the sector should continue exhibiting growth potential as new and replacement components are produced, as additional markets are penetrated, and as new green technologies are introduced. Manufacturing segments with high employment potential in the long term would include suppliers of components for wind farms. The study does note that a shortage of skills in certain professional fields pertinent to wind power generation presents a challenge that must be overcome.

The study also found that South Africa is in a position to leverage upon some of its existing manufacturing capacities in order to produce components and parts for various sections of wind turbines, especially those industries involved in the production of steel and metal products, as well as the boat building and electrical industries. Local manufacturing capacity can be promoted through engagement with established global manufacturers. The study does however note that critical mass would have to be developed in order to obtain economies of scale.

The study found that there was also significant potential for local involvement in the wind sector (Table 2.2). Local companies can also exploit market opportunities in other African countries with higher wind power potential. This would create additional opportunities for improving economies of scale and enhancing the local industry's chances to succeed.

**Table 2.2: Potential contribution capacity of local industries**

Industry	Product/services	Share in turbine cost <sup>30</sup>	Local capacity
<b>Manufacturing:</b>	<b>Production of:</b>		
Structural steel, cast iron, metal and cement products	Towers, frames, hubs	34%	High
Boat-, airplane-, glass fibre composites	Rotor blades, nacelle, other plastic and fibre glass products	26%	High
High-technology parts and machinery	Gearbox parts, shafts, bearings	18%	Low
Electrical and electronic equipment	Generators, transformers and other electrical components	15%	Medium
Metal products	Pitch, yaw and break systems, and other parts	7%	Medium
<b>Construction and civil engineering</b>	<b>Foundation laying, tower erection, housing</b>	-	High
<b>Electricity distribution</b>	<b>Grid connection</b>	-	High
<b>Electricity generation</b>	<b>Operations and maintenance</b>	-	High
<b>Logistics</b>	<b>Transportation of very large components</b>	-	Medium

The study also identifies a number of advantages associated with solar power as a source of renewable energy with a large 'technical' generation potential. In this regard solar energy does not emit carbon dioxide (CO<sub>2</sub>) in generating electricity and is associated with exceptionally low lifecycle emissions. The construction period for a solar farm is much shorter than that of conventional power stations, while an income stream may in certain instances be provided to local communities through employment and land rental. The study also notes that the greenhouse gases (GHG) associated with the construction phase are offset within a very short period of time compared with the project's lifespan. Solar power therefore provides an ideal means for reaching emission reduction targets in a relatively easy manner. In addition, and of specific relevance to South Africa, solar as energy source is not dependent on water (as compared to the massive water requirements of conventional power stations), has a limited footprint and therefore does not impact on large tracts of land, poses limited pollution and health risks, specifically when compared to coal and nuclear energy plants.

Of relevance, the study also notes that the case of solar power is enhanced by the positive effect on rural or regional development. Solar farms located in rural areas create an opportunity to benefit the local and regional economy through the creation of jobs and tax revenues. In Denmark, one of the world's most advanced countries with respect to wind power generation, a significant portion of wind turbines are owned by local communities. A major drawback for wind energy is that, due to the natural variation in wind power on a daily and/or seasonal basis, back-up base-load generation capacity is imperative to provide stability to the energy supply. Furthermore, as with other renewable energy sources, wind power has relied on incentive measures throughout the world for its development, although its relative competitiveness has been improving continuously.

### **2.4.3 Powering the Future: Renewable Energy Roll-out in South Africa**

The study notes that South Africa has higher CO<sub>2</sub> emissions per GDPppp (2002 figures) from energy and cement production than China or the USA (Letete, T et al). Energy accounts for 83% of the total GHG emissions (excluding land use, land use change and forestry) with fuel combustion in the energy industry accounting for 65% of the energy emissions of South Africa (DEA, 2011).

Within a broader context of climate change, coal energy does not only have environmental impacts, it also has socio-economic impacts. Acid mine drainage from abandoned mines in South Africa impacts on water quality and poses the biggest threat to the country's limited water resources. Huge volumes of water are also required to wash coal and cool operating power stations. Eskom uses an estimated 10 000 litres of water per second due to its dependency on coal (Greenpeace, 2012).

The report notes that the concerns relating to whether South Africa can afford renewable energy arise out of the perception that renewable energy (RE) is expensive while fossil and nuclear technologies are cheap. The premise also ignores life cycle costing of the technologies which is favourable to renewable technologies where the sources of fuel are free or cheap.

In terms of costs, onshore wind energy costs are expected to drop by 12% since 2011 due to lower cost equipment and gains in output efficiency. The report refers to Bloomberg New Energy Finance, which noted that the average wind farm could reach grid parity by 2016. In Australia, unsubsidised renewable energy is now cheaper than electricity from new-build coal- and gas-fired power stations. A BNEF study indicated that electricity can be supplied from a new wind farm at a cost of R747.32/MWh (AUS\$80), compared to R1 335.82/MWh (AUS\$143) from a new coal plant or R1 083.06 /MWh (AUS\$116) from a new base-load gas plant, including the cost of emissions under the Australian government's carbon pricing scheme. Based on this the chief executive of Bloomberg New Energy Finance, Michael Liebreich, noted that "The fact that wind power is now cheaper than coal and gas in a country with some of the world's best fossil fuel resources shows that clean energy is a game changer which promises to turn the economics of power systems on its head," (Paton, 2013).

Within the South African context, a presentation by the South African Wind Energy Association (SAWEA) at the NERSA hearings in February 2013 indicated that in the second round of (REIPPPP) the bidding price for wind was 89c/kWh. The estimates for nominal new Eskom coal power range from NERSA's 97c/kWh to Standard Bank's estimate that Kusile will cost R1.38/kWh in 2019. In addition to being more expensive, coal-fired power stations have fewer job creation possibilities than RE, carry future expenses due to climate change impacts, and have health expense issues due to pollution.

The Greenpeace study notes that it is not only local manufacturers and rural farmers that benefit from RE, but large scale renewable utilities as well. The report notes that the Lake Turkana Wind Power Project (LTWP), which has a capacity of 310MW and consists of 365 turbines of 850kW, is the largest wind farm in Sub-Saharan Africa. The project is equivalent to 20% of the current installed capacity in Kenya and is the largest single private investment in Kenya's history (LTWP, 2012). At the proposed 9.9 US cents per kWh it will be cheapest electricity in Kenya (Kernan, 2012). Wind energy therefore creates significant opportunities for investment and the production of

affordable energy without the significant environmental and socio-economic impacts associated with coal and nuclear energy options.

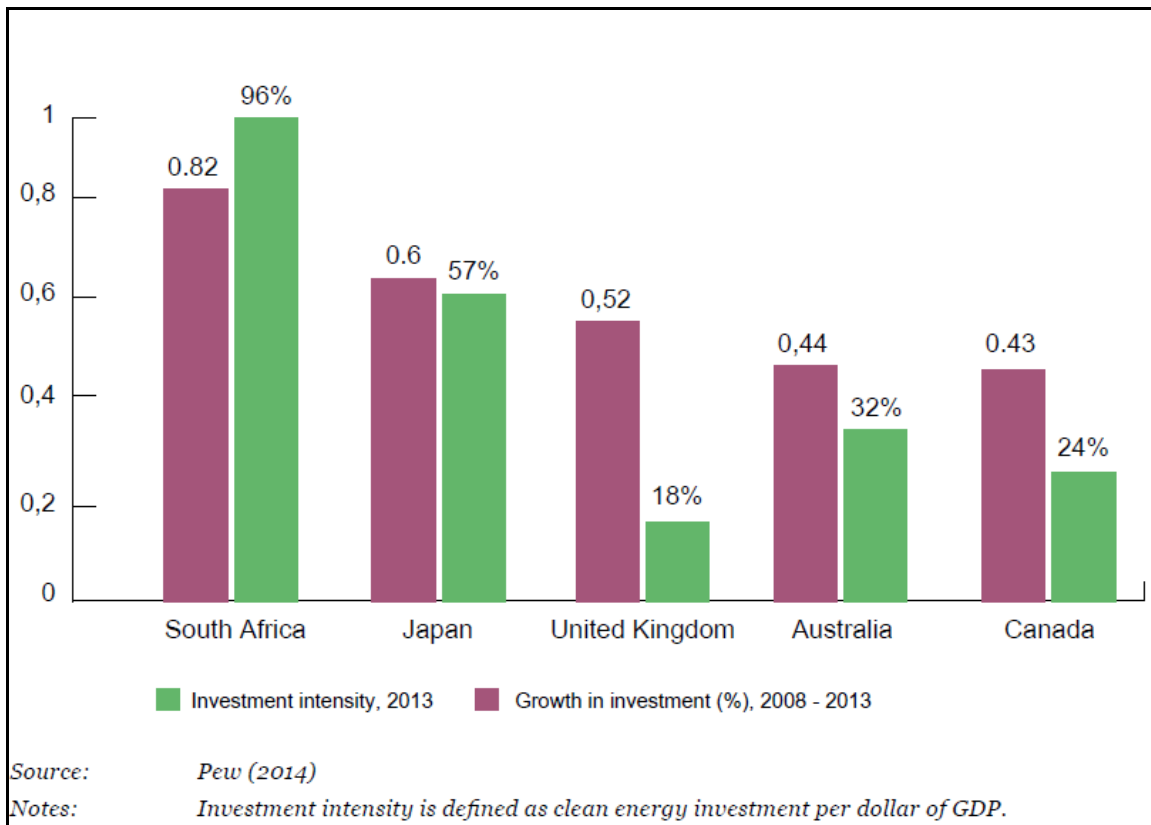
#### **2.4.4 WWF SA, Renewable Energy Vision 2030**

In its vision the WWF motivated for a more ambitious plan, suggesting that the IRP should provide for an 11-19% share of electricity capacity by 2030, depending on the country's growth rate over the next fifteen years. The vision is to increase renewable energy at the expense of new coal-fired and nuclear capacity. The report notes that in addition to the obvious environmental benefits of this scenario, it will enable South Africa to add flexibility to energy supply capacity on an on-demand basis.

The report notes that Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) introduced in 2011, has by all accounts been very successful in quickly and efficiently delivering clean energy to the grid. Increasingly competitive bidding rounds have led to substantial price reductions. In this regard the study indicates that in three years, wind and solar PV have reached pricing parity with supply from new coal-fired power stations from a levelised cost of electricity (LCOE) perspective.

In bidding window 3 of August 2013, the average tariffs bid for wind and solar PV were R0,66/kWh and R0.88/kWh respectively, well below the recent estimates of R1.05/kWh for supply from the coal-fired Medupi and Kusile power stations (Papapetrou 2014). In 2013, the average levelised cost of electricity supplied to the grid was R0.82/kWh (Donnelly 2014), so wind-generated power has already achieved pricing parity with the grid.

The report also notes that the REIPPPP has several contracting rounds for new renewables supply. A robust procurement process, extension of a 20-year sovereign guarantee on the power purchase agreement (PPA) and, especially, ideal solar power conditions, have driven the investment case for RE in South Africa. In this regard South Africa has been identified as one of the worlds' leading clean energy investment destinations (Figure 2.4).



**Figure 2.4: South Africa leads as a clean energy investment destination**

The study also found that there were a number of opportunities to further reduce the cost wind energy, specifically cost reductions for turbines. Towers, constructed mostly from steel, comprise 25% of the cost of wind turbines. The increasing distribution of manufacturers, greater competition and the use of more lightweight materials support cost reductions. In addition, since towers can, and are manufactured locally, they will be less sensitive to the weakening Rand. The study estimates a potential cost reduction of 15-20% by 2030. Rotor blades comprise 20% of the cost of wind turbines. On-going improvements in reducing weight through the use of carbon fibre and other lightweight materials will support a reduction of 10-20% by 2020. Gearbox costs and the costs of other components may be reduced by 10-15% by 2020, owing to manufacturing efficiencies.

With regard to local economic development, the REIPPPP sets out various local economic development requirements with stipulated minimum threshold and aspirational targeted levels, which each bidder must comply with. Based on the Broad-Based Black Economic Empowerment Codes, this requirement comprises the following components which make up a scorecard:

- Ownership by black people and local communities;
- Job creation;
- Local content;
- Management control;
- Preferential procurement;
- Enterprise development; and

- Socioeconomic development.

The final award is based on a combined evaluation in which price determines 70% of the ranking and performance on the local economic development scorecard the remaining 30%. This gives non-price criteria a much heavier weighting than they would normally enjoy under Government's preferential procurement policy.

Job creation, local content and preferential procurement accounted for the bulk of possible points on the scorecard in REIPPPP Round 3. Consequently, a requirement to source goods and services locally is considered to be the central driver of project costs associated with local economic development. In terms of local content, the definition of local content is quite broad, being the value of sales less the costs associated with imports. However, through successive bidding rounds, the definition has become subject to more detailed definition, with an expanding list of exclusions and increased targeting in terms of key components identified by the Department of Trade and Industry for local manufacturing. This has benefitted local manufacturers and suppliers.

The WWF study considers a low and high growth renewable energy scenario. The capital requirements for the low growth scenario are estimated at R474 billion over the period 2014-2030 (2014 Rand value), rising to R1.084 trillion in the high-growth scenario, in which 35 GW of capacity is built. Each annual round of purchasing 2 200 MW of RE capacity would cost approximately R77 billion in 2014 Rand value terms. In relative economic terms, this equates to 2% of GDP per annum or approximately one quarter of Government's planned annual investment in infrastructure over the medium term. In the low economic growth scenario, which is arguably the more realistic one, the average annual new liability over the period is approximately R40 billion.

The study also points out that infrastructure spend is more beneficial than other government expenditure due to the infrastructure multiplier effect. This refers to the beneficial impact of infrastructure on economic growth in both the short term, resulting from expansion in aggregate demand, as well as in the longer term (six to eight years) due to enhanced productive capacity in the economy. A recent USA study on highway expenditure revealed the infrastructure multiplier to be a factor of two on average, and greater during economic downturns (Leduc & Wilson 2013). This means that one dollar spent on infrastructure raises GDP by two dollars. If the same were to hold true, as similar analysis suggests it would (Kumo 2012, Ngandu et al 2010), this indicates that the construction of renewable energy plants could be a valuable economic growth driver at a time when fears of recession abound.

The report concludes that the WWF is optimistic that South Africa can achieve a much more promising clean energy future than current plans allow for. With an excellent solar resource and several very good wind-producing pockets, the country is an ideal candidate for a renewable energy revolution.

The report indicates that the levelised cost of producing renewable energy already competes favourably with the three main alternatives, namely coal, gas and nuclear. In addition, renewable energy would contribute to a more climate-resilient future and insulate South Africa from dependence on expensive and unreliable fuel sources priced in dollars. Critical from a planning perspective, the report notes that renewable energy can also provide added flexibility on an 'as needed' basis, as electricity demand grows. This is vital in a highly uncertain environment.

#### **2.4.5 The impact of the green economy on jobs in South Africa**

The paper notes that greening the economy is particularly important in South Africa for two basic reasons: (1) the exceptional level of unemployment that the country is experiencing and (2) the high carbon impact of the economy.

In terms of employment, the paper refers to the IDC *Green Jobs Report* (2011). In summary, the short-term (next 2 years) estimate of total net employment potential is 98 000 jobs, and the long-term (next 8 years) employment potential is 462 567 jobs.<sup>16</sup> Natural resource management is predicted to lead to the greatest number of these at 232 926 long-term jobs. Green energy generation is estimated to produce 130 023 long-term jobs, with energy and resource efficiency measures adding another 67 977 long-term jobs.

The paper notes that the Green Jobs Report was prepared by 17 primary researchers from three prominent organisations, namely the IDC, the Development Bank of South Africa, and Trade and Industrial Policy Strategies. Many role players from other organisations were also consulted, including the World Wide Fund for Nature, the Green Building Council, the Economic Development Department and private companies involved in green industries.

Despite questions surrounding the employment estimates contained in the Green Jobs Report, green economic activity does appear to generate more local jobs than fossil-fuel-based industries. Some of the estimates also indicate the potential for significant employment. The paper concludes that the figures represent a promising starting point that warrants further research and policy involvement in greening the economy in South Africa.

#### **2.4.6 The potential for local community benefits from wind farms in South Africa**

In her thesis, Tait notes that the distributed nature of renewable energy generation can induce a more geographically dispersed pattern of development. As a result, RE sites can be highly suited to rural locations with otherwise poor potential to attract local inward investment thus able to target particularly vulnerable areas.

In her conclusion, Tait notes that the thesis has found positive evidence for the establishment of community benefit schemes in the wind sector in South Africa. The BBBEE requirements for developers as set out in the DoE's IPPPP for renewables is the primary driver for such schemes. The procurement programme, in keeping with the objective of maximising the economic development potential from this new sector, includes a specific focus on local communities in which wind farms are located.

The procurement programme, typical of all Government tendering processes, includes a BBBEE scorecard on which wind projects are evaluated. However, the renewables scorecard appears to play an important part in a renewed focus on the broad-based Aspects of the legislation, as enforced by a recent national review of the BBBEE Act. In this regard the renewables scorecard includes specifications for local communities in respect of broad-based ownership schemes, socio-economic development and enterprise development contributions. This approach to legislating social responsibilities of business in all sectors definitely has a South African flavour, borne out of the political history of the country and the imperatives for social transformation laid out in the constitution.



While Tait notes that it is still early days for the development of this sector and one cannot determine the impact that such benefit schemes may have, it is clear though that targeted development expenditure will be directed to multiple rural communities and there seems to be a strong potential to deliver socio-economic benefits.

#### **2.4.7 Market Intelligence Report: Renewable Energy**

A study undertaken by Greencape in 2014 found that the bidding programme is placing increasing pressure on developers to include locally manufactured 'key components'. In the wind sector the key components that are being focussed on are wind turbine blades and towers. In this regard two tower manufacturers had at the time begun the establish facilities in South Africa., DCD in Coega, and Gestamp in Atlantis. LM wind power has also announced that they have developed business cases for two regions in South Africa. In the PV industry the focus has been on panels, inverters, mounting structures, cables and trackers. There is already considerable manufacturing set up in the Western Cape to support the PV industry, including SunPower, Jinko, SolarDirect, ZnShine (pending) (Modules) and AEG, SMA, Gefran, and MLT-Drives (Inverters). The report notes that these manufacturers could supply a significant portion of the South African market. The increasing local content requirements are leading to increasing interest in setting up manufacturing in the country, specifically in the Western Cape.

The study also notes that the Western Cape is home to the bulk of the renewable energy industry in South Africa. The majority of 'successful' developers are in Cape Town. The majority of professional services, the majority of EPC companies, and the majority of manufactures are based in the province. The Western Cape has also launched a broader Green Economy strategy, which focuses on enshrining the green economy principles in a transversal strategic framework. As part of the strategy the City of Cape Town has made a large area of industrial land available for the manufacturing of renewable energy components. This opportunity is perfect for manufacturers who are interested in green field sites. The DTi in collaboration with GreenCape will be establishing a special economic zone (SEZ) in Atlantis focussed on Green technology manufacturing (Atlantis Green Economic Hub). The zone will offer significant incentives for investment, including proposed 15% company tax rate.

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## SECTION 3: OVERVIEW OF STUDY AREA

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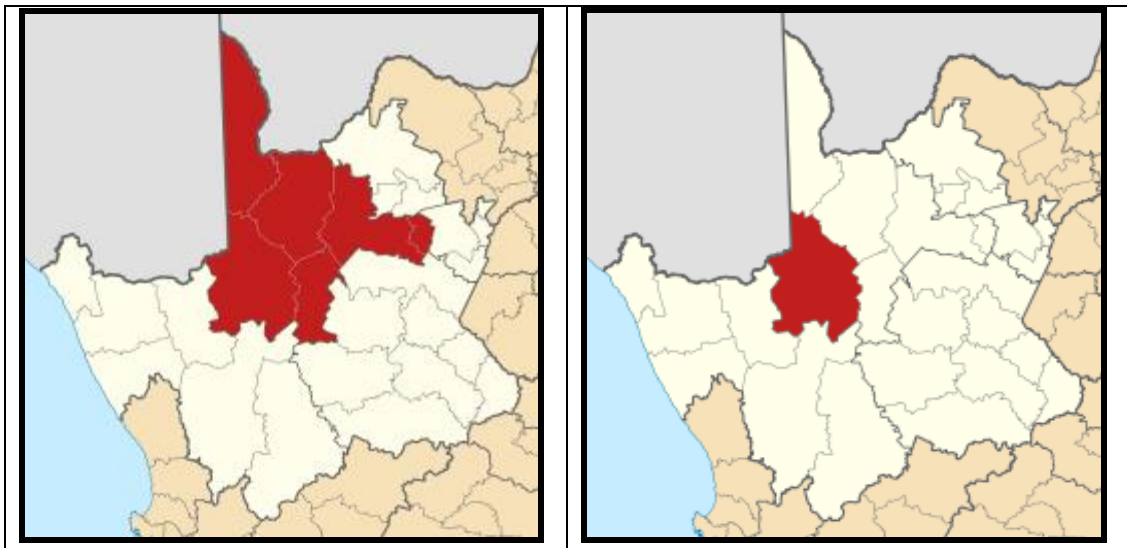
### 3.1 INTRODUCTION

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

- The administrative context;
- Provincial context;
- Overview of district and local municipalities.

### 3.2 ADMINISTRATIVE CONTEXT

The proposed Brypaal PV site is located within the Kai !Garib Local Municipality (KGLM), which forms part of the larger ZF Mgcawu District Municipality (ZFMDM)<sup>9</sup>(Figure 3.1). 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. The town of Keimoes serves as the administrative centre for the KGLM. A number of other solar energy projects proposed in the area.



**Figure 3.1: Location of ZF Mgcawu District Municipality (left) and Kai !Garib Local Municipality (right) within the Northern Cape Province**

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<sup>9</sup> ZF Mgcawu District Municipality was previously known as the Siyanda District Municipality

### 3.3 PROVINCIAL CONTEXT<sup>10</sup>

The proposed PV 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, ZF Mgcawu District Municipality (known before 1 July 2013 as Siyanda DM), and Kgalagadi DM, twenty-six Category B municipalities and five district management areas. The site itself is located in the Kai !Garib LM, which is one of eight local municipalities that fall within the greater ZF Mgcawu District Municipality (DC8).

#### **Population**

Despite having the largest surface area, the Northern Cape has the smallest population of 1 145 861 (Census 2011) or 2.28% of the population of South Africa. The population has increased from 991 919 in 2001. Of the five districts, Frances Baard has the largest population of 382 086. The other districts and their respective populations are, ZF Mgcawu District Municipality (236 783), John Taola Gaetsewe (224 799), Pixley ka Seme (186 351) and Namakwa (115 842). In terms of age, 30.1% are younger than 15 years of age and 64.2% fall within the economically active age group of 15-64 years of age (Census 2011). The female proportion makes up approximately 52.7% of the total with males making up the remaining 47.3% (Census 2011).

#### **Education**

Based on the information contained in the NCPSDF the average adult education attainment levels in the Northern Cape are lower than the adult education attainment levels of South Africa as a whole. Approximately 19.7% of the Northern Cape adults have no schooling in comparison to South Africa's 18.1%. The Northern Cape has the second lowest percentage of adult individuals (5.5%) that obtained a tertiary education in South Africa. The LED Strategy for the Northern Cape indicates that Pixley ka Seme has the lowest adult education attainment levels in the Northern Cape with 27.3% of the adult population having no form of schooling, whilst John Taolo Gaetsewe is second with 25.4% having no schooling. The highest number of the adult population with tertiary education (6.4%) is located in Frances Baard.

The Northern Cape also has the smallest portion (11.1%) of highly skilled formal employees in South Africa and Gauteng has the highest (14.3%). Linked to this the Northern Cape has the second largest portion of semi and unskilled formal employees in the country. A lack of skilled people often results in both the public and the private sector being unable to implement planned growth strategies and achieve the desired productivity, service delivery and service quality (NCPSDF, 2012).

#### **Economic development**

Over the past 8 years there has been little to no variance in the Human Development Index (HDI) figures for the Northern Cape, indicating no increase or decrease in the overall standard of living<sup>11</sup>. This trend is unlikely to change in the foreseeable future,

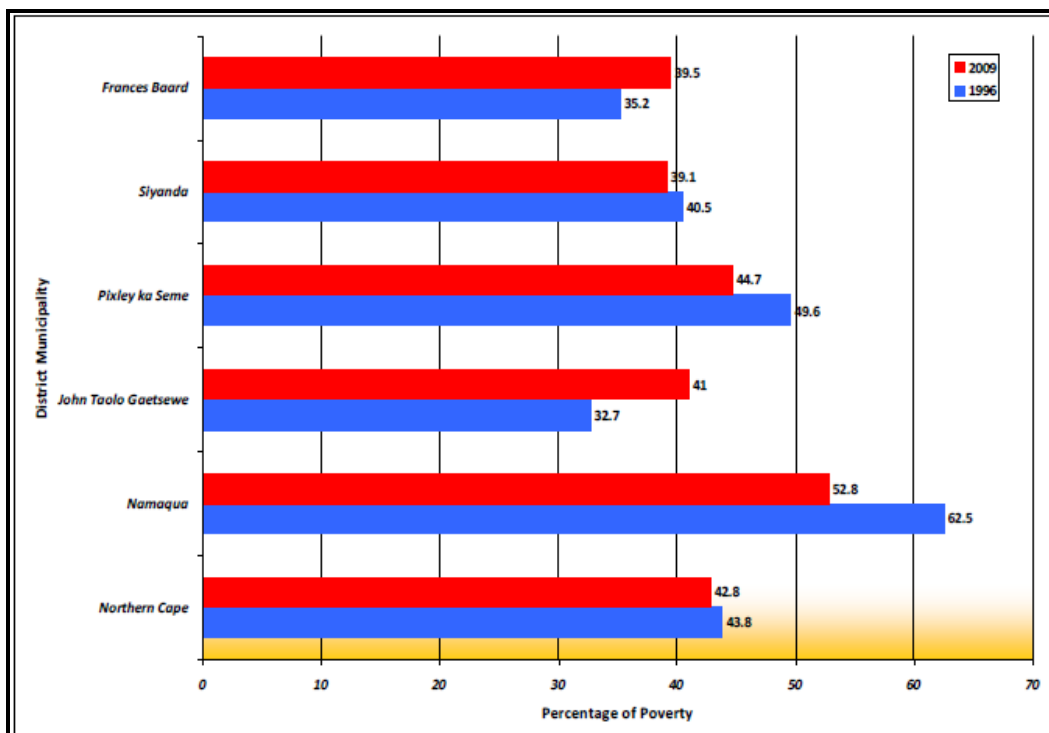
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<sup>10</sup> The information in this section is based on the Northern Cape Provincial Growth and Development Strategy 2004-2014. This document does not include 2011 Census Data. Where possible data from the 2011 Census and the NCPSDF 2012 has been used to update the information.

<sup>11</sup> The Human Development Index (HDI) was developed by the United Nations Development Programme (UNDP) based on the philosophy that the goal of development was to ensure that

mainly due to the marginal economic base of the poorer areas, and the consolidation of the economic base in the relatively better-off areas. It is important to note that the HDI for the Northern Cape (0.55) is substantially below the South African figure of 0.72. The HDI of 0.55 displays a pattern of semi-development, and there is a definite inequality between the different population groups, with the Whites having a higher development lifestyle than the African or Coloured groups.

The percentage of Northern Cape people living below the poverty line has decreased from 40% in 1995 to 27% in 2011, while the poverty gap has decreased from 11% in 1995 to 8% in 2011 (Figure 3.2). The goal set by the province is to decrease the percentage of people living below the poverty line to 20% by 2015 (NCSDF, 2012). The alleviation of poverty is one of the key challenges for economic development. Higher levels of economic growth are a key challenge for poverty eradication. Investment in people is pivotal to the eradication of poverty and inequality. Investment in people is also, to a large extent, about delivering social and economic infrastructure for education, welfare, health, housing, as well as transport and bulk infrastructure.

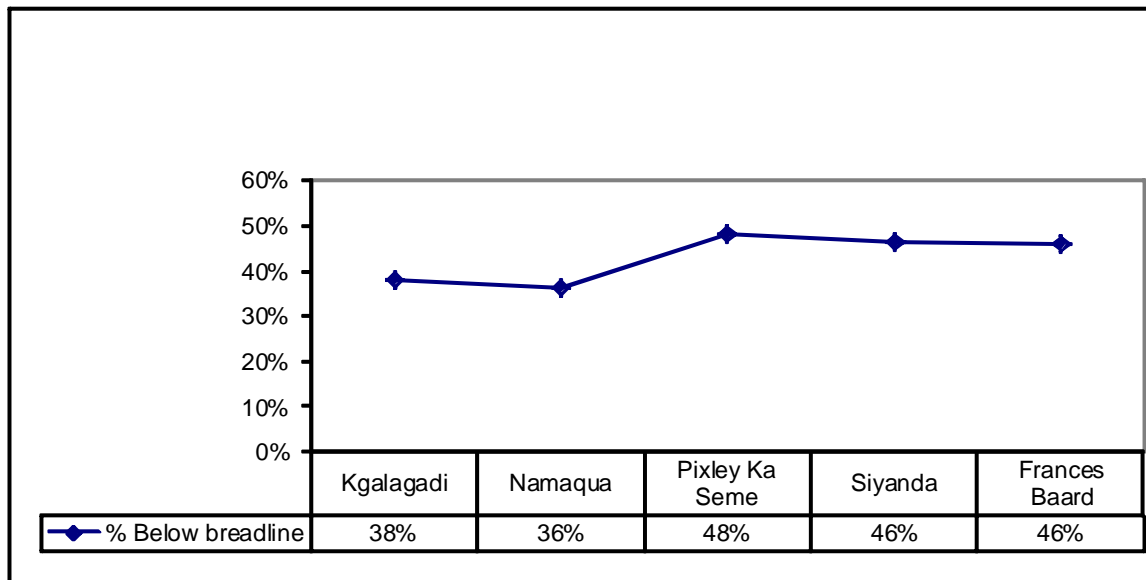


**Figure 3.2: Percentage of people living in poverty in the Northern Cape (Source: Global Insight, 2009 as cited in the PGDS, July 2011)<sup>12</sup>.**

individuals live long, informed and comfortable lives. The HDI consists of three components: Longevity, which is measured by life expectancy at birth; Educational attainment, which is measured by two education variables, namely adult literacy and combined gross primary, secondary and tertiary enrolment ratio, and; Income, which is measured by gross domestic product (GDP) per capita. Performance in each dimension is expressed as a value between 0 and 1, and the HDI index gives an internationally accepted measure of the wellness (quality of life) of the population of the area under consideration. The closer the HDI is 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>12</sup> Siyanda DM is now called the ZF Mgcawu DM.

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>13</sup>. The poverty line indicates a lack of economic resources to meet basic food needs. Figure 3.3 indicates the percentage 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 3.3: Percentage of household income below the poverty breadline by district** (Source: Northern Cape PGDS)

### Economic sectors

The Northern Cape economy has shown significant recovery since 2000/2001 when it had a negative economic growth rate of -1.5% (LED Strategy). The provincial economy reached a peak of 3.7% in 2003/2004 and remained the lowest of all provinces. The Northern Cape is the smallest contributing province to South Africa's economy (only 2% to South Africa GDP per region in 2007).

The mining sector is the largest contributor to the provincial GDP, contributing 28.9% to the GDP in 2002 and 27.6% in 2008. The mining sector is also important at a national level. In this regard the Northern Cape produces approximately 37% of South Africa's diamond output, 44% of its zinc, 70% of its silver, 84% of its iron-ore, 93% of its lead and 99% if its manganese.

Agriculture and agri-processing sector is also a key economic sector. Approximately 2% of the province is used for crop farming, mainly under irrigation in the Orange

<sup>13</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.

River Valley and Vaalharts Irrigation Scheme. Approximately 96% of the land is used for stock farming, including beef cattle and sheep or goats, as well as game farming. The agricultural sector contributed 5.8% to the Northern Cape GDP per region in 2007 which was approximately R1.3 billion, and it employs approximately 19.5% of the total formally employed individuals (NCSD, 2012). The sector is experiencing significant growth in value-added activities, including game-farming. Food production and processing for the local and export market is also growing significantly.

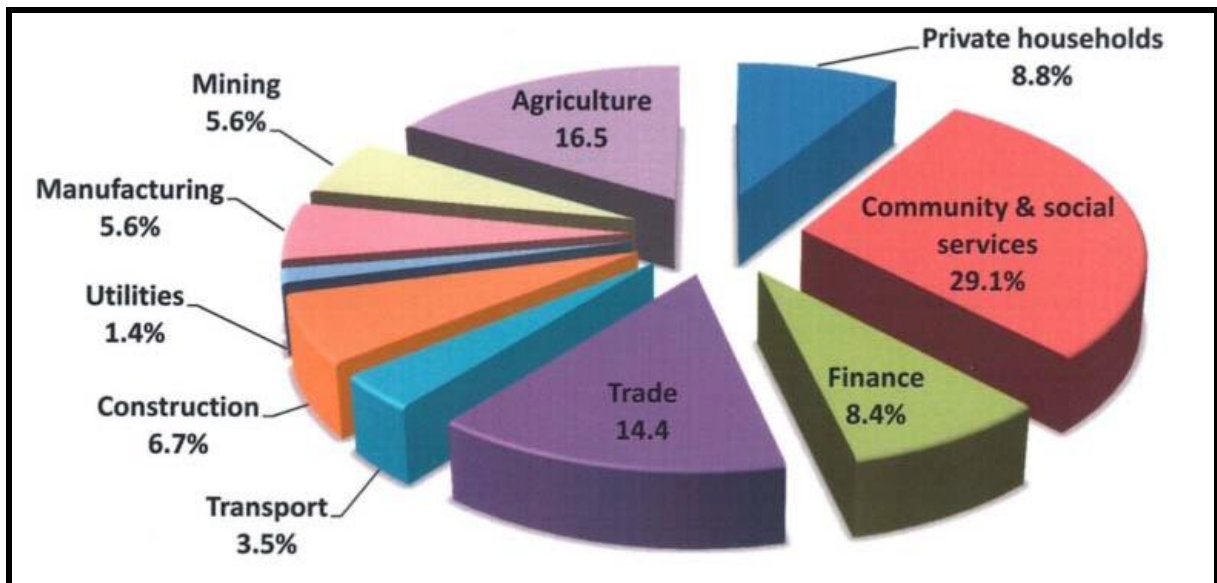
The main agricultural produce of the Northern Cape include:

- High-value horticultural products such as table grapes, sultanas and wine grapes, dates, nuts, cotton, fodder, and cereal crops are grown along the Orange River.
- Wheat, fruit, groundnuts, maize and cotton in the Vaalharts irrigation scheme in the vicinity of Hartswater and Jan Kempdorp.
- Vegetables and cereal crops at the confluence of the Vaal River and the Orange Rivers in the vicinity of Douglas.
- Wool, mohair, karakul, Karoo lamb, ostrich meat and leather, and venison throughout most of the province.

Economic development in the Northern Cape is hampered by the vastness of the area and the remoteness of its communities in rural areas. Development is also hampered by the low education and skills levels in the province. As a result unemployment in the Northern Cape presents a major challenge.

### Employment

According to Statistics South Africa Labour (2012) the community and social services sector is the largest employer in the province at 29%, followed by the agricultural sector (16%), wholesale and retail trade (14%), finance (8%) manufacturing (6%) and mining (6%), etc. (Figure 3.4).



**Figure 3.4: Employment by Economic Sector and Industry (Source: Statistics South Africa 2012).**

### 3.4 ZF MGCAWU DISTRICT MUNICIPALITY

The ZF Mgcawu District Municipality (ZFMDM) consists of six Local Municipalities namely, Mier; Kai !Garib; //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. Following the municipal elections in 2011, Riemvasmaak (Sending and Vredesvallei) were included within the KGLM. The Riemvasmaak Community is located ~ 60 km west of Kakamas. Based on Census 2011 data the total population of the ZFMDM is in the region of 236 763 people. The KGLM and KGLM are home to ~ 67 % of the ZFMDM population (Table 3.1).

**Table 3.1: Population of Local Municipalities within the ZFMDM**

<b>Local Municipality</b>	<b>Population</b>	<b>Percentage</b>
<u>//Khara Hais</u>	93 494	39.5%
<u>Kai !Garib</u>	65 869	27.8%
<u>Tsantsabane</u>	35 093	14.8%
<u>!Kheis</u>	16 637	7.0%
<u>Kgatelopele</u>	18 687	7.9%
<u>Mier</u>	7 003	2.9%

Source: Census 2011

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

The ZFMDM accounts for ~ 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 ZFMDM is dominated by grape production for table grapes, which is mainly exported to Europe, as well as livestock and game farming.

The Orange River over area delivers a major part is that South Africa's table grape production. More than 90% of Africa's total dried vine fruit arm production is produced through 1250 sultana grape growers in the Northern Cape who produced more than 50,000 tons in 2010. The sultanas produced comprise more than 80% of that which is exported primarily to Europe and other eastern countries (ZFMDM IDP 2013-1014). SAD Vine Fruit Pty (Ltd) is located in Upington and owns the largest dried vine fruit processing and packaging plant in South Africa, employing more than 350 persons. It has intakes at Groblershoop, Mylpaal, Louisvaleweg, Keimoes, Kakamas and Vredendal. The Orange River Wine Cellars Co-op, also based in Upington, is the second largest winemaking cooperative in the world and has wine cellars are at Groblershoop, Grootdrink, Upington, Keimoes and Kakamas. This co-op has more than 740 members

who produce wine grapes and 445 farmers who produce grape juice (ZFMDM IDP 2013-1014).

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 ZFMDM. In this regard the ZFMDM 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 ZFMDM. Key mining activities include copper and zinc of Areachap 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 ZFMDM's greatest social problems are illiteracy and poverty and low education levels.

## **3.5 KAI !GARIB MUNICIPALITY**

### **3.5.1 Introduction**

The proposed facility is located in the KGLM, a category-B municipality<sup>14</sup>. The municipality is approximately 7 445 km<sup>2</sup> in size (~7.2% of the ZFMDM) 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.

The Orange River (Gariiep River) plays a key role in the day to day life of most the inhabitants in the KGLM and is critical to the areas economic well-being. The main towns of Kakamas and Keimoes are situated in the midst of an intensive irrigation farming community stretching from Groblershoop in the east up to Blouputs in the west. Farming includes crops such as vineyards, pecan nut- and citrus plantations. Local areas within the KGLM where intensive irrigation is undertaken include Blouputs, Eksteenskuil, Riemvasmaak and Cannon Island.

The KGLM also has two unique trust communities that in many ways functions differently than other communities. The first is Riemvasmaak which is located ~ 60 km west from Kakamas and falls with Ward 1 of the municipality. The Riemvasmaak community consists of ~ 250 households and were forcefully removed from their land in 1973 and returned in 1994. The Riemvasmaak Community Trust is divided in two sections namely Vredesvallei and Mission.

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<sup>14</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.



The second Trust community is the Blocuso Trust Community, which consists of 3 farms, namely, Bloemsmond, Curriescamp and Soverby. These farms are located in Ward 8, ~ 10 km north east of Keimoes. The farms were handed over to the three families by Queen Victoria in 1886. However, the properties were forcefully resold to white farmers in 1914 and the previous owners became farm workers. The Independent church of Gordonia under the leadership of Ds Saul Damon bought back the farmers between 1914 and 1934. In 2000 the government assisted the 466 families on the three farms to buy the farms from the church. The communities established the Blocuso Trust and used the government subsidies to buy the farms and provide basic services like electricity and clean water. Since the Blocuso Trust was established the government have provided the trust with great assistance in terms of infrastructure projects.

The Municipal Area is divided into 9 wards (Table 3.2). The proposed SEF is located in Ward 9, Kenhardt and Southern Farms.

**Table 3.2: List of Wards in the KGLM**

Ward	Areas
1	Augrabies, Noudonsies, Zeekoeisteeck, Blouput Riemvasmaak
2	Cillie, Marchand, Perde-eiland, Omdraai
3	Kakamas Dorp, Alheit, Bloukamp, Truterkamp
4	Kromhout Boerdery, Kakamas Oos (Langverwag), Neus
5	Lennertsville, Koms, Keimoes Dorp, Akasia Park
6	Gardenia, Whalsig, Noodkamp, Vaaldriehoek
7	Lutzburg, Friersdale, Warmsand, Eenduin, Swartbooisberg, Bloemsmond,
8	Eksteenskuil Eilande, Soverby, McTaggerscamp, Curriescamp, Blaauwsekop, Kanoneiland
9	Kenhardt, Southern Farms

*(Demarcation Board 2012)*

### 3.5.2 Demographics

#### Population

As indicated in Table 3.3, the population of the KGLM increased from 58 671 to 65 869 over the period 2001-2011, which represents an increase of ~ 12%. The increase in the population in the KGLM was linked to an increase in the 15-64 age group. There were decreases in the less than 15 and 65+ age groups. In terms of breakdown, the majority of the population are Coloured (62.2%), followed by Black African (28.3%) and Whites (6.3%). The dominant language was Afrikaans (71.1%), followed by Setswana (23.9%), and English (1.2%). The total population in Ward 9 in 2011, where the PV site is located, was 6 679.

As expected, the number of households in the KGLM increased from 14 032 to 16 703. The average household size decreased marginally from 3.0 to 2.9 (Table 3.3). The number of formal dwellings also decreased from 90% to 88.4%. This implies that a number of the increased households in the KGLM are informal dwellings, which is a concern in terms of service delivery. The increase in the number of informal dwellings is likely to be linked to an influx of people into the urban areas from the rural areas.

The dependency ratio in the KGLM decreased from 48.6 to 41.9. The improvement indicates that there are fewer people who are dependent the economically active 15-64 age group. This represents a positive socio-economic improvement. The dependency ratio in the KGLM is also significantly lower than the ratio for the ZFMDM, which was 50.5 in 2011. The age dependency ratio is the ratio of dependents, people younger than 15 or older than 64, to the working, age population, those ages 15-64. The age dependency ratio (% of working-age population) in South Africa in 2010 was 53.29. Over the past 50 years, the value for this indicator has fluctuated between 84.43 in 1966 and 53.29 in 2010.

### **Household income**

Based on the data from the 2011 Census, 6.1% of the population of the KGLM have no formal income, 2.3% earn between 1 and R 4 800, 4.5% earn between R 4 801 and R 9 600 per annum, 25.7% between R 9 601 and 19 600 per annum and 26.7% between R 19 600 and R 38 200 per annum (Census 2011).

The poverty gap indicator produced by the World Bank Development Research Group measures poverty using information from household per capita income/consumption. This indicator illustrates the average shortfall of the total population from the poverty line. This measurement is used to reflect the intensity of poverty, which is based on living on less than R3 200 per month for an average sized household. Based on this measure 65.3% of the households in the KGLM live close to or below the poverty line. The low-income levels reflect the limited formal employment opportunities in the KGLM and the dependence on the agricultural sector. The low income levels are a major concern given that an increasing number of individuals and households are likely to be dependent on social grants. The low income levels also result in reduced spending in the local economy and less tax and rates revenue for the district and local municipality.

### **Employment**

In terms of employment, the official unemployment rate in the KGLM decreased for the ten year period between 2001 and 2011, falling from 16.1 to 10% of the economically active population. Youth unemployment in the KGLM also dropped over the same period, from 17.7 to 10% (Table 3.3). While unemployment figures appear to be low, specifically within the context of the figures for the Northern Cape Province as a whole (27.4% unemployment and 34.5% youth unemployment in 2011), they do not reflect the fact that the majority of the employment in the KGLM is seasonal and linked to the agricultural sector.

### **Education**

Education levels in the KGLM improved between 2001 and 2011 with the percentage of the population over 20 years of age with no schooling dropping from 14.7% to 9.0%. The percentage of the population over the age of 20 with matric also increased from 11.2 to 15.5%. Despite this increase the percentage of the population in the KGLM over the age of 20 with matric is still lower than the ZFMDM (21.7%) and the Northern Cape (22.7%). Overall education levels in the KGLM are therefore still low.

**Table 3.3: Overview of key demographic indicators for the ZFMDM and KGLM**

ASPECT	ZFMDM		KGLM	
	2001	2011	2001	2011
<b>Population</b>	202160	236763	58671	65869
<b>% Population &lt;15 years</b>	30.8	28.4	27.4	24.4
<b>% Population 15-64</b>	64.1	66.4	63.7	70.5
<b>% Population 65+</b>	5.1	5.1	5.4	5.1
<b>Households</b>	48100	61097	14032	16703
<b>Household size (average)</b>	3.7	3.5	3.0	2.9
<b>Formal Dwellings %</b>	83.9	79.4	90.0	88.4
<b>Dependency ratio per 100 (15-64)</b>	56.0	50.5	48.6	41.9
<b>Unemployment rate (official) - % of economically active population</b>	26.5	19.2	16.1	10.0
<b>Youth unemployment rate (official) - % of economically active population 15-34</b>	32.1	22.7	17.7	10.0
<b>No schooling - % of population 20+</b>	16.8	9.5	14.7	9.0
<b>Higher Education - % of population 20+</b>	4.8	6.3	3.7	3.9
<b>Matric - % of population 20+</b>	16.1	21.7	11.2	15.5

Source: Compiled from StatsSA Census 2011 Municipal Fact Sheet

**Table 3.4: Population per Ward in the KGLM**

Ward	Areas	Population
1	Augrabies, Noudonsies, Zeekoeisteeck, Blouput Riemvasmaak	11 408
2	Cillie, Marchand, Perde-eiland, Omdraai	8 191
3	Kakamas Dorp, Alheit, Bloukamp, Truterkamp	9 317
4	Kromhout Boerdery, Kakamas Oos (Langverwag), Neus	6 375
5	Lennertsville, Koms, Keimoes Dorp, Akasia Park	5 499
6	Gardenia, Whalsig, Noodkamp, Vaaldriehoek	7 684
7	Lutzburg, Friersdale, Warmsand, Eenduin, , Swartbooisberg, Bloemsmond,	4 856
8	Eksteenskuil Eilande, Soverby, McTaggerscamp, Curriescamp, Blaauwsekop, Kanoneiland	5 660
9	Kenhardt, Southern Farms	6 679

(Stats SA: Census 2011)

### 3.5.3 Municipal services

As indicated in Table 3.5, with the exception of a decrease in the percentage of households in the KGLM with piped water inside the dwelling, the access municipal services as measured in terms of flush toilets', refuse removal and electricity, has improved in the KGLM. The decrease in number of households with piped water inside the dwelling is likely to be linked to the increase in the number of informal dwellings in the KGLM between 2001 and 2011. Despite the improvement in municipal service the levels in the KGLM remain lower than the levels for the ZFMDM and the Northern Cape Province (with the exception of households that use electricity).

**Table 3.5: Overview of access to basic services in the ZFMDM and KGLM**

ASPECT	ZFMDM		KGLM	
	2001	2011	2001	2011
% households with access to flush toilet	58.1	63.9	50.2	59.6
% households with weekly municipal refuse removal	58.6	70.3	38.3	53.8
% households with piped water inside dwelling	37.2	48.5	36.7	41.0
% households which uses electricity for lighting	73.5	86.6	75.6	87.4

Source: Compiled from StatsSA Census 2011 Municipal Fact Sheet

The KGLM IDP also lists challenges facing education, health and policing.

#### **Education and schools**

- Travelling distances between communities and schools, especially relating to Secondary and High schools;
- The quality of transport for school children as many of the busses are not roadworthy;
- Availability of good quality sport and recreational facilities at some of the smaller schools;
- Lack of sufficient teachers and classrooms for the number of pupils/ for subject like maths and science;
- De-motivated teachers.

#### **Health**

- HIV/AIDS increase & TB increase;
- High rate of teenage pregnancies;
- Lack of sufficient and qualified staff and limited skills amongst current nurses and nursing sisters to make correct diagnosis and prescribe correct medicine accordingly;
- Lack of sufficient facilities to render a proper health service to all communities in the KGLM;
- Irregular and insufficient service rendered by mobile clinics;
- Lack of necessary health equipment and medication at clinics.

#### **Safety and crime challenges**

- Lack of sufficient police vehicles;
- Lack of accommodation for police officials;
- Increase in crime, i.e. family abuse and robberies, related to alcohol and drug abuse
- Need for houses of safety for victims of violence against woman and children, and domestic violence.

#### **3.5.4 Economic overview**

The Orange River (Gariiep River) plays a key economic role in the KGLM, with most of the economic activities linked to and located adjacent to the river. In addition, the

majority of towns and settlements are located within close proximity to and or adjacent to the river. The economy of the area is heavily depended on the Agricultural Sector, both intensive and extensive. However, the major roads (N14, R27 and R359) assist in the growth the municipal area experience.

The renewable energy sector is also recognized as a key sector. The IDP notes that new opportunities have opened up for KGLM area since the need to facilitate the generation of sustainable energy was introduced in South Africa by Eskom and the South African government. The IDP notes that there are a number of solar projects proposed in the area and that the economic benefits from these projects are eagerly anticipated. In this regard the IDP lists 15 projects in the KGLM (Table 3.6).

**Table 3.6: List of renewable energy projects in the KGLM (KGLM IDP 2016/17)**

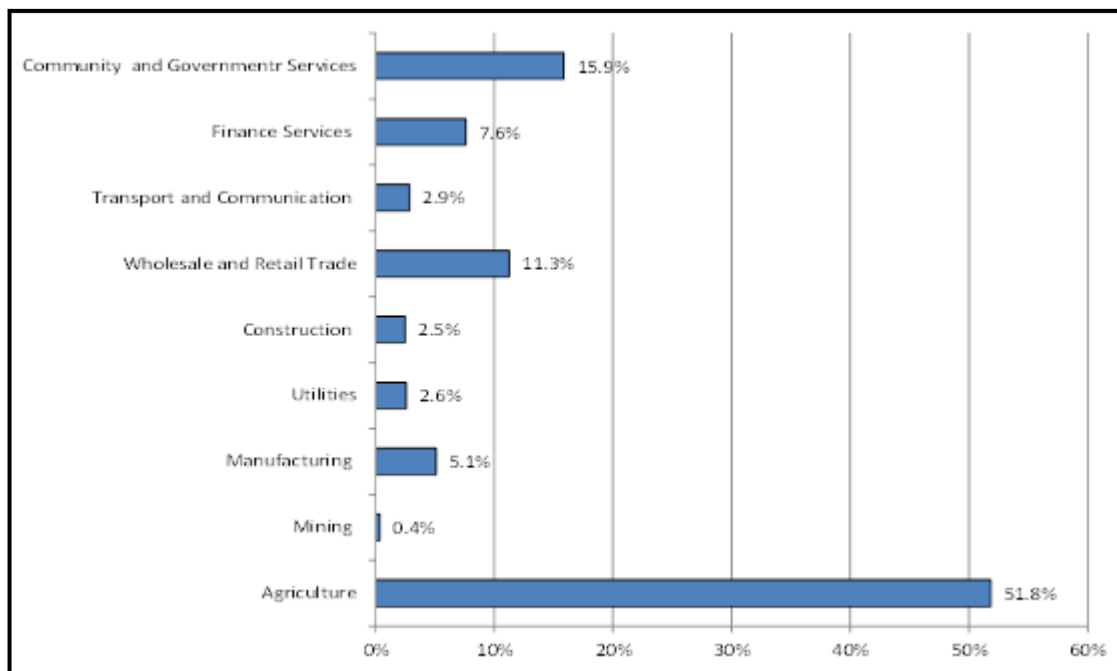
	<b>Developer</b>
1	Abengoa
2	Sub Solar
3	Biotherm Renewable Energy
4	S28 Energy
5	S28 Energy
6	S28 Energy
7	Solek Renewable Energy Engineers
8	Solek Renewable Energy Engineers
9	Aurora Power Solutions
10	Southern Cross Game Reserve
11	Orlight SA
12	Southern Cross Game reserve
13	Aurora Power Solutions
14	Inca Kakamas Solar
15	AEP Bloemsmond Solar PV1 & 2 Facilities

In terms of contribution to local GDP the most important economic sector is Agriculture (51.8%), followed by Community and Government Services (15.9%) and Wholesale and Retail Trade (11.3%). The key economic sectors are listed in Figure 3.5.

The Agriculture sector is also a major employer in the Municipality, providing 66.5% of all formal employment. It is also the sector with the largest potential for economic growth. The majority of the agricultural activity is linked to the Orange River and includes table and wine grapes. Citrus fruit is also becoming more prevalent in the area. There are three wine cellars located in the area in Keimoes, Kakamas and Kanoneiland. Emerging farmers in the area tend to focus more on small stock farming, lucern, cotton, corn, and nuts which are cultivated under irrigation from the Orange River. The IDP identifies a number of constraints facing the agricultural sector, these

include, poor quality access roads to and from farms, low farming skills amongst the youth and finances for emerging farmers. The opportunities in the agricultural sector include the expansion of the production of lucern and citrus fruits as well as the possible establishment of ostrich farming. Other sectors that show potential within the sector are agri-tourism.

The tourism sector also plays an important role in the local economy and has been identified a key sector in terms of future growth. The key tourism attractions in the area include the Augrabies Falls, Kokerboom Route, Tierberg Nature Reserve, heritage sites and ancient rock art in Kenhardt, historical routes between islands/ Island Route, water tunnels in Kakamas, Rooibergdam in Kenhardt and Riemvasmaak historical and cultural values. The N14 is also an important route providing access to the Cape in the South and the Kalahari National Park in the north. The tourism accommodation facilities in the area are also of high standard and available in all major towns.



(Source: KGLM IDP)

**Figure 3.5: Key economic sectors in the KGLM**

### 3.6 KHARA HAIS LOCAL MUNICIPALITY

While the town of Upington falls outside of the KGLM, it functions as a key economic center for the area and is the administrative center of the KGLM and the ZFMDM. The key demographic indicators for the KGLM are therefore also provided, as is an overview of the local economic profile.

#### 3.6.1 Demographics

##### Population

As indicated in Table 3.7, the population of the KGLM increased from 77919 to 93 494 over the period 2001-2011, which represents an increase of almost 20%. The increase in the population in the KGLM was linked to an increase in the 15-64 and 65 + age

groups. There was a decrease in the less than 15 age group. In terms of breakdown, the majority of the population are Coloured (65%), followed by Black African (23%) and Whites (10%).

As expected, the number of households in the KHLM increased from 17 934 to 23 245. The average household size decreased from 4.1 to 3.9. The number of formal dwellings also decreased from 81.2% to 75.2%. This implies that a number of the increased households in the KHLM are informal dwellings, which is a concern in terms of service delivery. The increase in the number of informal dwellings is likely to be linked to an influx of people into the urban areas from the rural areas.

The dependency ratio in the KHLM decreased from 58.7 to 54.7. The improvement indicates that there are fewer people who are dependent the economically active 15-64 age group. This represents a positive socio-economic improvement. However, the dependency ratio in the KHLM is lower than the ratio for the ZFMDM, which was 50.5 in 2011. The age dependency ratio is the ratio of dependents, people younger than 15 or older than 64, to the working, age population, those ages 15-64. The age dependency ratio (% of working-age population) in South Africa in 2010 was 53.29. Over the past 50 years, the value for this indicator has fluctuated between 84.43 in 1966 and 53.29 in 2010.

### **Household income**

Based on the data from the 2011 Census, 10.5% of the population of the KHLM have no formal income, 2.6% earn between 1 and R 4 800, 4.3% earn between R 4 801 and R 9 600 per annum, 16.3% between R 9 601 and 19 600 per annum and 21.2% between R 19 600 and R 38 200 per annum (Census 2011).

The poverty gap indicator produced by the World Bank Development Research Group measures poverty using information from household per capita income/consumption. This indicator illustrates the average shortfall of the total population from the poverty line. This measurement is used to reflect the intensity of poverty, which is based on living on less than R3 200 per month for an average sized household. Based on this measure 55% of the households in the KHLM live close to or below the poverty line. The low-income levels reflect the limited formal employment opportunities in the KHLM and the dependence on the agricultural sector. The low income levels are a major concern given that an increasing number of individuals and households are likely to be dependent on social grants. The low income levels also result in reduced spending in the local economy and less tax and rates revenue for the district and local municipality.

### **Employment**

In terms of employment, the official unemployment rate in the KHLM decreased for the ten year period between 2001 and 2011, falling from 34.0 to 22.1% of the economically active population. Youth unemployment in the KHLM also dropped over the same period, from 42.3 to 29%. While unemployment figures appear to be low, specifically within the context of the figures for the Northern Cape Province as a whole (27.4% unemployment and 34.5% youth unemployment in 2011), they do not reflect the fact that the majority of the employment in the KHLM is seasonal and linked to the agricultural sector.

### **Education**

Education levels in the KHLM improved between 2001 and 2011 with the percentage of the population over 20 years of age with no schooling dropping from 13.6% to 7.1%. The percentage of the population over the age of 20 with matric also increased from

20.9 to 26.0%. This is higher than the average for the ZFMDM (21.7%) and the Northern Cape (22.7%). This is linked to the important economic role played by the town of Upington and the associated well developed education facilities in the town.

**Table 3.7: Overview of key demographic indicators for the ZFMDM and KHLM**

ASPECT	ZFMDM		KHLM	
	2001	2011	2001	2011
<b>Population</b>	202160	236763	77919	93494
<b>% Population &lt;15 years</b>	30.8	28.4	31.7	29.8
<b>% Population 15-64</b>	64.1	66.4	63.0	64.6
<b>% Population 65+</b>	5.1	5.1	5.3	5.4
<b>Households</b>	48100	61097	17934	23245
<b>Household size (average)</b>	3.7	3.5	4.1	3.9
<b>Formal Dwellings %</b>	83.9	79.4	81.2	75.2
<b>Dependency ratio per 100 (15-64)</b>	56.0	50.5	58.7	54.7
<b>Unemployment rate (official) - % of economically active population</b>	26.5	19.2	34.0	22.1
<b>Youth unemployment rate (official) - % of economically active population 15-34</b>	32.1	22.7	42.3	29.0
<b>No schooling - % of population 20+</b>	16.8	9.5	13.6	7.1
<b>Higher Education - % of population 20+</b>	4.8	6.3	5.9	7.8
<b>Matric - % of population 20+</b>	16.1	21.7	20.9	26.0

*Source: Compiled from StatsSA Census 2011 Municipal Fact Sheet*

### 3.6.2 Municipal services

As indicated in Table 3.8, there has been a decrease in the percentage of households with access to flush toilets and households with access to weekly municipal refuse removal. For the other two categories (piped water inside dwelling and households that use electricity) there was an improvement in the access municipal services. The decrease in number of households with flush toilets and households with access to weekly municipal refuse is likely to be linked to the increase in the number of informal dwellings in the KHLM between 2001 and 2011. The level of services in the KHLM is higher than the levels for the ZFMDM and the Northern Cape Province.



**Table 3.8: Overview of access to basic services in the ZFMDM and KHLM**

Municipal Services	ZFMDM		KHLM	
	2001	2011	2001	2011
% households with access to flush toilet	58.1	63.9	68.6	68.3
% households with weekly municipal refuse removal	58.6	70.3	79.3	87.2
% households with piped water inside dwelling	37.2	48.5	38.7	56.0
% households which uses electricity for lighting	73.5	86.6	73.6	91.1

Source: Compiled from StatsSA Census 2011 Municipal Fact Sheet

### 3.6.3 Economic profile

Upington is the main town of the //Khara Hais Municipality and has, since its inception, been the hub of activities in the region. In terms of its economic role the town serves as:

- Agricultural hub of the Northern Cape.
- Portal to Namibia and vice versa.
- Frontier to the Kalahari and Kgalagadi Transfrontier Park.
- Portal to the Kalahari's hunting grounds.

In terms of economic indicators, the Municipality enjoys comparative advantages in all of the economic sectors, except mining, compared to the other local municipalities that make up the ZFMDM. The fastest growing sectors in the Municipality are agriculture, electricity and water, and mining sectors. The IDP notes that the current growth occurring in these sectors should be exploited to ensure the creation of new job opportunities for local people.

The IDP makes reference to the SDF and refers to a number of anchor projects approved by Council. The Upington Solar Park proposed by Eskom is located adjacent to the site and is therefore of specific relevance to the proposed STPs. The IDP notes that the establishment of a solar park will place pressure on the municipality in terms of providing the necessary infrastructure.

#### **Agricultural sector**

The agricultural sector is largely linked to irrigation along the Orange River (Gariiep), specifically table and wine grapes. In this regard the //Khara Hais region accounts for ~ 40% of South Africa's grape exports. Most of Upington's wines are produced by Orange River Wine Cellars (OWC). The company has six depots in the area (all of them located adjacent to the Orange River) at Upington, Kanoneiland, Grootdrink, Kakamas, Keimoes and Groblershoop. The wines from OWC are exported, inter alia, to Europe and the USA. A number of privately owned cellars also exist in the area.

In terms of the agricultural sector there are 7 smaller rural settlements and various farms. Settlements include: Lambrechtsdrift, Karos, Leerkrans, Leseding, Raaswater, Sesbrugge and Klippunt, and Kalksloot. The inhabitants of these settlements are mainly reliant upon agricultural activities for their livelihoods.

### ***Tourism sector***

Upington is well situated as a base for exploration of the region and has an outstanding infrastructure in the form of accommodation. Various areas are classified as nature conservation areas. Spitskop Nature Reserve lies 13 km north of Upington. This nature reserve, of approximately 6 000 hectares, supports gemsbok, zebra, springbok, ostrich, eland, blue wildebeest, as well as smaller game, and can be viewed from a circular route running through the park. Other nature areas within the jurisdiction of //Khara Hais are Gariep Lodge and Uizip. The Kalahari Oranje Museum Complex has the status of a regional- and provincial museum. There are also a number of declared national monuments, including:

- Roman Catholic Church in Le Roux Street (still in use);
- NG Mother Community in Schroder Street (still in use);
- Hortentia water mill;
- Missionary complex in Schroder Street (building is being used as a museum).

### ***Business sector***

The central business district of Upington is located along the northern bank of the Orange River (then Gariep River). Due to certain physical limitations, such as the Orange River to the south and south-east and the railway line to the north, the business district has expanded westwards. Smaller suburban shopping centres are found in all residential areas. Both industrial areas on the northern and the south-western sides of the town (Upindustria & Laboria) have railway facilities. Due to the unique spatial manifestation of the municipality, both the first and second economy is mostly located around the CBD and farms. Upington has a well-defined business centre with numerous residential areas. Secondary activities in the study area are mainly light industrial, warehousing, and light engineering works. Main traffic routes connect Upington, the hub of activities in the region, to cities like Kimberley, Johannesburg, Cape Town and Namibia. Upington also serves as the 'Portal' to Namibia and vice versa, the 'Frontier' to the Kalahari and the Kgalagadi Transfrontier Park, the 'Oasis' in the desert', the Agricultural hub of the Northern Cape, and the 'Portal to the Kalahari's hunting ground. Furthermore, two major national parks are situated within a few hours' drive from Upington.

Although there are a large variety of industries, there is a shortage of manufacturing industries. In this regard the KHELM's economy is centred on the trade and retail sector, due to its strong tourism sector, leaving the local economy fairly vulnerable for any significant changes in this industry. The IDP therefore highlights the need for the KHELM to diversify its economy into other sectors. The development of the renewable energy sector will create opportunities to diversify the local economy. The IDP also indicates that the manufacturing sector is one of the lowest performing sectors of the local economy. As a result, much in the municipality has to be sourced from outside of the municipal boundaries, resulting in money flowing out of the local economy. Despite the current poor performance of the manufacturing sector there are a number of potential opportunities linked to the agro-processing and other activities.

The IDP identifies a number of potential development constraints and challenges facing the KHELM. Of relevance to the proposed STPs these include a shortage of job opportunities in the area. As a result, job seekers are forced to seek employment opportunities outside of the Municipality (e.g. Kimberley), etc. Despite this the employment rate for the Municipality is relatively high, with as much as 75% of people of working age who are actively seeking employment being able to secure a job.

However, the majority of the employed population is found in elementary occupations, which require little or no skills. This is also reflected in the low education levels of the local population, with as much as 12% of the population aged 20 years and older having no form of education whatsoever. This, to some extent, constrains the development potential of the Municipality in the development of more advanced industries. The level of employment and type of occupations taken up by the population of the Municipality also directly affects their income levels. The low income levels also impact on buying power and the creation of business opportunities (KHLM IDP 2013-2014 Review).

In terms of opportunities, Upington Airport has been identified as an alternative or supplement for the O.R Tambo International Airport for cargo traffic, as there is less congestion and quicker airport turnaround times, shorter-to-market timeframes which would enhance product freshness by one day, and improved supply-chain performance, therefore offering greater benefits for cargo airlines and both importers and exporters of goods. The long runway and the strategically advantageous location of the Upington Airport make it ideal to serve the African continent. Due to this, the establishment of an Industrial Development Zone (IDZ) at the airport was proposed to (KHLM IDP 2013-2014 Review). However, the establishment of an IDZ (Industrial Development Zone) has been replaced by the proposed establishment of a SEZ's (Special Economic Zone). New IDZ's are only established at ports and bigger manufacturing hubs. The proposed Upington IDZ ( $\pm$  400 ha) will be a purpose-built industrial estate linked to the Upington Airport. The IDZ will leverage fixed direct investments in value added and export-oriented manufacturing industries.

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## SECTION 4: ASSESSMENT OF KEY SOCIAL 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:

- Review of project related information, including other specialist studies;
- Interviews with key interested and affected parties;
- Experience/ familiarity of the author with the area and local conditions;
- Experience with similar projects;

The assessment section is divided into the following sections:

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

### 4.2 ASSESMENT OF POLICY AND PLANNING FIT

The findings of the review indicate that renewable, including solar energy, is strongly supported at a national, provincial 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 development of and investment in renewable energy is also supported by the National Development Plan (NDP), New Growth Path Framework and National Infrastructure Plan, which all make reference to renewable energy.

The proposed SEF also supports a number of objectives contained in the NCP Provincial Growth and Development Strategy and the ZFMDM and KGLM IDP, specifically promotion of socio-economic development, SMME’s, job creation and private sector investment. The findings of the SIA also indicate that unemployment and poverty levels in the study area are high. In this regard the proposed SEF has the potential to support local economic development and create employment opportunities. The

proposed development therefore supports a number of key objectives contained in the KGLM IDP. The KGLM also identifies solar energy as a growth opportunity within the local economy.

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 suitably sited solar energy facilities is supported at a national, provincial, and local level. It is therefore the opinion of the authors that the establishment of a SEF in the area is supported by national, provincial and local policies and planning documents.

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

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

#### **Potential positive impacts**

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

#### **Potential negative impacts**

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

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

Based on the information from other PVF projects the construction phase for a 100 MW PVF is expected to extend over a period of 14-18 months and create approximately 300 employment opportunities during peak construction. The work associated with the construction phase will be undertaken by contractors and will include the establishment of the PVF and the associated components, including, access roads, substation, services and power line. It is anticipated that approximately 60% (180) of the employment opportunities will be available to low skilled workers (construction labourers, security staff etc.), 25% (75) for semi-skilled workers (drivers, equipment operators etc.) and 15% (45) for skilled personnel (engineers, land surveyors, project managers etc.). Members from the local communities are likely to be in a position to qualify for the majority of the low skilled and some of the semi-skilled employment opportunities. The majority of these employment opportunities are also likely to accrue to Historically Disadvantaged (HD) members from the Keimoes, Kakamas, Kenhardt and other towns in the KGLM. Given high local unemployment levels and limited job opportunities in the area, this will represent a significant, if localised, social benefit. The remainder of the semi-skilled and majority of the skilled employment opportunities are likely to be associated with the contractors appointed to construct the SEF and associated infrastructure. However, in the absence of specific commitments from the developer to maximise local employment targets the potential opportunities for local employment will be limited.

The total wage bill for the construction phase is estimated to be in the region of R 50 million (2017 rand value). This is based on the assumption that the average monthly salary for low skilled, semi-skilled and skilled workers will be in the region of R 5 000, R 8 000 and R 30 000 respectively for a period of 16 months. 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 Keimoes, Kakamas and Kenhardt and other towns in the KGLM. The majority of the beneficiaries are likely to be historically disadvantaged (HD) members of the community. This would represent a significant positive social benefit in an area with limited employment opportunities. However, in the absence of specific commitments from the developer to employ local contractors the potential for meaningful skills to local employment targets the benefits for members from the local communities may be limited. In addition, the low education and skills levels in the area may also hamper potential opportunities for local communities.

The potential benefits for local communities is confirmed by the findings of the Overview of the Independent Power Producers Procurement Programme (IPPPP) undertaken by the Department of Energy, National Treasury and DBSA (30 September 2016). The study found that employment opportunities created during the construction phase of the projects implemented to date had created 61% more jobs than anticipated. The study also found that significantly more people from local communities were employed during construction than was initially planned. In this regard the expectation for local community participation was 6 771 job years. To date 15 215 job years have been realised (i.e. 125% greater than initially planned). Black South African citizens, youths and rural or local communities have been the major beneficiaries during the construction phases, as they respectively represent 80%, 41% and 52% of total job opportunities created by IPPs to date.

The study also found that the share of black citizens employed during construction (80%) had significantly exceeding the 50% target. Likewise, the share of skilled black citizens (as a percentage of skilled employees) for both construction and operations has also exceeding the 30% target and is at least 3.5 times more than the minimum threshold of 18%. The study also found that the share of local community members as a share of SA-based employees was 52% and 68% for construction and operations respectively – at least 4 times more than the minimum threshold of 12% and more than 2.5 times more than the target of 20%.

The capital expenditure associated with the construction of a 100 MW PVF will be in the region of R 2.5 billion (2017 rand value). In terms of business opportunities for local companies, expenditure during the construction phase will create business opportunities for the regional and local economy. However, given the technical nature of the project and high import content associated with SEFs opportunities for the local economy in Keimoes, Kakamas, Kenhardt and the KGLM will 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. 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. A percentage of the wage bill (~R 50 million) will be spent in the local economy which will also create opportunities for local businesses in Keimoes, Kakamas, Kenhardt and the KGLM.

The implementation of the proposed enhancement measures listed below would also enable the establishment of the proposed SEF to support co-operation between the public and private sectors, which would support local economic development in the KGLM. Interviews undertaken LED representatives from the KGLM, Mr Markus and November, as part of SIAs for other renewable energy projects in the KGLM indicated that such development was strongly supported due the limited opportunities in the KGLM area. Unemployment and lack of meaningful skills development were key challenges. The opportunity to create employment was therefore welcomed. However, steps should be taken to maximise employment opportunities for members from the local communities in the area and support skills development and training programmes. This was also supported by Vivian McPherson and Johnny McKay, the IDP Manager and Director of Planning respectively at the KGLM. However, Mr McKay indicated that the experience from past projects was there tended to be limited employment of local community members. The proponent should therefore commit to employing as many local community members as possible.

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

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

<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 (3)	Local – Regional (4)
<b>Duration</b>	Short term (2)	Short term (2)
<b>Magnitude</b>	Moderate (6)	High (8)
<b>Probability</b>	Highly probable (4)	Highly probable (4)
<b>Significance</b>	Medium (44)	Medium (56)
<b>Status</b>	Positive	Positive
<b>Reversibility</b>	N/A	N/A
<b>Irreplaceable loss of resources?</b>	N/A	N/A
<b>Can impact be enhanced?</b>	Yes	
<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 SEF would however be forgone.

## **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, the proponent 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 Broad Based Black Economic Empowerment (BBBEE) criteria;
- Before the construction phase commences the proponent should meet with representatives from the KGLM 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 the proponent 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**

- The proponent should liaise with the KGLM with regards the establishment of a database of local companies, specifically BBBEE 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, the proponent should assist local BBBEE companies to complete and submit the required tender forms and associated information.
- The KGLM, in conjunction with the local business sector and representatives from the local hospitality industry, should identify strategies aimed at maximising the potential benefits associated with the project.

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

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

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

- An increase in alcohol and drug use;



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

Due to the location of the proposed site the proponent is considering accommodating workers on site. However, over weekends workers will travel to local towns, such as Keimoes and Kakamas where they will pose a risk to local communities. The potential risk can however be mitigated by a commitment to implement a local employment policy, specifically for the low and semi-skilled employment opportunities associated with the construction phase. As indicated above, all of the low skilled (220) and the majority of the semi-skilled (120) work opportunities are likely to benefit members from the local community. Employing members from the local community to fill the low-skilled job categories will reduce the risk and mitigate the potential impacts on the local communities. Where possible these workers should be sourced from the KGLM. 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 reduced.

The local farmers in the area indicated that due to potential safety and security risks they were not in favour of a construction workers being accommodated on the site. The use of local residents from the KGLM to fill the low skilled job categories would also reduce the need to provide accommodation for construction workers in Kakamas and or Keimoes.

The findings of the SIA indicate that unemployment levels in the KGLM are high. The creation employment opportunities for low and semi-skilled workers from the area would therefore represent a positive socio-economic benefit. 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. This has been borne out from the experiences with other solar energy projects in the Northern Cape Province, for example projects located near Poffadder. 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 (2) (Rated as 2 due to potential severity of impact on local communities)	Local (1) (Rated as 1 due to potential severity of impact on local communities)
<b>Duration</b>	Short term for community as a whole (2)	Short term for community as a whole (2)
<b>Magnitude</b>	Moderate for the community as a whole (6)	Low for community as a whole (4)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Medium for the community as a whole (30)	Low for the community as a whole (21)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	No in case of HIV and AIDS	No in case of HIV and AIDS
<b>Irreplaceable loss of resources?</b>	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods	
<b>Can impact be mitigated?</b>	Yes, to some degree. However, the risk cannot be eliminated	
<b>Mitigation:</b> See below		
<b>Cumulative impacts:</b> Impacts on family and community relations that may, in some cases, persist for a long period of time. Also in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.		
<b>Residual impacts:</b> See cumulative impacts.		

### Assessment of No Go option

There is no impact as 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, the proponent should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically for semi and low-skilled job categories;
- The proponent should consider the option of establishing a Monitoring Forum (MF) in order to monitor the construction phase and the implementation of the

recommended mitigation measures. The MF should be established before the construction phase commences, and should include key stakeholders, including representatives from local communities, local KGLM Councillor for Ward 9, farmers and the contractor(s). The MF should also be briefed on the potential risks to the local community associated with construction workers;

- The proponent 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;
- The proponent and the contractor should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase;
- The construction area should be fenced off before construction commences and no workers should be permitted to leave the fenced off area;
- The contractor should provide transport for workers to and from the site on a daily basis. This will enable the contractor to effectively manage and monitor the movement of construction workers on and off the site. However, due to the location of the site it may not be possible to transport workers to and from the site on a daily basis. If this is the case on-site accommodation will need to be provided.
- Where necessary, the contractors should make the necessary arrangements to enable low and semi-skilled 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 contractor must ensure that all construction workers from outside the area are transported back to their place of residence within 2 days for their contract coming to an end;
- It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site. However, as indicated above, due to the location of the site, on-site accommodation for workers may need to be provided.

#### **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 SEF on its own does not constitute a large construction project, the proposed establishment of a number of other SEFs in the area may attract job seekers to the area. As in the case of construction workers employed on the project, the actual presence of job seekers in the area does not in itself constitute a social impact. However, the manner in which they conduct themselves can impact on the local community. The two main areas of concern are associated with the influx of job seekers:

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

These issues are similar to the concerns associated with the presence of construction workers and are discussed in Section 4.4.2. However, in some instances the potential impact on the community may be greater given that they are unlikely to have

accommodation and may decide to stay on in the area. In addition, they will not have a reliable source of income. The risk of crime associated with the influx of job seekers 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 findings of the SIA indicate that potential for economically motivated in-migration and subsequent labour stranding in Keimoes and Kakamas is likely to be low. This is due the relatively remote locations of the two towns. In addition, a number of the job seekers from outside of the area are likely to come from nearby towns in the area, such as Upington and Pofadder. Due to the proximity of these towns the risk of labour stranding is likely to be low. The likelihood to job seekers staying on in Keimoes and Kakamas is therefore also likely to be low. The risks associated with the influx of job seekers are therefore likely to be low.

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

<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 (2)	Local (1)
<b>Duration</b>	Permanent (5) (For job seekers that stay on the town)	Permanent (5) (For job seekers that stay on the town)
<b>Magnitude</b>	Minor (2)	Minor (2)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Low (27)	Low (24)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	No in case of HIV and AIDS	No in case of HIV and AIDS
<b>Irreplaceable loss of resources?</b>	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods	
<b>Can impact be mitigated?</b>	Yes, to some degree. However, the risk cannot be eliminated	
<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.

**Residual impacts:** See cumulative impacts.

### **Recommended mitigation measures**

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

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

#### **4.3.4 Risk to safety, livestock and farm infrastructure**

The presence on and movement of construction workers on and off the site poses a potential safety threat to local farmer's and farm workers in the vicinity of the site threat.

In addition, farm infrastructure, such as fences and gates, may be damaged and stock losses may also result from gates being left open and/or fences being damaged or stock theft linked either directly or indirectly to the presence of farm workers on the site. The local farmers in the area interviewed indicated that the presence of construction workers on the site would increase the exposure of their farming operations and livestock to the outside world, which, in turn, increased the potential risk of stock theft and crime. This risk would be increased if construction workers are accommodated on the site.

The local farmers did, however, indicate that the potential risks (safety, livestock and farm infrastructure) can be effectively mitigated by careful planning and managing the movement of construction on the site workers during the construction phase. The issue of establishing accommodation on the site will however need to be discussed with the local farmers in the area. Mitigation measures to address these risks are outlined below.

**Table 4.4: Assessment of risk to safety, livestock and damage to farm infrastructure**

<b>Nature:</b> Potential risk to safety of scholars, farmers and farm workers, livestock and damage to farm infrastructure associated with the presence of construction workers on site		
	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (3)	Local (2)
<b>Duration</b>	Short term (2)	Short term (2)
<b>Magnitude</b>	Medium (6)	Low (4)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Medium (33)	Low (24)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes, compensation paid for stock losses and damage to farm infrastructure etc.	Yes, compensation paid for stock losses and damage to farm infrastructure 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:

- The construction area should be fenced off prior to the commencement of the construction phase. The movement of construction workers on the site should be confined to the fenced off area;
- The proponent 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;
- Traffic and activities should be strictly contained within designated areas, including for the construction of the transmission line;
- Strict traffic speed limits must be enforced on the farm to ensure construction vehicles do not pose a risk to sheep, and especially ewes with young lambs;
- All farm gates must be closed after passing through. Stock management and grazing resource control are based on a rotational camp system. This ensures the safety of flocks as well as effective management of the grazing resource. Leaving gates open may cause stock to wander, resulting in time and potentially financial losses to the owner.

- Contractors appointed by the proponent should provide daily transport for low and semi-skilled workers to and from the site. This would reduce the potential risk of trespassing on the remainder of the farm and adjacent properties;
- The proponent 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;
- The proponent should hold contractors liable for compensating farmers and communities in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. This should be contained in the Code of Conduct to be signed between the proponent, the contractors and neighbouring landowners. The agreement should also cover losses and costs associated with fires caused by construction workers or construction related activities (see below);
- The Environmental Management Plan (EMP) must outline procedures for managing and storing waste on site, specifically plastic waste that poses a threat to livestock if ingested;
- Contractors appointed by the proponent 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 the proponent 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;
- It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site. However, as indicated above, due to the location of the site, on-site accommodation for workers may need to be provided.

#### **4.3.5 Increased risk of wild fires**

The presence of construction workers and construction-related activities on the site poses an increased risk of grass fires that could in turn pose a threat to livestock, crops, wildlife and farmsteads in the area. In the process, farm infrastructure may also be damaged or destroyed and human lives threatened. Local farmers interviewed indicated that grass fires were a concern and posed a threat to their livestock operations. Mr Johan Stadler indicated that the potential risk of grass fires was heightened by the windy conditions in the area, specifically during the dry, windy winter months from May to October. In terms of potential mitigation measures a firebreak should be constructed around the perimeter of the site prior to the commencement of the construction phase. In addition, a fire-fighting vehicle should be present at all times on the site during the construction phase.

**Table 4.5: Assessment of impact of increased risk of grass 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 grass fires		
	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (4) (Rated as 4 due to potential severity of impact on local farmers)	Local (2)
<b>Duration</b>	Short term (2)	short term (2)
<b>Magnitude</b>	Moderate due to reliance on agriculture for maintaining livelihoods (6)	Low (4)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Medium (36)	Low (24)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes, compensation paid for stock and crop losses etc.	
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impact be mitigated?</b>	Yes	
<b>Mitigation:</b> See below		
<b>Cumulative impacts:</b> No, provided losses are compensated for.		
<b>Residual impacts:</b> See cumulative impacts.		

**Assessment of No-Go option**

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

**Recommended mitigation measures**

The mitigation measures include:

- The proponent 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;
- A fire-break should be constructed around the perimeter of the site prior to the commencement of the construction phase;
- Contractor should ensure that open fires on the site for cooking or heating are not allowed except in designated areas;
- Smoking on site should be confined to designated areas;
- Contractor to ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced. Measures to reduce the risk of fires include avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high risk dry, windy winter months;
- Contractor should provide adequate fire fighting equipment on-site, including a fire fighting vehicle;



- Contractor to provide fire-fighting training to selected construction staff;
- No construction staff, with the exception of security staff, to be accommodated on site over night;
- As per the conditions of the Code of Conduct, in the advent of a fire being caused by construction workers and or construction activities, the appointed contractors must compensate farmers for any damage caused to their farms. The contractor should also compensate the fire fighting costs borne by farmers and local authorities.

#### 4.3.6 Impacts associated with construction vehicles

The movement of heavy construction vehicles during the construction phase has the potential to damage roads and create noise, dust, and safety impacts for other road users and local communities in the area. Access to the PVF site will be via the gravel road to Loeriesfontein which joins the gravel road to Kenhardt approximately 9 km south of Kakamas. The Loeriesfontein Road provides the only access to the site and the farms located in the area. The movement of construction related traffic along the Loeriesfontein Road and the northern section of the road to Kenhardt do have the potential to impact on other road users, specifically local farmers in the area. However, the volume of traffic along the road is low. Despite the movement of heavy construction vehicles does have the potential to damage the road surface, which in turn would impact negatively on other road users. There are also vineyards located along the northern section of the road to Kenhardt towards Kakamas. Dust generated by the movement of construction vehicles does have the potential to impact on these vineyards. There are also low income houses located on the west of the road before it joins with the R359 between Kakamas and Keimoes. The inhabitants of these houses would also be impacted by dust generated by construction traffic.

**Table 4.6: 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>	Medium (6)	Minor (2)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Medium (30)	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 local farm 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. Dust impacts to vineyards and houses could also impact on future contracts and community health.

**Residual impacts:** See cumulative impacts

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

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

### **Recommended mitigation measures**

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

- The movement of heavy vehicles associated with the construction phase should be timed to avoid times days of the week, such as weekends, when the volume of traffic travelling along the Loeriesfontein Road and the northern section of the road to Kenhardt Road may be higher;
- The contractor must ensure that damage caused by construction related traffic to the Loeriesfontein Road and the northern section of the road to Kenhardt, and internal farm roads is repaired before the completion of the construction phase. The costs associated with the repair must be borne by the contractor;
- Dust suppression measures must be implemented the northern section of the road to Kenhardt that runs past vineyards and houses, such as wetting on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers;
- All vehicles must be road-worthy and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.

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

The activities associated with the construction phase have the potential to result in the loss of land available for grazing and other agricultural activities. The land in question is used for the land is grazing. The farm owner has entered into a lease agreement with the proponent for the use of the land for the proposed SEF. The impact on farm income due to the loss of grazing will be more than offset by the income from the SEF. The impact of the proposed SEF on the economic potential of the farm will therefore be low.

The final disturbance footprint can also be reduced by careful site design and management of operations, this requires a commitment from the proponent and careful monitoring. The impact on farmland associated with the construction phase can therefore be mitigated by minimising the footprint of the construction related activities and ensuring that disturbed areas are fully rehabilitated on completion of the construction phase. Recommended mitigation measures are outlined below.

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

<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 SEF and power lines will damage farmlands and result in a loss of farmlands for grazing.		
	<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>	Medium (6)	Minor (2)
<b>Probability</b>	Probable (3)	Highly Probable (4)
<b>Significance</b>	Medium (36)	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 site for the proposed PVF should be fenced off prior to commencement of construction activities;
- The footprint associated with the construction related activities (access roads, construction platforms, workshop etc.) should be minimised;
- An Environmental Control Officer (ECO) should be appointed to monitor the establishment phase of the construction phase;
- All areas disturbed by construction related activities, such as access roads on the site, construction platforms, workshop area etc., should be rehabilitated at the end of the construction phase;
- The implementation of a rehabilitation programme should be included in the terms of reference for the contractor/s appointed. The specifications for the rehabilitation

programme should be drawn up the Environmental Consultants appointed to undertake the EIA;

- The implementation of the Rehabilitation Programme should be monitored by the ECO.

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

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

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

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

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

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

##### **4.2.1 Development of renewable energy infrastructure**

The establishment of renewable energy infrastructure, such as the proposed Brypaal PVF, should be viewed, firstly within the context of the South Africa's current reliance on coal powered energy to meet the majority of its energy needs, and secondly, within the context of the success of the REIPPPP.

##### ***Impact of a coal powered economy***

The Green Jobs study (2011) notes that South Africa has one of the most carbon-intensive economies in the world, thus making the greening of the electricity mix a national imperative. Within this context the study notes that the green economy could be an extremely important trigger and lever for enhancing a country's growth potential and redirecting its development trajectory in the 21<sup>st</sup> century. The study also identifies a number of advantages associated with wind power as a source of renewable energy with a large 'technical' generation potential. In this regard wind energy does not emit carbon dioxide (CO<sub>2</sub>) in generating electricity and is associated with exceptionally low lifecycle emissions. The construction period for a wind farm is much shorter than that of conventional power stations, while an income stream may in certain instances be provided to local communities through employment and land rental. The study also notes that the greenhouse gases (GHG) associated with the construction phase are offset within a very short period of time compared with the project's lifespan. Wind power therefore provides an ideal means for reaching emission reduction targets in a relatively easy manner. In addition, and of specific relevance to South Africa, wind as energy source is not dependent on water (as compared to the massive water requirements of conventional power stations), has a limited footprint and therefore does not impact on large tracts of land, poses limited pollution and health risks, specifically when compared to coal and nuclear energy plants.

The Greenpeace Report (powering the future: Renewable Energy Roll-out in South Africa, 2013), notes that within a broader context of climate change, coal energy does

not only have environmental impacts, it also has socio-economic impacts. Acid mine drainage from abandoned mines in South Africa impacts on water quality and poses the biggest threat to the country's limited water resources. Huge volumes of water are also required to wash coal and cool operating power stations. Eskom uses an estimated 10 000 litres of water per second due to its dependency on coal (Greenpeace, 2012).

### ***Benefits associated with REIPPPP***

The overview of the IPPPP (2016) indicates that the REIPPPP has attracted R53.4 billion in foreign investment and financing in the six bid windows (BW1 – BW4 and 1S2). This is more than double the inward FDI attracted into South Africa during 2015 (R22.6 billion). In terms of local equity shareholding, 47% (R31.5 billion) of the total equity shareholding (R66.7 billion) was held by South African's across BW1 to BW4 and BW1S2. This equates to substantially more than the 40% requirement. As far as Broad Based Black Economic Empowerment is concerned, Black South Africans own, on average, 31% of projects that have reached financial close, which is slightly above the 30% target.

The total projected procurement spend for during the construction phase was R73 billion, more than the projected operations procurement spend over the 20 years operational life (R70 billion). The combined (construction and operations) procurement value for BW1 to BW4 and 1S2 is projected as R142.9 billion, of which R44.3 billion has been spent to date. For construction, of the R41.8 billion already spent to date, R32.5 billion is from the 51 projects which have already been completed. These 51 projects had planned to spend R30.1 billion. The actual procurement construction costs have therefore exceeded the planned costs by 8% for completed projects. Of the R41.8 billion spent on procurement during construction, R37.2 billion has reportedly been procured from BBBEE suppliers, achieving 89% of total procured. Actual BBBEE spend during construction for BW1 and BW2 alone was R25.5 billion. The R37.2 billion spent on BBBEE during construction already exceeded the R33.9 billion that had originally been anticipated by IPPs.

The report notes that for a programme of this magnitude, with construction procurement spend alone estimated at R73 billion, the result is a substantial stimulus for establishing local manufacturing capacity. The report also notes that the strategy has prompted several technology and component manufacturers to establish local manufacturing facilities. The report also notes that this will improve with greater certainty relating to subsequent bid windows and further determinations will continue to build on these successes.

In terms of employment, to date, a total of 28 4842 job years<sup>15</sup> have been created for South African citizens, of which 26 207 were in construction and 2 276 in operations. Black South African citizens, youths and rural or local communities have been the major beneficiaries during the construction phases, as they respectively represent 80%, 41% and 52% of total job opportunities created by IPPs to date. These job years should rise further past the planned target as more projects enter the construction phase. The REIPPPP has also ensured that black people in local communities have ownership in the IPP projects that operate in or nearby their vicinities. On average, black local communities own 11% of projects that have reached financial close. This is well above the 5% target.

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<sup>15</sup> The equivalent of a full time employment opportunity for one person for one year

The WWF (2014) study also notes that the REIPPPP requirement of 30% allocated to the local economic development has ensured that non-price criteria linked to socio-economic upliftment have a much heavier weighting than they would normally enjoy under Government’s preferential procurement policy (WWF, 2014). The establishment of renewable energy facilities, such as the proposed Brypaal PVF, therefore not only addresses the environmental issues associated with climate change and consumption of scarce water resources, but also creates significant socio-economic opportunities and benefits, specifically for historically disadvantaged, rural communities.

**Table 4.8: Implementation of clean, renewable energy infrastructure**

<b>Nature:</b> Development of infrastructure to generate clean, renewable energy		
	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local, Regional and National (4)	Local, Regional and National (5)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	High (8)	High (8)
<b>Probability</b>	Highly Probable (4)	Definite (5)
<b>Significance</b>	High (64)	High (85)
<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> Overall reduction in CO <sub>2</sub> emission, reduction in water consumption for energy generation, contribution to establishing an economically viable commercial renewables generation sector in the Northern Cape and South Africa.		
<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.

**Recommended mitigation measures**

Should the project be approved the proponent should:

- Implement a skills development and training programme aimed at maximizing the number of employment opportunities for local community members;
- Maximise opportunities for local content, procurement and community shareholding.

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

Based on information from other PVF projects the proposed PVF would create ~ 20 permanent employment opportunities for over a 20 year period. Additional temporary employment opportunities will also be created, linked to maintenance and cleaning of solar panels etc. The majority of the employment opportunities associated with the operational phase is likely to benefit HD members of the community. However, given that the solar energy sector in South Africa is relatively new, a number of the skilled positions may need to be filled by people from other parts of South Africa.

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

Procurement during the operational phase will also create opportunities for the local economy and businesses. In this regard the overview of the IPPPP (2016) notes that the procurement spend over the 20 year operational phase for BW1 to BW4 and 1S2 will be in the region of R 70 billion. The Green Jobs study (2011) also found that energy generation is expected to become an increasingly important contributor to green job creation over time, as projects are constructed or commissioned. The study notes that largest gains are likely to be associated with operations and maintenance (O&M) activities. In this regard, operations and maintenance employment linked to renewable energy generation plants will also be substantial in the longer term.

The establishment of renewable energy projects, such as the Brypaal PVF, also supports the development of a green energy manufacturing sector in South Africa. The Green Jobs study (2011) found that South Africa is in a position to leverage upon some of its existing manufacturing capacities in order to produce components and parts for renewable energy projects, especially industries involved in the production of steel and metal products, as well as electrical industries. Local manufacturing capacity can be promoted through engagement with established global manufacturers. The study does however note that critical mass would have to be developed in order to obtain economies of scale. The establishment of projects, such as the Brypaal PVF, would therefore contribute to achieving this critical mass.

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

The local hospitality industry in Kakamas and Keimoes 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.

The proposed development was strongly supported by Mr Vivian McPherson and Mr Johnny McKay, the IDP Manager and Director of Planning respectively at the KGLM.

However, as indicated above, the proponent should commit to employing as many local community members as possible.

**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</b>
<b>Extent</b>	Local and Regional (1)	Local and Regional (2)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	Low (4)	Low (4)
<b>Probability</b>	Probable (3)	Definite (5)
<b>Significance</b>	Low (27)	Medium (50)
<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.

#### **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.

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

An important focus of the REIPPPP is to ensure that the build programme secures sustainable value for the country and enables local communities to benefit directly from the investments attracted into the area. In this regard IPPs are required to contribute a percentage of projected revenues accrued over the 20 year project operational life toward socio-economic development (SED) initiatives. These contributions are linked to Community Trusts and accrue over the 20 year project operation life and are used to invest in housing and infrastructure as well as healthcare, education and skills development.



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

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

The minimum compliance threshold for SED contributions is 1% of revenue with 1.5% the targeted level over the 20 year project operational life. The 51 projects that are currently operational have contributed R256 to SED to date, which represents approximately 1.2% of total revenue generated to date. The 51 IPP projects have also committed 1.5% over the 20 year project operational life. Therefore, based on current projects average commitment level is 2.2% or 120% more than the minimum compliance threshold (IPPP Overview, 2016).

The 2016 IPPP Overview notes that to date (across 6 bid windows) a total contribution of R19.3 billion has been committed to SED initiatives. Of the total commitment, R15.2 billion is specifically allocated for local communities where the IPPs operate. With every new IPP on the grid, revenues and the respective SED contributions will increase.

The Green Jobs study (2011), found that the case for wind power is enhanced by the positive effect on rural or regional development. Wind farms located in rural areas create an opportunity to benefit the local and regional economy through the creation of jobs and tax revenues. The findings of the thesis by Tait (2012) also note that the distributed nature of renewable energy generation can induce a more geographically dispersed pattern of development. As a result renewable energy sites can be highly suited to rural locations with otherwise poor potential to attract local inward investment thus able to target particularly vulnerable areas. In her conclusion Tait notes that thesis found positive evidence for the establishment of community benefit schemes in the wind sector in South Africa. The BBBEE requirements for developers as set out in the DoE's IPPPP for renewables was the primary driver for such schemes. The procurement programme, in keeping with the objective of maximising the economic development potential from this new sector, includes a specific focus on local communities in which wind farms are located.

In addition to the benefits for local communities, the establishment of a SEF has a limited impact on the current agricultural land uses that underpin the local economic activities in the area and does consume negligible volumes of water during the operational phase. Based on the findings of the review it is clear that the establishment of Community Trusts associated with renewable energy projects have the potential to create significant benefits for local rural communities. However, Community Trusts can also be mismanaged. This is an issue that will need to be addressed when setting up the trust.

**Table 4.10: Assessment of benefits associated with establishment of community trust**

<b>Nature:</b> Establishment of a community trust funded by revenue generated from the sale of energy. The revenue can be used to fund local community development		
	<b>Without Mitigation</b>	<b>With Enhancement<sup>16</sup></b>
<b>Extent</b>	Local and Regional (2)	Local and Regional (3)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Intensity</b>	Low (4)	Moderate (6)
<b>Likelihood</b>	Probable (3)	Definite (5)
<b>Significance</b>	Medium (30)	High (65)
<b>Status</b>	Positive	Positive
<b>Reversibility</b>	Yes	Yes
<b>Can impact be enhanced?</b>	Yes	
<b>Enhancement:</b> See below		
<b>Cumulative impacts:</b> Promotion of social and economic development and improvement in the overall well-being of the community		
<b>Residual impacts:</b> See cumulative impacts		

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

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

#### **Recommended enhancement measures**

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

- The KGLM should liaise with the proponents of other renewable energy projects in the area to investigate how best the Community Trusts can be established and managed so as to promote and support local, socio-economic development in the region as a whole.
- The KGLM should be consulted as to the structure and identification of potential trustees to sit on the Trust. The key departments in the KGLM that should be consulted include the Municipal Managers Office, IDP Manager and LED Manager.
- Clear criteria for identifying and funding community projects and initiatives in the area should be identified. The criteria should be aimed at maximising the benefits for the community as a whole and not individuals within the community;
- Strict financial management controls, including annual audits, should be instituted to manage the funds generated for the Community Trust from the SEF plant.

<sup>16</sup> Enhancement assumes effective management of the community trust

#### 4.2.2 Generate income for affected landowner

The proponent has entered into rental agreements with the affected landowner for the use of the land for the establishment of the proposed SEF. In terms of the rental agreement the affected landowner will be paid an annual amount dependent upon the number of wind turbines located on the property. The additional income will reduce the risk to his livelihoods posed by droughts and fluctuating market prices for sheep and farming inputs, such as fuel, feed etc. Given the low carrying capacity of the veld the additional income represents a significant benefit for the affected landowner.

**Table 4.11: Assessment of benefits associated with income generated for the affected farmer(s)**

<b>Nature:</b> The generation of additional income represents a significant benefit for the local affected farmer(s) and reduces the risks to their livelihoods posed by droughts and fluctuating market prices for sheep and farming inputs, such as feed etc. (+)		
	<b>Without Mitigation</b>	<b>With Enhancement<sup>17</sup></b>
<b>Extent</b>	Local (1)	Local (3)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Intensity</b>	Low (4)	Moderate (6)
<b>Likelihood</b>	Probable (3)	Definite (5)
<b>Significance</b>	Low (27)	Medium (53)
<b>Status</b>	Positive	Positive
<b>Reversibility</b>	Yes	Yes
<b>Can impact be enhanced?</b>	Yes	
<b>Enhancement:</b> See below		
<b>Cumulative impacts:</b> Support for local agricultural sector and farming		
<b>Residual impacts:</b> See cumulative impacts		

#### Assessment of No-Go option

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

#### Recommended enhancement measures

Implement agreements with affected landowner.

#### 4.4.3 Impact on productive agricultural land

The proponent has entered into a lease agreement with landowner for the use of the land for the proposed SEF. The impact on farm income due to the loss of grazing will be more than offset by the income from the SEF. The impact of the proposed SEF on the economic potential of the farm will therefore be low. In addition, the final disturbance footprint can also be reduced by careful site design and placement of components. The impact on farmland associated with the operational phase can therefore be mitigated by minimising the footprint of the proposed SEF. The impact on current and future agricultural uses of the land is therefore regarded as low.

<sup>17</sup> Enhancement assumes effective management of the community trust

**Table 4.12: Potential impacts on productive land and farming activities**

<b>Nature:</b> Potential loss of productive agricultural land associated with the SEF footprint and associated potential impact on viability of operations		
	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (1)	Local (1)
<b>Duration</b>	Long term-permanent if disturbed areas are not effectively rehabilitated (5)	Short term if damaged areas are rehabilitated (2)
<b>Magnitude</b>	Minor (2)	Minor (2)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Low (24)	Low (15)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes, disturbed areas can be rehabilitated	Yes, disturbed areas can be rehabilitated
<b>Irreplaceable loss of resources?</b>	Yes, loss of farmland. However, disturbed areas can be rehabilitated	Yes, loss of farmland. However, disturbed areas can be rehabilitated
<b>Can impact be mitigated?</b>	Yes, however, loss of farmland cannot be avoided	Yes, however, loss of farmland cannot be avoided
<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. In terms of closure costs, the costs associated with decommissioning and the rehabilitation of disturbed areas will be covered by the sale scrap metal (steel and copper) from the PV plant.

**4.4.4 Visual impact and impact on sense of place**

The components associated with the proposed facility are likely to have a visual impact on the landscape and areas undisturbed rural sense of the place. In this regard Mr. Johann Stadler indicated that the undisturbed landscape was one of the special features of the area. Mr. Stadler indicated that he was concerned that the establishment of the proposed PVF would impact on the areas undisturbed sense of place. In this regard Mr. Stadler’s house is located approximately 500m from the south western boundary of the site. Mr. Stadler requested that the PVF be located as far north on the site towards the Eskom transmission line as possible, as this would reduce the visual impact from his house. Mr. Kobus van Zyl, whose house is located approximately 500 m south of the site, also requested that the PVF be located as far

north on the site as possible. The findings of the SIA indicate that potential visual impacts associated with the proposed SEF can be reduced if the PVF is located in the northern portion of the site.

In terms of impact on passing traffic, the Loerisfontein Road is not a scenic road and there are no tourism operations located along the relevant portion of the road. The road is used mainly by local farmers. In addition, the visual quality of the area has been impacted by an existing power Eskom transmission line to Namibia located approximately 100 m to the north of the site. The potential impact on passing motorists and tourism is therefore likely to be minor.

**Table 4.13: Visual impact and impact on sense of place**

<b>Nature:</b> Visual impact associated with the proposed solar facility and the potential impact on the areas rural sense of place.		
	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (2)	Local (1)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	Minor (2)	Minor (2)
<b>Probability</b>	Probable (4)	Highly Probable (4)
<b>Significance</b>	Medium (32)	Low (28)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes, solar facility can be removed.	
<b>Irreplaceable loss of resources?</b>	No	
<b>Can impact be mitigated?</b>	Yes	
<b>Mitigation:</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 also be implemented.

#### **4.4.5 Potential impacts on tourism**

The tourism sector is regarded as an important economic sector in the Northern Cape Province (NCP). The tourism potential of the area is linked to the areas natural resources, including the relatively undisturbed scenery and landscape. However, due to the sites isolated location the tourist potential of the area is low. In addition, the site is not located adjacent to any identified tourist routes. The impact of the proposed PVF on the tourism potential of the area and the KGLM and NCP is therefore likely to be

low. In some instances the PVF may also attract tourists to the area. However, the significance of this potential benefit is also rated as low positive.

**Table 4.14: Potential impact on tourism**

<b>Nature:</b> Potential impact of the SEF on local tourism		
	<b>Without Mitigation</b>	<b>With Enhancement / Mitigation</b>
<b>Extent</b>	Local (2)	Local (2)
<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 (24) (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 SEF is one of a number of SEFs proposed in the KGLM area. Due to size and height of SEFs the 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 OF DECOMMISSIONING PHASE**

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

Given the relatively small number of people employed during the operational phase (~ 20), the social impacts at a community level associated with decommissioning will be limited. In addition, potential impacts associated with the decommissioning phase can be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be Low (negative).

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

<b>Nature:</b> Social impacts associated with retrenchment including loss of jobs, and source of income		
	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local and regional (2)	Local and regional (1)
<b>Duration</b>	Medium Term (2)	Very Short Term (1)
<b>Magnitude</b>	Moderate (6)	Low (4)
<b>Probability</b>	Highly Probable (4)	Highly Probable (4)
<b>Significance</b>	Medium (40)	Low (24)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes, assumes retrenchment packages are paid to all affected employees	
<b>Irreplaceable loss of resources?</b>	No	
<b>Can impact be mitigated?</b>	Yes	
<b>Mitigation:</b> See below		
<b>Cumulative impacts:</b> Loss of jobs and associated loss of income etc. can impact on the local economy and other businesses. However, decommissioning can also create short term, temporary employment opportunities associated with dismantling etc.		
<b>Residual impacts:</b> See cumulative impacts		

### Recommended mitigation measures

The following mitigation measures are recommended:

- The proponent should ensure that retrenchment packages are provided for all staff retrenched when the plant is decommissioned.
- All structures and infrastructure associated with the proposed facility should be dismantled and transported off-site on decommissioning;
- Revenue generated from the sale of scrap metal during decommissioning should be allocated to funding closure and rehabilitation of disturbed areas.

### 4.6 CUMULATIVE IMPACT ON SENSE OF PLACE

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

are, as in the case of wind farms, also likely to be linked to visual impacts and the impact on rural, undeveloped landscapes.

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

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

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

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

As indicated above, the potential impact of the proposed SEF on the areas sense of place is likely to be low. Based on information gathered during the site visit a SEF facility is proposed on Mr Human's farm located to the north of the site. In addition, a number of other SEFs are proposed to the vicinity of Kenhardt. The potential for cumulative impacts associated with combined visibility (whether two or more solar facilities will be visible from one location) and sequential visibility (e.g. the effect of seeing two or more solar facilities along a single journey, e.g. road or walking trail) does therefore exist. However, with careful planning, the visual impacts associated with



SEFs tend to be low. The visibility of the proposed SEFs will also be mitigated by the low-scale nature of SEFs. The potential cumulative impacts associated with combined visibility (whether two or more wind farms (solar facilities) will be visible from one location) and sequential visibility (e.g. the effect of seeing two or more wind farms (solar facilities) along a single journey, e.g. road or walking trail) are therefore likely to be low.

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

**Table 4.16: Cumulative impacts on sense of place and the landscape**

<b>Nature:</b> Visual impacts associated with the establishment of more than one SEF and the potential impact on the areas rural sense of place and character of the landscape.		
	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local and regional (2)	Local and regional (2)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	Low (4)	Minor (2)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Medium (30)	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.

#### **4.7 CUMULATIVE IMPACT ON LOCAL SERVICES AND ACCOMMODATION**

The establishment of the proposed PVF and the other renewable energy facilities in the GKLM will place pressure on local services in small towns, such as Keimoes and Kakamas, specifically services such as medical, education and accommodation. This pressure will be associated with the influx of workers to the area associated with the construction and operational phases of renewable energy projects proposed in the area, including the proposed SEF. The potential impact on local services can be mitigated by employing local community members. However, due to the low education and skills levels in the area there is likely to be a need to implement a training and skills development programme to ensure that local employment opportunities are maximised. The presence of non-local workers during both the construction and operation phase will also place pressure on property prices and rentals. As a result, local residents, such as government officials, such as municipal workers, school teachers, and the police, may no longer be able to buy or afford to rent accommodation in Keimoes and Kakamas and other towns in the KGLM.

However, as indicated below, this impact should also be viewed within the context of the potential positive cumulative impacts for the local economy associated with the establishment of a renewable energy hub in the area. These benefits will create opportunities for investment in Keimoes and Kakamas and the KGLM, including the opportunity to up-grade and expand existing services and the construction of new houses. In this regard the establishment of a renewable energy hub will create a unique opportunity for Keimoes and Kakamas to develop.

The Community Trusts associated with each project will generate revenue that can be used by the KGLM in consultation with the NC Provincial Government, to invest in up-grading local services where required. It should also be noted that it is the function of national, provincial and local government to address the needs created by development and provide the required services. The additional demand for services and accommodation created by the establishment of development renewable energy projects should therefore be addressed in the Integrated Development Planning process undertaken by the KGLM.

**Table 4.17: Cumulative impacts on local services**

<b>Nature:</b> The establishment of a number of renewable energy facilities in the KGLM and ZFMDM will place pressure on local services, specifically medical, education and accommodation		
	<b>Without Mitigation</b>	<b>With Mitigation<sup>18</sup></b>
<b>Extent</b>	Local and regional (3)	Local and regional (1)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	Moderate (6)	Minor (2)
<b>Probability</b>	Highly Probable (4)	Highly Probable (4)
<b>Significance</b>	Medium (52)	Low (28)
<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> Negative impact on the local services		
<b>Residual impacts:</b> See cumulative impacts		

**Comment on No-Go option**

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

**Recommended mitigation measures**

The North West Provincial Governments, in consultation with the ZFMDM, KGLM and the proponents involved in the development renewable energy projects in the GKLM, should consider establishing a Development Forum to co-ordinate and manage the development and operation of renewable energy projects in the area with the specific aim of mitigating potential negative impacts and enhancing opportunities. This would include identifying key needs, including capacity of existing services, accommodation and housing and the implementation of an accredited training and skills development programmes aimed at maximising the opportunities for local workers to be employed during the construction and operational phases of the various proposed projects. These issues should be addressed in the Integrated Development Planning process undertaken by the KGLM and ZFMDM.

**4.8 CUMULATIVE IMPACT ON LOCAL ECONOMY**

In addition to the potential negative impacts, the proposed SEF also has the potential to result in significant positive cumulative impacts. In this regard the establishment of

<sup>18</sup> The mitigation measures are linked to initiatives undertaken by Provincial and Local Government to address the additional demand for services and accommodation etc. created by the establishment of development renewable energy projects in the Upington Solar REDZ.

a number of SEFs in the area will create a number of socio-economic opportunities for the KGLM and NCP, which, in turn, will result in a positive social benefit. The positive cumulative impacts include creation of employment, skills development and training opportunities, and downstream business opportunities. In this regard the establishment of SEFs in the area is strongly supported by the LED representatives from the KGLM.

The Overview of the IPPP (2016) confirms the benefits associated with renewable energy projects for local and regional economies. The total projected procurement spend for BW1 to BW4 and 1S2 during the construction phase was R73 billion, while the operational procurement over 20 years is estimated to be in the region of R70 billion. The reports notes that the construction spend of R73 billion has resulted in a substantial stimulus for establishing local manufacturing capacity. Actual local content spend reported for IPPs that have started construction amounts to R33.8 billion against a corresponding project value (as realised to date) of R66.6 billion. This means 51% of the project value has been locally procured, exceeding the 45% commitment from IPPs and the thresholds for BW1 – BW4. The report also notes that the REIPPPP has prompted several technology and component manufacturers to establish local manufacturing facilities. The potential cumulative benefits for the local and regional economy are therefore associated with both the construction and operational phase of renewable energy projects and extend over a period of 20-25 years.

The representatives from the KGLM indicated that due the limited opportunities in the area, unemployment and lack of meaningful skills development were key challenges. The opportunity to create employment was therefore welcomed. However, steps should be taken to maximise employment opportunities for members from the local communities in the area and support skills development and training programmes.

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

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

### **Recommended mitigation measures**

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

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

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

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

**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>19</sup></b>
<b>Extent</b>	Local-International (4)	Local-International (4)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	Moderate (6)	Moderate (6)
<b>Probability</b>	Highly Probable (4)	Highly Probable (4)
<b>Significance</b>	Moderate (56)	Moderate (56)
<b>Status</b>	Negative	Positive
<b>Reversibility</b>	Yes	
<b>Irreplaceable loss of resources?</b>	Yes, impact of climate change on ecosystems	
<b>Can impact be mitigated?</b>	Yes	
<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 that need to be addressed in the location, design and layout of the proposed facility.

<sup>19</sup> Assumes establishment of a Community Trust

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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 relevant literature on social and economic impacts;
- The experience of the authors with other solar energy projects in South Africa

### 5.2 SUMMARY OF KEY FINDINGS

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

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

#### 5.2.1 Policy and planning issues

The findings of the review indicate that renewable, including solar energy, is strongly supported at a national, provincial 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 development of and investment in renewable energy is also supported by the National Development Plan (NDP), New Growth Path Framework and National Infrastructure Plan, which all make reference to renewable energy.

The proposed SEF also supports a number of objectives contained in the NCP Provincial Growth and Development Strategy and the ZFMDM and KGLM IDP, specifically promotion of socio-economic development, SMME's, job creation and private sector investment. The findings of the SIA also indicate that unemployment and poverty levels in the study area are high. In this regard the proposed SEF has the potential to

support local economic development and create employment opportunities. The proposed development therefore supports a number of key objectives contained in the KGLM IDP. The KGLM also identifies solar energy as a growth opportunity within the local economy.

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 suitably sited solar energy facilities is supported at a national, provincial, and local level. It is therefore the opinion of the authors that the establishment of a SEF in the area is supported by national, provincial and local policies and planning documents.

### **5.1.1 Construction phase impacts**

The key social issues associated with the construction phase include:

#### **Potential positive impacts**

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

Based on information from other SEF projects, the construction phase for a 100 MW PVF is expected to extend over a period of 14-18 months and create approximately 300 employment opportunities, depending on the final design. Of this total ~ 60% (180) will be available to low-skilled workers (construction labourers, security staff etc.), 25% (75) to semi-skilled workers (drivers, equipment operators etc.) and 15% (45) to skilled personnel (engineers, land surveyors, project managers etc.). The total wage bill for the construction phase is estimated to be in the region of R 50 million (2017 rand value). 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 Keimoes and Kakamas. The majority of the beneficiaries are likely to be historically disadvantaged (HD) members of the community. This would represent a significant positive social benefit in an area with limited employment opportunities. However, in the absence of specific commitments from the developer to employ local contractors the potential for meaningful skills to local employment targets the benefits for members from the local communities may be limited. In addition, the low education and skills levels in the area may also hamper potential opportunities for local communities.

The potential benefits for local communities is confirmed by the findings of the Overview of the Independent Power Producers Procurement Programme (IPPPP) undertaken by the Department of Energy, National Treasury and DBSA (30 September 2016). The study found that employment opportunities created during the construction phase of the projects implemented to date had created 61% more jobs than anticipated. The study also found that significantly more people from local communities were employed during construction than was initially planned. In this regard the expectation for local community participation was 6 771 job years. To date 15 215 job years have been realised (i.e. 125% greater than initially planned). Black South African citizens, youths and rural or local communities have been the major beneficiaries during the construction phases, as they respectively represent 80%, 41% and 52% of total job opportunities created by IPPs to date.

The capital expenditure associated with the construction phase will be in the region of R 2.5 billion (2017 rand value). A percentage of the wage bill will also be spent in the local economy which will create opportunities for local businesses in Kakamas, Keimoes



and Uppington. 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.

#### Potential negative impacts

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

The significance of the potential negative impacts with mitigation was assessed to be of Low significance. All of the potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented. In addition, if the majority of the low and semi-skilled construction workers are sourced from the local area the potential risk to local family structures and social networks is regarded as low. However, the impact on individuals who are directly impacted on by construction workers (i.e. contract HIV/ AIDS) was assessed to be of Medium-High negative significance. Table 5.1 summarises the significance of the impacts associated with the construction phase.

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

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

#### 5.2.2 Operational phase impacts

##### Potential positive impacts

- The establishment of infrastructure to generate renewable energy;

- Creation of employment and business opportunities. The operational phase will also create opportunities for skills development and training;
- Benefits associated with the establishment of a Community Trust;
- Generation of income for affected landowner/s.

### ***Development of renewable energy infrastructure***

The establishment of renewable energy infrastructure, such as the proposed Brypaal PVF, should be viewed, firstly within the context of the South Africa's current reliance on coal powered energy to meet the majority of its energy needs, and secondly, within the context of the success of the REIPPPP.

The Green Jobs study (2011) notes that South Africa has one of the most carbon-intensive economies in the world, thus making the greening of the electricity mix a national imperative. The Greenpeace Report (Powering the future: Renewable Energy Roll-out in South Africa, 2013), notes that within a broader context of climate change, coal energy does not only have environmental impacts, it also has socio-economic impacts. Acid mine drainage from abandoned mines in South Africa impacts on water quality and poses the biggest threat to the country's limited water resources. Huge volumes of water are also required to wash coal and cool operating power stations.

The Green Jobs study (2011) identifies a number of advantages associated with wind power as a source of renewable energy, including zero carbon dioxide (CO<sub>2</sub>) emissions during generation and low lifecycle emissions. Greenhouse gases (GHG) associated with the construction phase are offset within a very short period of time compared with the project's lifespan. Wind power therefore provides an ideal means for reaching emission reduction targets in a relatively easy manner. In addition, and of specific relevance to South Africa, wind as energy source is not dependent on water (as compared to the massive water requirements of conventional power stations), has a limited footprint and therefore does not impact on large tracts of land, poses limited pollution and health risks, specifically when compared to coal and nuclear energy plants.

In terms of investment, the REIPPPP has attracted R53.4 billion in foreign investment and financing in the six bid windows (BW1 – BW4 and 1S2). This is more than double the inward FDI attracted into South Africa during 2015 (R22.6 billion). In terms of local equity shareholding, 47% (R31.5 billion) of the total equity shareholding (R66.7 billion) was held by South African's across BW1 to BW4 and BW1S2. As far as Broad Based Black Economic Empowerment is concerned, Black South Africans own, on average, 31% of projects that have reached financial close. The combined (construction and operations) procurement value for BW1 to BW4 and 1S2 is projected as R142.9 billion, of which R44.3 billion has been spent to date. In terms of employment, a total of 28 4842 job years<sup>20</sup> have been created for South African citizens, of which 26 207 were in construction and 2 276 in operations.

The establishment of renewable energy facilities, such as the Brypaal PV, therefore not only address the environmental issues associated with climate change and consumption of scarce water resources, but also creates significant socio-economic opportunities and benefits, specifically for historically disadvantaged, rural communities.

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<sup>20</sup> The equivalent of a full time employment opportunity for one person for one year

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

The total number of permanent employment opportunities is estimated to be in the region of 20. Of this total ~ 12 are low skilled workers, 6 semi-skilled and 2 skilled. The annual wage bill for the operational phase will be ~ R 3 million (2017 Rand value). The majority of the low and semi-skilled beneficiaries are likely to be historically disadvantaged (HD) members of the community. Given the location of the proposed facility the majority of permanent staff is likely to reside in the towns of Kakamas and Keimoes.

Procurement during the operational phase will also create opportunities for the local economy and businesses. In this regard the overview of the IPPPP (2016) notes that the procurement spend over the 20 year operational phase for BW1 to BW4 and 1S2 will be in the region of R 70 billion. The Green Jobs study (2011) also found that energy generation is expected to become an increasingly important contributor to green job creation over time, as projects are constructed or commissioned. The study notes that largest gains are likely to be associated with operations and maintenance (O&M) activities. In this regard, operations and maintenance employment linked to renewable energy generation plants will also be substantial in the longer term.

### ***Community Trust***

The establishment of a community benefit structure (typically, a Community Trust) also creates an opportunity to support local economic development in the area. The requirement for the project to allocate funds to socio-economic contributions (through structures such as Community Trusts) provides an opportunity to advance local community projects, which is guaranteed for a 20 year period (project lifespan). The revenue from the proposed SEF can be used to support a number of social and economic initiatives in the area, including but not limited to:

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

The 2016 IPPP Overview notes that to date (across 6 bid windows) a total contribution of R19.3 billion has been committed to Socio-economic Development (SED) initiatives linked to Community Trusts. Of this total commitment, R15.2 billion has been specifically allocated to local communities where the IPPs operate. The Green Jobs study (2011), found that the case for wind power is enhanced by the positive effect on rural or regional development. Wind farms located in rural areas create an opportunity to benefit the local and regional economy through the creation of jobs and tax revenues.

The long term duration of the contributions from the SEF also enables local municipalities and communities to undertake long term planning for the area. Experience has, however, shown that Community Trusts can be mismanaged. This issue will need to be addressed in order to maximise the potential benefits associated with the establishment of a Community Trust or other community benefit structure (entity). The REIPPP programme does however have stringent audit requirements in place to try and prevent the mismanagement of trusts.

### Potential negative impacts

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

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

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

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

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

<b>Impact</b>	<b>Significance No Mitigation</b>	<b>Significance With Mitigation</b>
<b>Promotion of renewable energy projects</b>	High (Positive impact)	High (Positive impact)
<b>Creation of employment and business opportunities</b>	Low (Positive impact)	Medium (Positive impact)
<b>Establishment of Community Trust</b>	Medium (Positive impact)	High (Positive impact)
<b>Generate income for affected landowner/s</b>	Low (Positive impact)	Medium (Positive impact)
<b>Impact on agricultural land</b>	Low (Negative impact)	Low (Negative impact)
<b>Visual impact and impact on sense of place</b>	Medium (Negative impact)	Low (Negative impact)
<b>Impact on tourism</b>	Low (Positive and Negative)	Low (Positive and Negative)

### 5.2.3 Assessment of cumulative impacts

#### ***Cumulative impact on sense of place***

In addition to the proposed PVF, one other SEF is proposed in the immediate vicinity of the site. In addition, a number of other SEFs are proposed to the vicinity of Kenhardt. The potential for cumulative impacts associated with combined visibility (whether two or more solar facilities will be visible from one location) and sequential visibility (e.g. the effect of seeing two or more solar facilities along a single journey, e.g. road or walking trail) does therefore exist. However, with careful planning, the visual impacts

associated with SEFs tend to be low. The visibility of the proposed SEFs will also be mitigated by the low-scale nature of SEFs. The potential cumulative impacts associated with combined visibility (whether two or more wind farms (solar facilities) will be visible from one location) and sequential visibility (e.g. the effect of seeing two or more wind farms (solar facilities) along a single journey, e.g. road or walking trail) are therefore likely to be low.

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

#### ***Cumulative impact on services***

The establishment of the proposed SEF and the other renewable energy facilities in the KGLM will place pressure on local services in the towns of Kakamas and Keimoes, specifically medical, education and accommodation. This pressure will be associated with the influx of workers to the area associated with the construction and operational phases of the renewable energy projects proposed in the area, including the proposed SEF. The potential impact on local services can be mitigated by employing local community members. The presence of non-local workers during both the construction and operation phase will also place pressure on property prices and rentals. As a result, local residents, such as government officials, such as municipal workers, school teachers and the police, may no longer be able to buy or afford to rent accommodation in Kakamas and Keimoes. With effective mitigation the impact is rated as **Low Negative**.

However, as indicated below, this impact should also be viewed within the context of the potential positive cumulative impacts for the local economy associated with the establishment of a renewable energy hub in the KGLM. These benefits will create opportunities for investment in Kakamas and Keimoes, including the opportunity to upgrade and expand existing services and the construction of new houses. In this regard the establishment of a renewable energy hub will create a unique opportunity for the KGLM to develop. It should also be noted that it is the function of national, provincial and local government to address the needs created by development and provide the required services. The additional demand for services and accommodation created by the establishment of development renewable energy projects in the KGLM should therefore be addressed in the Integrated Development Planning process undertaken by the KGLM and ZFMDM.

#### ***Cumulative impact on local economies***

In addition to the potential negative impacts, the establishment of the proposed PVF and other renewable energy projects in the area also has the potential to create a number of socio-economic opportunities for the KGLM and ZFMDM, 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. This benefit is rated as **High Positive** with enhancement.

#### **5.2.4 Decommissioning phase**

Typically, the major social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income. This has implications for the

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

Given the relatively small number of people employed during the operational phase (~ 20), the potential negative social impact on the local economy associated with decommissioning will be limited. In addition, the potential impacts associated with the decommissioning phase can also be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be Low (negative).

In terms of closure costs, the revenue from the sale of scrap metal from the PV plant should be allocated to cover the costs associated with closure and the rehabilitation of disturbed areas.

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

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

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

## **5.3 CONCLUSIONS AND RECOMMENDATIONS**

The findings of the SIA indicate that the development of the proposed Brypaal PVF will create employment and business opportunities for locals during both the construction and operational phase of the project.

The establishment of a Community Trust will also benefit the local community. The enhancement measures listed in the report should be implemented in order to maximise the potential benefits. The significance of this impact is rated as **High Positive**. The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the negative environmental and socio-economic impacts associated a coal based energy economy and the challenges created by climate change, represents a significant positive social benefit for society as a whole. The findings of the SIA also indicate that the Renewable Energy Independent

Power Producers Procurement Programme (REIPPPP) has resulted in significant socio-economic benefits, both at a national level and at a local, community level. These benefits are linked to foreign Direct Investment, local employment and procurement and investment in local community initiatives. The establishment of the proposed Brypaal PVF is therefore supported by the findings of the SIA.

Due the number of other renewable energy projects proposed in the KGLM, it is recommended that the KGLM liaise with the proponents to investigate how best the Community Trusts can be established and managed so as to promote and support local, socio-economic development in the region as a whole.

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.

## **ANNEXURE A**

### **INTERVIEWS**

- Mr and Mrs Human, adjacent land owners, 3/04/2017;
- Mr and Mrs Stadler, adjacent land owners, 3/04/2017;
- Mr and Mrs van Zyl, adjacent land owners, 4/04/2017;
- Mr McPherson, IDP Manager, Kai !Garib Local Municipality, 4/04/2017;
- Mr MacKay, Director of Planning, Kai !Garib Local Municipality, 4/04/2017.

The following representatives from the Kai !Garib Local Municipality were interviewed in 2016 as part of an SIA for a SEF located near Kenhardt:

- Markus, Mr (26-08-16). Kai !Garib Local Municipality – Keimoes LED office.
- November, Mr Alcord (26-08-16). Kai !Garib Local Municipality – Keimoes LED office.

### **REFERENCES**

- The National Energy Act (2008);
- The White Paper on the Energy Policy of the Republic of South Africa (December 1998);
- The White Paper on Renewable Energy (November 2003);
- Integrated Resource Plan (IRP) for South Africa (2010-2030);
- The National Development Plan (2011);
- Northern Cape Provincial Growth and Development Strategy (2004-2014);
- Northern Cape Climate Change Response Strategy (in progress);
- Northern Cape Spatial Development Framework (2012);
- ZF MCGAWU District Municipality Integrated Development Plan (2016);
- Kai! Garib Local Municipality Integrated Development Plan (IDP) (2016/17);
- //Khara Hais Integrated Development Plan (2016 Revision);
- Green Jobs Study (2011), IDC, DBSA Ltd and TIPS;
- Independent Power Producers Procurement Programme (IPPPP): An Overview (30 September 2016), Department of Energy, National Treasury and DBSA;
- Powering the Future: Renewable Energy Roll-out in South Africa (2013), Greenpeace South Africa;
- Market Intelligence Report: Renewable Energy (2014). Mike Mulcahy, Greencape.

### **Internet sources**

- [www.demarcation.org.za](http://www.demarcation.org.za) (Municipal and Ward demarcations)
- Google Earth 2012.
- Borthakur, S. 2017. Photovoltaic (PV)-Solar Cells & Panels: The available types and their best suitability. <https://www.linkedin.com/pulse/photovoltaics-pv-solar-cells-panels-available-types-best-borthakur>



## 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: CV**

### **Tony Barbour**

### **ENVIRONMENTAL CONSULTING AND RESEARCH**

10 Firs Avenue, Claremont, 7708, South Africa  
(Tel) 27-21-761 2355 - (Fax) 27-21-761 2355 - (Cell) 082 600 8266  
(E-Mail) [tbarbour@telkomsa.net](mailto:tbarbour@telkomsa.net)

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Tony Barbour's experience as an environmental consultant includes working for ten years as a consultant in the private sector followed by four years at the University of Cape Town's Environmental Evaluation Unit. He has worked as an independent consultant since 2004, with a key focus on Social Impact Assessment. His other areas of interest include Strategic Environmental Assessment and review work.

#### **EDUCATION**

- BSc (Geology and Economics) Rhodes (1984);
- B Economics (Honours) Rhodes (1985);
- MSc (Environmental Science), University of Cape Town (1992)

#### **EMPLOYMENT RECORD**

- Independent Consultant: November 2004 – current;
- University of Cape Town: August 1996-October 2004: Environmental Evaluation Unit (EEU), University of Cape Town. Senior Environmental Consultant and Researcher;
- Private sector: 1991-August 2000: 1991-1996: Ninham Shand Consulting (Now Aurecon, Cape Town). Senior Environmental Scientist; 1996-August 2000: Steffen, Robertson and Kirsten (SRK Consulting) – Associate Director, Manager Environmental Section, SRK Cape Town.

#### **LECTURING**

- University of Cape Town: Resource Economics; SEA and EIA (1991-2004);
- University of Cape Town: Social Impact Assessment (2004-current);
- Cape Technikon: Resource Economics and Waste Management (1994-1998);
- Peninsula Technikon: Resource Economics and Waste Management (1996-1998).

#### **RELEVANT EXPERIENCE AND EXPERTISE**

Tony Barbour has undertaken in the region of 200 SIA's, including SIA's for infrastructure projects, dams, pipelines, and roads. All of the SIAs include interacting with and liaising with affected communities. In addition he is the author of the Guidelines for undertaking SIA's as part of the EIA process commissioned by the Western Cape Provincial Environmental Authorities in 2007. These guidelines have been used throughout South Africa.

Tony was also the project manager for a study commissioned in 2005 by the then South African Department of Water Affairs and Forestry for the development of a Social Assessment and Development Framework. The aim of the framework was to enable the Department of Water Affairs and Forestry to identify, assess and manage social impacts associated with large infrastructure projects, such as dams. The study also included the development of guidelines for Social Impact Assessment, Conflict Management, Relocation and Resettlement and Monitoring and Evaluation.

Countries with work experience include South Africa, Namibia, Angola, Botswana, Zambia, Lesotho, Swaziland, Ghana, Mozambique, Mauritius, Kenya, Ethiopia, Oman, South Sudan and Sudan.

## ANNEXURE D: DECLARATION OF INDEPENDENCE

The specialist declaration of independence in terms of the Regulations\_

I, Tony Barbour , declare that --

General declaration:

I act as the independent specialist in this application;

I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;

I declare that there are no circumstances that may compromise my objectivity in performing such work;

I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;

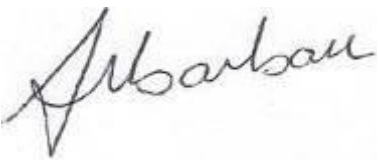
I will comply with the Act, Regulations and all other applicable legislation;

I have no, and will not engage in, conflicting interests in the undertaking of the activity;

I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;

all the particulars furnished by me in this form are true and correct; and

I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



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Signature of the specialist:

Tony Barbour Environmental Consulting and Research

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Name of company (if applicable):

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29 May 2017

Date: