

SOCIAL IMPACT ASSESSMENT

DUNEVELD PV FACILITY

NORTHERN CAPE PROVINCE

APRIL 2020

Prepared

By

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EXECUTIVE SUMMARY

INTRODUCTION AND LOCATION

CapeEAPrac was appointed by Duneveld PV (Pty) Ltd to manage the Basic Assessment (BA) process for the proposed 100 MW Duneveld PV facility. The proposed development site is located approximately 30 km south west of Upington and 16 km north east of Keimoes in the Northern Cape Province. The site is situated within the Kai !Garib Local Municipality (KGLM), which is located within the ZF Mgcawu District Municipality (ZFMDM).

Tony Barbour Environmental Consulting was appointed by CapeEAPrac to undertake a specialist Social Impact Assessment (SIA) as part of a Basic Assessment (BA) process. This report contains the findings of the SIA for the 100 MW Duneveld PV facility.

DESCRIPTION OF THE PROPOSED SOLAR ENERGY FACILITY

The proposed Duneveld PV will have a net generating capacity of 100 MW. The construction phase is expected to extend over a period of ~18-24 months and 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 billion (2020 Rand values). The energy will be linked via an on-site substation to the Eskom grid¹. The project is therefore an Independent Power Producer (IPP) project.

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 socio-economic environment;
- 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 2011 Census Survey and 2016 Household Community Survey;
- Review of relevant planning and policy frameworks;

¹ The grid connection is being assessed as part of a separate BA process.

- 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 the “no development” alternative;
- Assessment of cumulative impacts.

POLICY AND PLANNING ISSUES

The findings of the review indicate that renewable energy is strongly supported at a national, provincial and local level. At a national and provincial level the development of and investment in renewable energy is 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 Northern Cape Province (NCP) Provincial Growth and Development Strategy. Renewable energy is also supported at a district and local level. The Duneveld PV facility is also located within the Upington Solar REDZ which was formally gazetted in 2018². The area has therefore been identified as suitable for the establishment of large-scale solar energy facilities.

CONSTRUCTION PHASE

The key social issues associated with the construction phase include:

Potential positive impacts

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

The construction phase is expected to extend over a period of 14-18 months and create approximately 300 employment opportunities. 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 R50 million (2020 rand value). Most 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 local settlements, such as Brugge, Klippunt, Dyasons Klip, Oranjevallei, Louisvale, Kanoneiland, Bloemsmond, and Keimoes. 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

² GN114 of 2018

employ local contractors the potential for meeting local employment targets may be limited. In addition, the low education and skills levels in the area may hamper potential opportunities for local communities.

The potential benefits for local communities are 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 (March 2019). The review found that by the end of March 2019 the 64 renewable energy projects that had been successfully completed had created 31 633 job years³ of employment, compared to the anticipated 20 689. This was 53% more than planned. The study also found that significantly more people from local communities were employed during construction than was initially planned.

The capital expenditure associated with the construction phase will be in the region of R 2 billion (2020 Rand value). A percentage of the wage bill will be spent in the local economy which will create opportunities for local businesses in 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 grass fires associated with construction related activities;
- Noise, dust and safety impacts of construction related activities and vehicles;
- Impact on productive farmland.

The findings of the SIA indicate that the significance of all the potential negative impacts with mitigation were **Low Negative**. The potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented. Given that most of the low and semi-skilled construction workers can be sourced from the local area the potential risk posed by construction workers on local family structures and social networks is regarded as low for the community as a whole. Table 1 summarises the significance of the impacts associated with the construction phase.

³ The equivalent of a full-time employment opportunity for one person for one year

Table 1: Summary of social impacts during construction phase

Impact	Significance No Mitigation	Significance With Mitigation
Creation of employment and business opportunities	Medium (Positive impact)	Medium (Positive impact)
Presence of construction workers and potential impacts on family structures and social networks	Medium (Negative impact for community as a whole)	Low (Negative impact for community as a whole)
Influx of job seekers	Low (Negative)	Low (Negative)
Safety risk, stock theft and damage to farm infrastructure associated with presence of construction workers	Medium (Negative impact)	Low (Negative impact)
Increased risk of veld fires	Medium (Negative impact)	Low (Negative impact)
Impact of heavy vehicles and construction activities	Medium (Negative impact)	Low (Negative impact)
Loss of farmland	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; and
- Generation of income for affected landowner/s.

Development of renewable energy infrastructure

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 National Climate Change Response White Paper outlines the national response to the impacts of climate change, as well as the domestic contribution to international efforts to mitigate green-house gas emissions. As part of the global commitment, South Africa is targeting an emissions trajectory that peaks at 34% below a "business as usual" case in 2020, 42% below in 2025 and from 2035 declines in absolute terms. The emission reductions between March 2018 and 2019 are estimated to be 10.9 million tonnes of CO². This represents 53% of the total projected annual emission reductions achieved with only partial operation to date. Since operation, the IPPs have generated 35 699 GWh, resulting in 36.2 Mton of CO² emissions being offset and saving 42.8 million kilolitres of water related to fossil fuel power generation.

The REIPPPP had therefore contributed significantly towards meeting South Africa's GHG emission targets and, at the same time, supporting energy security, economic stability and environmental sustainability.

The establishment of renewable energy facilities, such as the proposed SEF, 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 (2020 Rand value). The majority of low and semi-skilled beneficiaries are likely to be historically disadvantaged (HD) members of the community. Given the location of the proposed facility most of permanent staff is likely to reside in the local settlements and towns in the area, including Brugge, Klippunt, Dyasons Klip, Oranjevallei, Louisvale, Kanoneiland, Bloemsmond, Keimoes and Upington.

Procurement during the operational phase will also create opportunities for the local economy and businesses. In this regard, the overview of the REIPPPP (March 2019) notes that the operational phase procurement spend over the 20 years for BW1 to BW4, 1S2 and 2S2 will be in the region of R 73.1 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 Duneveld PV facility 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 2019 REIPPPP Overview notes that the socio-economic development (SED) contributions associated with the 64 IPPs has to date has amounted to R 860.1 million. The province with the highest SED contribution has been the Northern Cape Province, followed by the Eastern Cape and Western Cape.

Enterprise development contributions committed for BW1 to BW4, 1S2 and 2S2 amount to R7.2 billion. Of the total commitment, R5.6 billion is specifically committed

directly within the local communities where the IPPs operate, contributing significantly to local enterprise development. Up until the end of March 2019 a total of R 254.3 million had already been made to local communities located in the vicinity of the 64 operating IPPs. The Green Jobs study (2011), found that the case for renewable energy enhanced by the positive effect on rural or regional development. Renewable energy projects 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 renewable energy projects also enable 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.

Benefits to landowners

The income from the Duneveld PV facility reduces the risks to the livelihoods of the affected landowners posed by droughts and fluctuating market prices for sheep and farming inputs, such as fuel, feed etc. The additional income from the SEF would improve economic security of farming operations, which in turn would improve job security of farm workers and benefit the local economy.

Potential negative impacts

- 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 Negative** 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 Duneveld PV facility the impact on the areas sense of place with mitigation is likely to be low. The site is also located in the Upington Solar REDZ. The area has therefore been identified for the development of large-scale solar energy projects.

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

Table 2: Summary of social impacts during operational phase

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

CUMULATIVE IMPACTS***Cumulative impact on sense of place***

There are a number of other SEFs located and proposed in the vicinity of the site. 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, due to the topography of the area and the scale of PV solar panels, the visibility of the majority of the SEFs from the only major road in the area, the N14, is limited. With careful planning, the visual impacts associated with SEFs can also be effectively mitigated. The potential cumulative impacts associated with combined visibility and sequential visibility are therefore likely to be low. In addition, the site is located within the Upington Solar REDZ. The area has therefore been identified as being suitable for the establishment of large-scale solar energy facilities.

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 such as Keimoes and Upington, 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 Duneveld PV facility. 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, municipal workers, schoolteachers and the police, may no longer be able to buy or afford to rent accommodation in the local towns and settlements in the area, such as Keimoes,

Kanoneiland and Upington. 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 Keimoes and Upington, 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 economic development and investment in the KGLM. 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 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 SEF 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. The economic benefits associated with Independent Power Producers Procurement Programme (IPPPP) have been confirmed by the review undertaken by the Department of Energy, National Treasury and DBSA (March 2019). This benefit is rated as **High Positive** with enhancement.

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.

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 developments, including SEFs, are currently proposed in the Northern Cape and South Africa. Foregoing the proposed Duneveld PV development would therefore not necessarily compromise the development of renewable energy facilities in the NCP

or South Africa. However, the socio-economic benefits for the local communities in KGLM would be forfeited.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The findings of the SIA indicate that the development of the proposed Duneveld PV facility 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 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 Duneveld PV facility is therefore supported by the findings of the SIA. The site is also located in the Upington Solar REDZ. The area has therefore been identified for the development of large-scale solar energy projects.

Recommendations

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.

CONTENTS OF THE SPECIALIST REPORT – CHECKLIST

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	Section of Report
(a) details of the specialist who prepared the report; and the expertise of that specialist to compile a specialist report including a <i>curriculum vitae</i> ;	Section 1.6, p4, Annexure C, p105
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Section 1.7, p4, Annexure D, p106
(c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 1.1, p1, Section 1.2, p2
(cA) an indication of the quality and age of base data used for the specialist report;	Section 1.2, p2, Section 3, p35
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 4, p62
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Interviews undertaken in 2020 (Annexure A)
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 1.2, p2, Annexure B, p103
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 4, p62, Section 5, p94
(g) an identification of any areas to be avoided, including buffers;	Section 4, p62
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Refer to VIA
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 1.4, p3
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment, or activities;	Section 4, p62, Section 5, p94
(k) any mitigation measures for inclusion in the EMPr;	Section 4, p62
(l) any conditions for inclusion in the environmental authorisation;	Section 4, p62, Section 5, p94
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	N/A
(n) a reasoned opinion— i. as to whether the proposed activity, activities or portions thereof should be authorised; iA. Regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr or Environmental Authorization, and where applicable, the closure plan;	Section 5.3, p100
(o) a description of any consultation process that was undertaken during the course of preparing the specialist report	Annexure A, lists key stakeholders interviewed
(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Annexure A, lists key stakeholders interviewed
(q) any other information requested by the competent authority	N/A
Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	

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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

SECTION 1: INTRODUCTION

1.1 INTRODUCTION

CapeEAPrac was appointed by Duneveld PV (Pty) Ltd as independent environmental assessment practitioners to undertake and manage the Basic Assessment (BA) process for the proposed 100 MW Duneveld PV facility. The proposed development site located approximately 30 km south west of Upington and 16 km north east of Keimoes in the Northern Cape Province. The site is situated within the Kai !Garib Local Municipality (KGLM), which is located within the ZF Mgcawu District Municipality (ZFMMDM).

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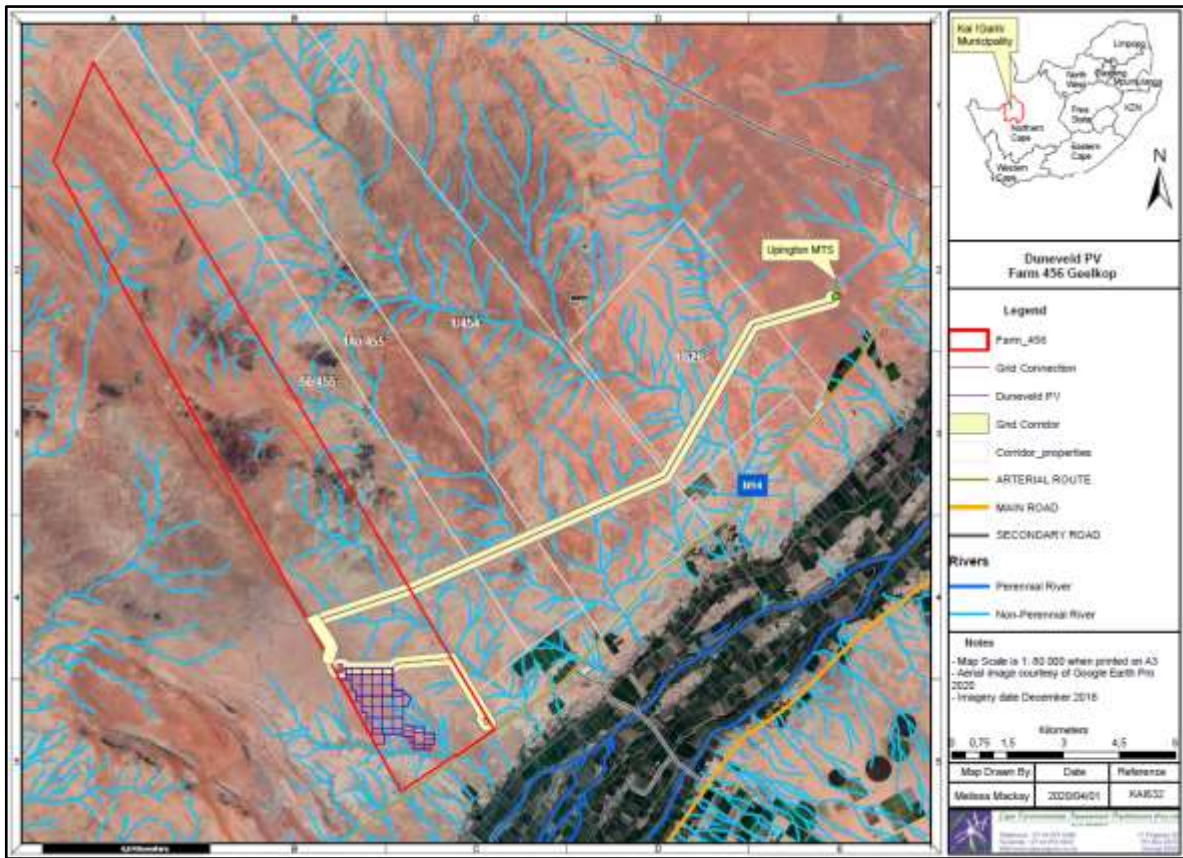


Figure 1.1: Location of 100 MW Duneveld PV Facility

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; and
- Identification of enhancement and mitigation aimed at maximising opportunities and avoiding and or reducing negative impacts.

1.3 PROJECT DESCRIPTION

The PV energy facility will consist of solar photovoltaic (PV) technology, fixed-tilt-, single-axis tracking- or dual-axis tracking- mounting structures, with a net generating capacity of 100 MW as well as associated infrastructure, which will include:

- Solar panels a maximum of \pm 3.5m from ground level;
- On-site switching-station / substation;
- Approximately 3-5ha of laydown area will be required (the laydown areas will not exceed 5ha and will be situated within the assessed footprint). A permanent laydown area of a maximum of a 1ha will remain;
- Auxiliary buildings of approximately 1 ha. The function of the buildings include (but are not limited to) gate house, ablutions, workshops, storage and warehousing area, site offices, substation (75m x 150m) and control centre.
- Facility substation up to 0.5 ha;
- Perimeter Fencing not exceeding 3m in height.
- The project intends to connect from the onsite sub-stations to the Upington MTS (400/132 kV), via the 132kV Geelkop Collector Substation (to be assessed in a separate environmental process);
- Access will be of the N14.

Locality

The proposed project is located on the Remaining Extent (RE) of Geel Kop Farm No 456, approximately 25km south west of Upington and 16 km north east of Keimoes. The site is located in the Kai !Garib Local Municipality (KGLM) which falls within the greater ZF Mgcawu District Municipality (ZFMDM) in the Northern Cape Province.

Construction phase

It is estimated that the construction of the proposed 100 MW Duneveld PV facility and associated infrastructure is expected to extend over a period of 12-18 months. The capital expenditure associated with the establishment of the 100 MW SEF is estimated to be in the region of R 2 billion (2020 Rand value). The construction phase will create approximately ~300 employment opportunities. Based on information provided by the developer, no on-site accommodation will be provided. Staff will be transported to the site by busses. Overnight site worker presence will be limited to security staff.

Operation phase

The operational phase will be for at least 20-25 years and will create in the region of 20 employment opportunities.

1.4 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 for the study area;
- 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 SIAs 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 ASSUMPTIONS AND LIMITATIONS

1.5.1 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. The site is also located within the Upington REDZ, which was formally gazetted in 2018⁴. The area has therefore been identified as suitable for the establishment of renewable energy facilities, specifically large-scale solar farms.

1.5.2 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.

1.6 SPECIALIST DETAILS

Tony Barbour, the lead 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 260 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. Annexure C contains a copy of CV for Tony Barbour.

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

1.7 DECLARATION OF INDEPENDENCE

This confirms that Tony Barbour and Schalk van der Merwe, the specialist consultants responsible for undertaking the study and preparing the Draft SIA Report, are independent and do not have vested or financial interests in the proposed development being either approved or rejected. Annexure D contains a copy of signed declaration of independence.

1.8 REPORT STRUCTURE

The report is divided into five sections, namely:

- Section 1: Introduction;

⁴ GN 113 and GN114 of 2018

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

SECTION 2: POLICY AND PLANNING ENVIRONMENT

2.1 INTRODUCTION

Legislation and policy embody and reflect key societal norms, values and developmental goals. The legislative and policy context therefore plays an important role in identifying, assessing and evaluating the significance of potential social impacts associated with any given proposed development. An assessment of the “policy and planning fit⁵” 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 meeting the objectives of the BA 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);
- Strategic Environmental Assessment (SEA) for Wind and Solar PV energy in South Africa (CSIR);
- Northern Cape Provincial Growth and Development Strategy (2004-2014);
- Northern Cape Climate Change Response Strategy;
- Northern Cape Spatial Development Framework (2012);
- Northern Cape Province Green Document (2017/2018);
- ZF Mgcawu District Municipality Integrated Development Plan (2017-2022); and
- Kai !Garib Local Municipality Integrated Development Plan (IDP) (2018/19).

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 solar and wind:

“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

⁵ 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.

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

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

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

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

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

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

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

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

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

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

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

Disadvantages include:

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

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 Protocol⁶, 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. In this regard, the IRP 2010 aims to allocate 43% of new energy generation facilities in South Africa to renewables.

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 Integrated Energy Plan (2016)

The development of a National Integrated Energy Plan (IEP) was envisaged in the White Paper on the Energy Policy of the Republic of South Africa of 1998 and, in terms of the National Energy Act, 2008 (Act No. 34 of 2008), the Minister of Energy is mandated to develop and, on an annual basis, review and publish the IEP in the Government Gazette. The purpose of the IEP is to provide a roadmap of the future energy landscape for South Africa which guides future energy infrastructure investments and policy development.

The IEP notes that South Africa needs to grow its energy supply to support economic expansion and in so doing, alleviate supply bottlenecks and supply-demand deficits. In addition, it is essential that all citizens are provided with clean and modern forms of energy at an affordable price. As part of the Integrated Energy Planning process, eight key objectives were identified, namely:

- Objective 1: Ensure security of supply;
- Objective 2: Minimise the cost of energy;
- Objective 3: Promote the creation of jobs and localisation;
- Objective 4: Minimise negative environmental impacts from the energy sector;
- Objective 5: Promote the conservation of water;

⁶ 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).

- Objective 6: Diversify supply sources and primary sources of energy;
- Objective 7: Promote energy efficiency in the economy; and
- Objective 8: Increase access to modern energy.

The IEP provides an assessment of current energy consumption trends within different sectors of the economy (i.e. agriculture, commerce, industry, residential and transport) and uses this information to identify future energy requirements, based on different scenarios. The scenarios are informed by different assumptions on economic development and the structure of the economy and also take into account the impact of key policies such as environmental policies, energy efficiency policies, transport policies and industrial policies, amongst others.

Based on this information the IEP then determines the optimal mix of energy sources and technologies to meet those energy needs in the most cost-effective manner for each of the scenarios. The associated environmental impacts, socio-economic benefits and macroeconomic impacts are also analysed. The IEP is therefore focused on determining the long-term energy pathway for South Africa, taking into account a multitude of factors which are embedded in the eight objectives.

As part of the analysis four key scenarios were developed, namely the Base Case, Environmental Awareness, Resource Constrained and Green Shoots scenarios:

- The Base Case Scenario assumes that existing policies are implemented and will continue to shape the energy sector landscape going forward. It assumes moderate economic growth in the medium to long term;
- The Environmental Awareness Scenario is characterised by more stringent emission limits and a more environmentally aware society, where a higher cost is placed on externalities caused by the supply of energy;
- The Resource Constrained Scenario in which global energy commodity prices (i.e. coal, crude oil and natural gas) are high due to limited supply;
- The Green Shoots Scenario describes an economy in which the targets for high economic growth and structural changes to the economy, as set out in the National Development Plan (NDP), are met.

The IEP notes that South Africa should continue to pursue a diversified energy mix which reduces reliance on a single or a few primary energy sources. In terms of renewable energy the document refers to wind and solar energy. The document does however appear to support solar over wind noting that solar PV and CSP with storage present excellent opportunities to diversify the electricity mix, to produce distributed generation and to provide off-grid electricity. Solar technologies also present the greatest potential for job creation and localisation. Incentive programmes and special focused programmes to promote further development in the technology, as well as solar roll-out programmes, should be pursued.

In terms of existing electricity generation capacity the IEP indicates that existing capacity starts to decline notably from 2025, with significant plant retirement occurring in 2031, 2041 and 2048. By 2050 only 20% of the current electricity generation capacity remains. As a result large investments are required in the electricity sector in order to maintain an adequate supply in support of economic growth.

By 2020, various import options become available and some new coal capacity is added along with new wind, solar and gas capacity. The mix of generation capacity technologies by 2050 is considerably more diverse than the current energy mix, across all scenarios. The main differentiating factors between the scenarios are the level of demand, constraints on emission limits and the carbon dioxide externality costs.

In all scenarios the energy mix for electricity generation becomes more diverse over the period to 2050, with coal reducing its share from about 85% in 2015 to 15–20% in 2050 (depending on the scenario). Solar, wind, nuclear, gas and electricity imports increase their share. The Environmental Awareness and Green Shoots scenarios take on higher levels of renewable energy.

An assessment of each scenario against the eight objectives with reference to renewable energy notes while all scenarios seek to ensure that costs are minimised within the constraints and parameters of each scenario, the Base Case Scenario presents the least cost followed by the Environmental Awareness, Resource Constrained and Green Shoots scenarios respectively when total energy system costs are considered.

In terms of promoting job creation and localisation potential, the Base Case Scenario presents the greatest job creation potential, followed by the Resource Constrained, Environmental Awareness and Green Shoots scenarios respectively. In all scenarios, approximately 85% of total jobs are localisable. For electricity generation, most jobs result from solar technologies followed by nuclear and wind, with natural gas and coal making a smaller contribution.

The Environmental Awareness Scenario, due to its stringent emission constraints, shows the lowest level of total emissions over the planning horizon. This is followed by the Green Shoots, Resource Constrained and Base Case scenarios. These trends are similar when emissions are considered cumulatively and individually by type.

The IEP notes that a diversified energy mix with a reduced reliance on a single or a few primary energy sources should be pursued. In terms of renewable energy, wind and solar are identified as the key options.

Wind

Wind energy should continue to play a role in the generation of electricity. Allocations to ensure the development of wind energy projects aligned with the IRP2010 should continue to be pursued.

Solar

- Solar should play a much more significant role in the electricity generation mix than it has done historically, and constitutes the greatest share of primary energy (in terms of total installed capacity) by 2050. The contribution of solar in the energy mix comprises both CSP and solar PV.
- Investments should be made to upgrade the grid in order to accommodate increasing solar and other renewable energy contributions.

With reference to the Renewable Energy Independent Power Producer (REIPP) Procurement Programme, the IEP notes:

- The REIPP Procurement Programme should be extended and new capacity should be allocated through additional bidding windows in order ensure the ongoing deployment of renewable energy technologies;
- Experience and insights gained from the current procurement process should be used to streamline and simplify the process;
- The implementation of REIPP projects in subsequent cycles of the programme should be aligned with the spatial priorities of provincial and local government structures in the regions that are selected for implementation, in line with the Spatial Development Frameworks. This will ensure that there is long-term, sustainable infrastructure investment in the areas where REIPP projects are located. Such infrastructure

includes bulk infrastructure and associated social infrastructure (e.g. education and health systems). This alignment will further assist in supporting the sustainable development objectives of provincial and local government by benefiting local communities.

The IEP indicates that Renewable Energy Development Zones (REDZs) have been identified and describe geographical areas:

- In which clusters (several projects) of wind and solar PV development will have the lowest negative impact on the environment while yielding the highest possible social and economic benefit to the country;
- That are widely agreed to have strategic importance for wind and solar PV development;
- Where the environmental and other authorisation processes have been aligned and streamlined based on scoping level pre-assessments and clear development requirements; and
- Where proactive and socialised investment can be made to provide time-efficient infrastructure access.

2.2.5 Integrated Resource Plan

The integrated resource plan (IRP) is an electricity capacity plan which aims to provide an indication of the country's electricity demand, how this demand will be supplied and what it will cost. On 6 May 2011, the Department of Energy (DoE) released the Integrated Resource Plan 2010-2030 (IRP 2010) in respect of South Africa's forecast energy demand for the 20-year period from 2010 to 2030. The IRP 2010 was intended to be a 'living plan' that would be periodically revised by the DoE. However, this was never done and resulted in an energy mix that failed to adequately meet the constantly changing supply and demand scenarios in South Africa, nor did it reflect global technological advancements in the efficient and responsible generation of energy.

On 27 August 2018, the then Minister of Energy published a draft IRP which was issued for public comment (Draft IRP). Following a lengthy public participation and consultation process the Integrated Resource Plan 2019 (IRP 2019) was gazetted by the Minister of Mineral Resources and Energy, Gwede Mantashe, on 18 October 2019, updating the energy forecast for South Africa from the current period to the year 2030. The IRP is an electricity capacity plan which aims to provide an indication of the country's electricity demand, how this demand will be supplied and what it will cost.

Since the promulgated IRP 2010, the following capacity developments have taken place. A total 6 422MW under the government led Renewable Energy Independent Power Producers Programme (RE IPP Procurement Programme) has been procured, with 3 876MW currently operational and made available to the grid. In addition, IPPs have commissioned 1 005MW from two Open Cycle Gas Turbine (OCGT) peaking plants. Under the Eskom build programme, the following capacity has been commissioned: 1 332MW of Ingula pumped storage, 1 588MW of Medupi, 800MW of Kusile and 100MW of Sere Wind Farm. In total, 18 000MW of new generation capacity has been committed to.

Provision has been made for the following new additional capacity by 2030:

- 1 500MW of coal;
- 2 500MW of hydro;
- 6 000MW of solar PV;
- 14 400MW of wind;
- 1 860MW of nuclear;

- 2 088MW for storage;
- 3 000MW of gas/diesel; and
- 4 000MW from other distributed generation, co-generation, biomass and landfill technologies.

Figure 2.1 provides a summary of the allocations and commitments between the various energy sectors.

	Coal	Coal (Decommissioning)	Nuclear	Hydro	Storage	PV	Wind	CSP	Gas & Diesel	Other (Distributed Generation, CoGen, Biomass, Landfill)
Current Base	37,149		1,860	2,100	2,912	1,474	1,980	300	3,830	499
2019	2,155	-2,373					244	300		
2020	1,433	-557				114	300			Allocation to the extent of the short term capacity and energy gap
2021	1,433	-1,403				300	818			
2022	711	-844			513	400	1,000	1,600		
2023	750	-555				1,000	1,600			500
2024			1,860				1,600		1,000	500
2025						1,000	1,600			500
2026		-1,219					1,600			500
2027	750	-847					1,600	2,000		500
2028		-475				1,000	1,600			500
2029		-1,694			1,575	1,000	1,600			500
2030		-1,050		2,500		1,000	1,600			500
TOTAL INSTALLED CAPACITY by 2030 (MW)	33,364		1,860	4,600	5,000	8,288	17,742	600	6,380	
% Total Installed Capacity (% of MW)	43		2.36	5.84	6.35	10.52	22.53	0.76	8.1	
% Annual Energy Contribution (% of MWh)	58.8		4.5	8.4	1.2*	6.3	17.8	0.6	1.3	

- Installed Capacity
- Committed/Already Contracted Capacity
- Capacity Decommissioned
- New Additional Capacity
- Extension of Koeberg Plant Design Life
- Includes Distributed Generation Capacity for own use

- 2030 Coal Installed Capacity is less capacity decommissioned between years 2020 and 2030.
- Koeberg power station rated/installed capacity will revert to 1,926MW (original design capacity) following design life extension work.
- Other/ Distributed generation includes all generation facilities in circumstances in which the facility is operated solely to supply electricity to an end-use customer within the same property with the facility.
- Short term capacity gap is estimated at 2,000MW.

Figure 2.1: Summary of energy allocations and commitments

As indicated above, the changes from the Draft IRP capacity allocations see an increase in solar PV and wind, and a significant decrease in gas and diesel; and new inclusions include nuclear and storage.

In terms of renewable energy four bidding rounds have been completed for renewable energy projects under the RE IPP Procurement Programme. The most dominant technology in the IRP2019 is renewable energy from wind and solar PV technologies, with wind being identified as the stronger of the two technologies. There is a consistent annual allocation of 1 600MW for wind technology commencing in the year 2022 up to 2030. The solar PV allocation of 1 000MWs per year is incremental over the period up to 2030, with no allocation in the years 2024 (being the year the Koeberg nuclear extension is expected to be commissioned) and the years 2026 and 2027 (presumably since 2 000MW of gas is expected in the year 2027). The IRP 2019 states that although there are annual build limits, in the long run such limits will be reviewed to take into account demand and supply requirements.

2.2.6 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.

2.2.7 The New Growth Path Framework

The aim of the New Economic Growth Path Framework is to enhance growth, employment creation and equity. 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, through a series of partnerships between the State and the private sector. The Green Economy as one of the five priority areas to create jobs, 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.

2.2.8 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 strengthening 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.

2.2.9 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.

2.2.10 Strategic Environmental Assessment (SEA) for Wind and Solar PV energy in South Africa

The Strategic Environmental Assessment (SEA) for wind and solar PV energy in South Africa (CSIR, 2013) identified eight (8) Renewable Development Zones (REDZs). The REDZs identified areas where large scale renewable energy facilities can be developed in a manner that limits significant negative impacts on the environment while yielding the highest possible socio-economic benefits to the country. The Duneveld PV site is located within the Upington REDZ (Figure 2.2), which was formally gazetted in 2018⁷. The area has therefore been identified as suitable for the establishment of renewable energy facilities, specifically large-scale solar farms.

⁷ GN 113 and GN114 of 2018

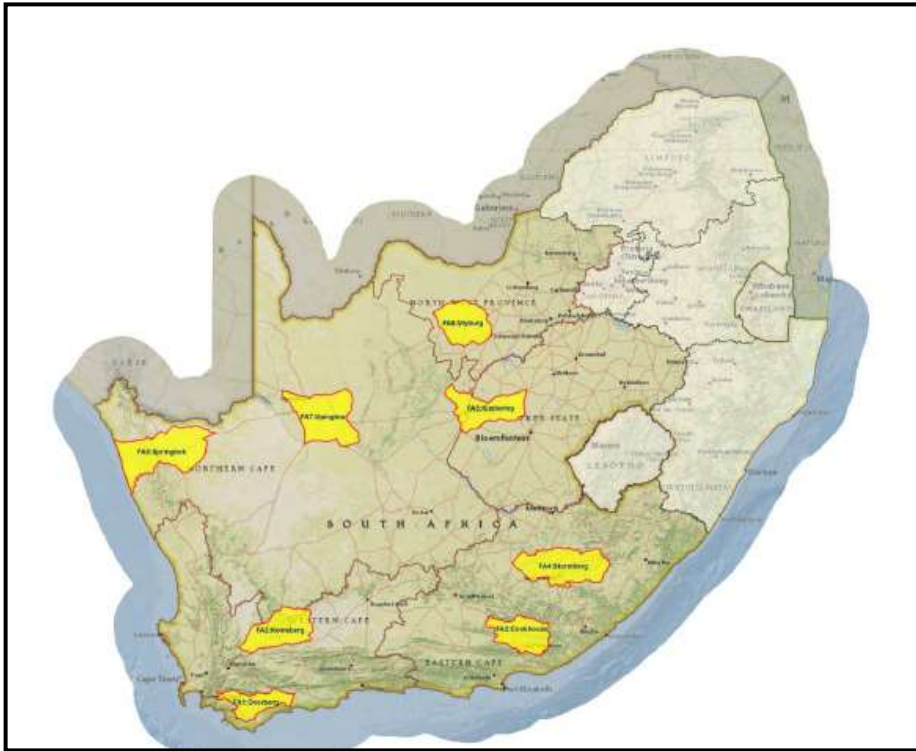


Figure 2.2: Location of Renewable Development Zones in South Africa (Source CSIR)

2.3 PROVINCIAL AND LOCAL LEVEL POLICY AND PLANNING

2.3.1 Northern Cape 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 SEF 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 ecosystems 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 that 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 km² of which the majority falls within the Northern Cape. It is estimated that, if the electricity production per km² 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 concentrating solar power (CSP) 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 CSP 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's 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, is identified 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 also indicated that the NCP was involved in the processing a number of WEF and Solar Energy Facility EIA applications.

2.3.4 Northern Cape Province Green Document 2017/2018

The NCP Green Document was prepared by the Northern Cape Department of Economic Development and Tourism and provides an impact assessment of IPPs on the communities in the province located within a 50 km radius from existing facilities. The document notes that the NCP is nationally a leader in commercial-scale renewable energy projects. By 2018 a total of 23 IPP projects in the province had been integrated into the national grid. These projects include Solar PV, Concentrated Solar and WEFs. The document notes that through their economic development obligations these projects have already made a significant positive contribution to affected communities. Much of the effort has been directed at supporting local education. The document also notes that, as these projects are committed to 20-year minimum lifespans, the collectively hold a tremendous potential for socio-economic upliftment.

Key issues identified with regard to improving the potential beneficial impact of IPPs in the NCP include:

- Local community members abusing project benefits for personal gain;
- Difficulty in outreach to local community beneficiaries due to high local illiteracy levels;
- A lack of business skills generally hampers the successful establishment of local small enterprises which could benefit from projects;
- Community benefit obligations are currently met in a piecemeal and uncoordinated fashion;
- Anticipated community benefits are often frustrated by inadequate engagement and insufficient ongoing consultation;
- The scarcity of people skilled in maths and sciences in local communities hampers meaningful higher-level local skills development and employment; and
- Insufficient support from local municipalities for IPP development.

2.3.5 ZF Mgcawu District Municipality Integrated Development Plan

The vision set out in the ZFMMD is "Quality support to deliver quality services". The mission is a "Centre of excellence in providing quality basic services through support to local municipalities".

In terms of the National Spatial Development Perspective, The ZF Mgcawu District area has been classified as a "medium" importance area which means that no significant investment is concentrated in the region.

The IDP lists a number of strategic objectives and development objectives. The relevant objectives include:

Strategic objective

To Facilitate the Development of Sustainable regional land use, economic, spatial and environmental planning frameworks that will support and guide the development of a diversified, resilient and sustainable district economy. The associated development objective is to:

- Establish a vehicle to ensure all businesses are co-operating (i.e. District LED Forum);
- Create investment opportunities in sectoral development (i.e. investment activities; Entrepreneurial business support programme);
- Enable an environment for business establishment and support initiatives (i.e. Increase the number of businesses; entrepreneurial support)

Strategic objective

To market, develop and co-ordinate tourism in the ZFMDM. The associated development objective is to:

- Promote the Green Kalahari tourism brand in the ZF Mgcawu district

The IDP identifies a number of key challenges. The following are relevant to the proposed development:

- High rate of unemployment;
- Inadequate human capital;
- Youth development;
- Access to health care facilities.

In terms of the Kai !Garib Municipality, the priority issues include:

- Lack of Basic Services;
- Lack of proper housing / existing informal settlements/ Lack of Land Ownership;
- Poverty & unemployment, lack of youth development and social issues contributing thereto (Local Economic Development) / Lack of farming land/ commonage;
- Lack of sport and recreational facilities and services;
- Lack of sufficient and proper health services (HIV/AIDS).

The IDP also notes that the ZF Mgcawu District Municipality acknowledges that climate change poses a threat to the environment, its residents, and future development. Actions are required to reduce carbon emissions (mitigation) and prepare for the changes that are projected to take place (adaptation) in the District. ZF Mgcawu District Municipality has therefore prioritised the development of a Climate Change Vulnerability Assessment and Climate Change Response Plan.

2.3.6 Kai !Garib Local Municipality Integrated Development Plan

The vision for the Kai !Garib LM 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." The mission is the "Provision of transparent, accountable and sustainable service delivery".

The IDP notes that that the activities of the KGLM are guided by a number of values, of which the following are relevant to the proposed development:

- Transparency in planning and management;
- Proper understanding of the needs of communities;
- The implementation of a development orientated approach to Local Government;
- Building capacity among the staff and Community wherever possible in order to enable them to play an effective role in Local Government.

The IDP is aligned with the National Government identified Key Performance Areas which are:

- KPA 1: Service Delivery and Infrastructure Development;
- KPA 2: Local Economic Development;
- KPA 3: Municipal Financial Viability and Management;
- KPA 4: Institutional Development and Transformation;
- KPA 5: Public Participation and Good Governance.

KPA 2, Local Economic Development, is the most relevance KPA for the proposed development.

A SWOT analysis was undertaken as part of the IDP. The following are of relevance to the proposed development.

Strengths

- Solar energy;
- Potential for private investment;
- Large labour pool available.

Weaknesses

- Lack of formal sector employment opportunities;
- Lack of attractive and vibrant business;
- Lack of financial stability;
- Lack of social facilities;
- High unemployment rate;
- High number of people living in poverty;
- Low disposable household income;
- Lack of proper community centres in neighbourhoods;
- Acceptable level of expertise;
- Lack of economic opportunity.

Opportunities

- Provincial tourism initiatives;
- Small business development.

Threats

- Lack of skills and capacitated labour;
- High rate of unemployment.

The key priority issues identified in the IDP includes poverty, unemployment, lack of youth development and Local Economic Development. Of key relevance the IDP also notes that the KGLM is positive about the contribution of renewable energy, specifically solar, to the local economy and future economic development. In this regard, there are already six established Independent Power Producers in the KGLM (Table 2.2) and a further 21 applications in place. The KGLM is also a participant in the ZF Mgcawu Development Forum, an initiative coordinated by the IDC which aims to ensure that integrated development planning and implementation of regional projects take place. This includes the renewable energy and mining plants, together with other industry stakeholders such as agricultural, business and civil society stakeholders.

Table 2.2: Renewable energy projects in the KGLM

IPPs in Kai !Garib Municipality				
Project Name	Technology	Status	Size	Lead Developer
Khi Solar One	Solar CSP	Fully operational	50 MW	Abengoa
Aries Solar	Solar PV	Fully operational	9.7 MW	BioTherm Renewable Energy
Neusberg Hydro Electric Project A	Hydro	Fully operational	10 MW	Hydro-SA & Hydro - Tasmania
Dayson's Klip 1	Solar PV	Approvals, planning and finance	75 MW	Scatec Solar
Dayson's Klip 2	Solar PV	Approvals, planning and finance	75 MW	Scatec Solar
Sirius Solar PV Project One	Solar PV	Approvals, planning and finance	75 MW	Scatec Solar

(Source, KGLM IDP)⁸

2.4 OVERVIEW RENEWABLE ENERGY SECTOR IN SOUTH AFRICA

The section below provides an overview of the potential benefits associated with the 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, specifically in terms of supporting economic development.

The following documents were reviewed:

- Independent Power Producers Procurement Programme (IPPPP): An Overview (March 2019), 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.

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 March 2019. By the end of March 2019, the REIPPPP had made the following significant impacts:

⁸ The Dyasonsklip 1 and Sirius Solar PV project One are both fully operational, with Dyasonsklip 2 due to be commissioned in April 2020.

Energy supply

By the end of March 2019, the REIPPPP had made the following significant impacts.

- 6 422MW of electricity had been procured from 112 RE Independent Power Producers (IPPs) in seven bid rounds;
- 976 MW of electricity generation capacity from 64 IPP projects has been connected to the national grid;
- 35669GWh of energy has been generated by renewable energy sources procured under the REIPPPP since the first project became operational.

. Renewable energy IPPs have proved to be very reliable. Of the 64 projects that have reached COD, 62 projects have been operational for longer than a year. The energy generated over the past 12-month period for these 62 projects is 10648GWh, which is 96% of their annual energy contribution projections (P50) of 11146GWh over a 12-month delivery period. Twenty eight (28) of the 62 projects (45%) have individually exceeded their P50 projections.

Energy costs

Through the competitive bidding process, the IPPPPP effectively leveraged rapid, global technology developments and price trends, buying clean energy at lower and lower rates with every bid cycle, resulting in SA getting the benefit of renewable energy at some of the lowest tariffs in the world. The estimated, average portfolio cost for all technologies under the REIPPPP has dropped consistently in every bid period to a combined average of R0.92/kWh in BW4. Indications are that prices will continue to decrease in future rounds. This compares with the industry estimates in April 2018 of R1.05/kWh for Medupi and R1.16/kWh for Kusile, i.e. R1.41/kWh and R1.60/kWh.

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 costs⁹), including interest during construction, of projects under construction and projects in the process of closure is R209.7 billion (this includes total debt and equity of R209.2 billion, as well as early revenue and VAT facility of R0.5 billion).

The REIPPPP has attracted R41.8 billion in foreign investment and financing in the seven bid windows (BW1 – BW4, 1S2 and 2S2). This is almost double the inward FDI attracted into South Africa during 2015 (R22.6 billion). The document notes that the share of foreign investment and equity showed an increase in the most recent bid window (2S2), suggesting that the REIPPPP continued to generate investor confidence despite the poor economic conditions in South Africa in recent years.

South African citizen shareholding

The importance of retaining local shareholding in IPPs is key condition of the procurement requirements. The RFP notes that bidders are required to have South African Equity Participation of 40% in order to be evaluated. In terms of local equity shareholding, 52% (R31.5 billion) of the total equity shareholding (R61.0 billion) was held by South African's across BW1 to BW4, 1S2 and 2S2. This equates to substantially more than the 40% requirement. Foreign equity amounts to R29.5 billion and contributes 48% of total equity.

⁹ Total project costs means the total capital expenditure to be incurred up to the commercial operations date in the design, construction, development, installation, and or commissioning of the project)

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, 33% of projects that have reached financial close (BW1-Bw4), which is slightly above the 30% target. This includes black people in local communities that have ownership in the IPP projects that operate in or near their communities.

On average, black local communities own 9% of projects that have reached financial close. This is well above the 5% target. In addition, an average of 19% shareholding by black people in engineering, procurement and construction (EPC) contractors has been attained for the 64 projects in operation (BW1, BW2 and BW3). This is slightly below the 20% target. The target for shareholding by black people in top management has been set at 40%, with an average 65% achieved to date. The target has therefore been significantly exceeded.

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, 1S2 and 2S2, qualifying communities will receive R26.9 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.

Income to all shareholders only commences with operation of the facility. Revenue generated to date by the 64 operational IPPs amounts to R74.4 billion.

Procurement spend

In addition to the financial investments into the economy and favourable equity structures aimed at supporting BEE, the REIPPPP also targets broader economic and socio-economic investment. This is through procurement spend and local content.

The total projected procurement spend for BW1 to BW4, 1S2 and 2S2 during the construction phase was R73.1 billion, while the projected operations procurement spend over the 20 years operational life is estimated at 76.8 billion. The combined (construction and operations) procurement value is projected as R149.9 billion of which R63.1 billion has been spent to date. For construction, of the R55.7 billion already spent to date, R51.1 billion is from the 64 projects which have already been completed. These 64 projects had planned to spend R50.4 billion. The actual procurement construction costs have therefore exceeded the planned costs by 1% for completed projects.

Preferential procurement

The share of procurement that is sourced from Broad Based Black Economic Empowered (BBBEE) suppliers, Qualifying Small Enterprises (QSE), Exempted Micro Enterprises (EME) and women owned vendors are tracked against commitments and targeted percentages. The IA target requirement for BBBEE is 60% of total procurement spend. However, the actual share of procurement spend by IPPs from BBBEE suppliers for construction and operations combined is currently reported as 86%, which is significantly higher than the target of 60%, but also the 71% that had been committed by IPPs. BBBEE, as a share of procurement spend for projects in construction, is also reported as

87% with operations slightly lower at 73%. However, these figures have not been verified and the report notes that they are reported with caution.

The majority of the procurement spend to date has been for construction purposes. Of the R55.7 billion spent on procurement during construction, R48.5 billion has reportedly been procured from BBBEE suppliers, achieving 87% of total procured. Actual BBBEE spend during construction for BW1 and BW2 alone was R25.5 billion, 81% more than the 14.1 billion planned by the IPPs.

Total procurement spend by IPPs from QSE and EMEs has amounted to R19.8 billion (construction and operations) to date, which exceeds commitments by 58% and is 31% of total procurement spend to date (while the required target is 10%). QSE and EME's procurement spend for construction is achieving 32% of total procurement to date and operations is less at 23%, however this is still well above the 10% target. QSE and EME share of construction procurement spend totals R18.1 billion, which is 3.7 times the targeted spend for construction of R4.9 billion during this procurement phase. However, procurement from women owned vendors is lagging, with only 3% of construction and 6% for operations achieved to date against a target of 5%.

Nonetheless, the fact that the REIPPPP has raised employment opportunities for black South African citizens and local communities beyond planned targets, indicates the importance of the programme to employment equity and the drive towards more equal societies.

Local Content¹⁰

The report notes that the REIPPPP 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 R73.1 billion, the result is a substantial stimulus for establishing local manufacturing capacity. The local content strategy has created the required incentives for a number of international technology and component manufactures to establish local manufacturing facilities.

Actual local content spend reported for IPPs that have started construction amounts to R46.5 billion against a corresponding project value (as realised to date) of R90.3 billion. This means 52% of the project value has been locally procured, exceeding the 45% commitment from IPPs and the thresholds for BW1 – BW4 (255-45%).

For the 64 projects that have reached COD, local content spend has been R 43.1 billion of a committed R43.3 billion, which is 0.4% below the planned local spend.

Leveraging employment opportunities

To date, a total of 40 134 job years¹¹ have been created for South African citizens, of which 33 019 job years were in construction and 7 115 in operations. These job years should rise further past the planned target as more projects enter the construction phase. Employment opportunities across all five active bid windows are 101% of the planned number during the construction phase (i.e. 32 602 job years), with 26 projects still in construction and employing people as of March 2019. The number of employment

¹⁰ Local content is expressed as a % of the total project value and not procurement or total project costs.

¹¹ The equivalent of a full time employment opportunity for one person for one year

opportunities is therefore likely to continue to grow beyond the original expectations. By the end of March 2019, 64 projects had successfully completed construction and moved into operation. These projects created 31 633 job years of employment, compared to the anticipated 20 689. This was 53% 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 – BW4 was 89% during construction (against a target of 80%), while it was 95% during operations for BW1 – BW3 (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 13 058 job years. To date 18 253 job years have been realised (i.e. 140% more than initially planned), with 26 projects still in construction. The number of black SA citizens employed during construction also exceeded the planned numbers by 22%.

Black South African citizens, youths and rural or local communities have been the major beneficiaries during the construction phases, as they respectively represent 79%, 41% and 49% 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. Nonetheless, the fact that the REIPPPP has raised employment opportunities for black South African citizens and local communities beyond planned targets, indicates the importance of the programme to employment equity and the drive towards more equal societies.

The share of black citizens employed during construction (79%) and the early stages of operations (83%) has significantly exceeded the 50% target and the 30% minimum threshold. Likewise, the share of skilled black citizens (as a percentage of skilled employees) for both construction (67%) and operations (79%) has also exceeded 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 49% and 67% for construction and operations respectively – exceeding the minimum threshold of 12% and 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 the revenue with 1.5% the targeted level over the 20-year project operational life. For the current portfolio of projects the average commitment level is 2.2%, which is 125% higher than the minimum threshold level. To date (across seven bid windows) a total contribution of R23.1 billion has been committed to SED initiatives. Assuming an even, annual revenue spread, the average contribution per year would be R1.153 billion. Of the total commitment, R18.8 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.

To date, with the limited number of operational IPPs (64), the SED contribution amounts to R 860.1 million. The majority of the spend has been on education and skills development (40.9%), followed by enterprise development (24.2%), social welfare (21.3%), general administration (9%) and health care (4.5%). In terms of education, the IPPs have supported 1 044 education institutions, with a total spend of R 236.7 million between 2015 and March 2018. It is estimated that these contributions have benefitted in the region of 375 737 learners.

The province with the highest SED contribution has been the Northern Cape Province, followed by the Eastern Cape and Western Cape. However, the report does note that SED contributions are concentrated in the communities in the immediate vicinity of the IPPs. As such there is a lack of equity considerations across geographical areas, i.e. some communities benefit more than others.

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 0.63% or 0.03% more than the target. Enterprise development contributions committed for BW1 to BW4, 1S2 and 2S2 amount to R7.2 billion. Assuming an equal distribution of revenue over the 20-year project operational life, enterprise development contributions would be R360 million per annum. Of the total commitment, R5.6 billion is specifically committed directly within the local communities where the IPPs operate, contributing significantly to local enterprise development. Up until the end of March 2019 a total of R 254.3 million had already been made to the local communities located in the vicinity of the 64 operating IPPs.

Contribution to cleaner energy and water savings

The National Climate Change Response White Paper outlines the national response to the impacts of climate change, as well as the domestic contribution to international efforts to mitigate green-house gas emissions. As part of the global commitment, South Africa is targeting an emissions trajectory that peaks at 34% below a "business as usual" case in 2020, 42% below in 2025 and from 2035 declines in absolute terms. The emission reductions between March 2018 and 2019 are estimated to be 10.9 million tonnes of CO₂. This represents 53% of the total projected annual emission reductions achieved with only partial operation to date. Since operation, the IPPs have generated 35 699 GWh, resulting in 36.2 Mton of CO₂ emissions being offset and saving 42.8 million kilolitres of water related to fossil fuel power generation.

The REIPPPP therefore contributes significantly towards meeting South Africa's GHG emission targets and, at the same time, supporting energy security, economic stability and environmental sustainability.

2.4.2 Green Jobs Study

The study notes that South Africa has one of the most carbon-intensive economies in the world, therefore 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 21st 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 2.3). 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.

Table 2.3: 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			

(Source: Green Jobs Study, 2011)

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 and solar farms. The study does note that a shortage of skills in certain professional fields pertinent to renewable energy generation presents a challenge that must be overcome.

The study also identifies a number of advantages associated with renewable energy with a large 'technical' generation potential. In this regard, renewable energy, such as solar and wind, does not emit carbon dioxide (CO₂) in generating electricity and is associated with exceptionally low lifecycle emissions. The construction period for renewable energy projects are much shorter than those 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 short period of time compared with the project's lifespan. Renewable 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, renewable 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 renewable energy projects in rural areas create an opportunity to benefit the local and regional economy through the creation of jobs and tax revenues.

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

The study notes that South Africa has higher CO₂ 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.

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 highly 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).

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 2.1).

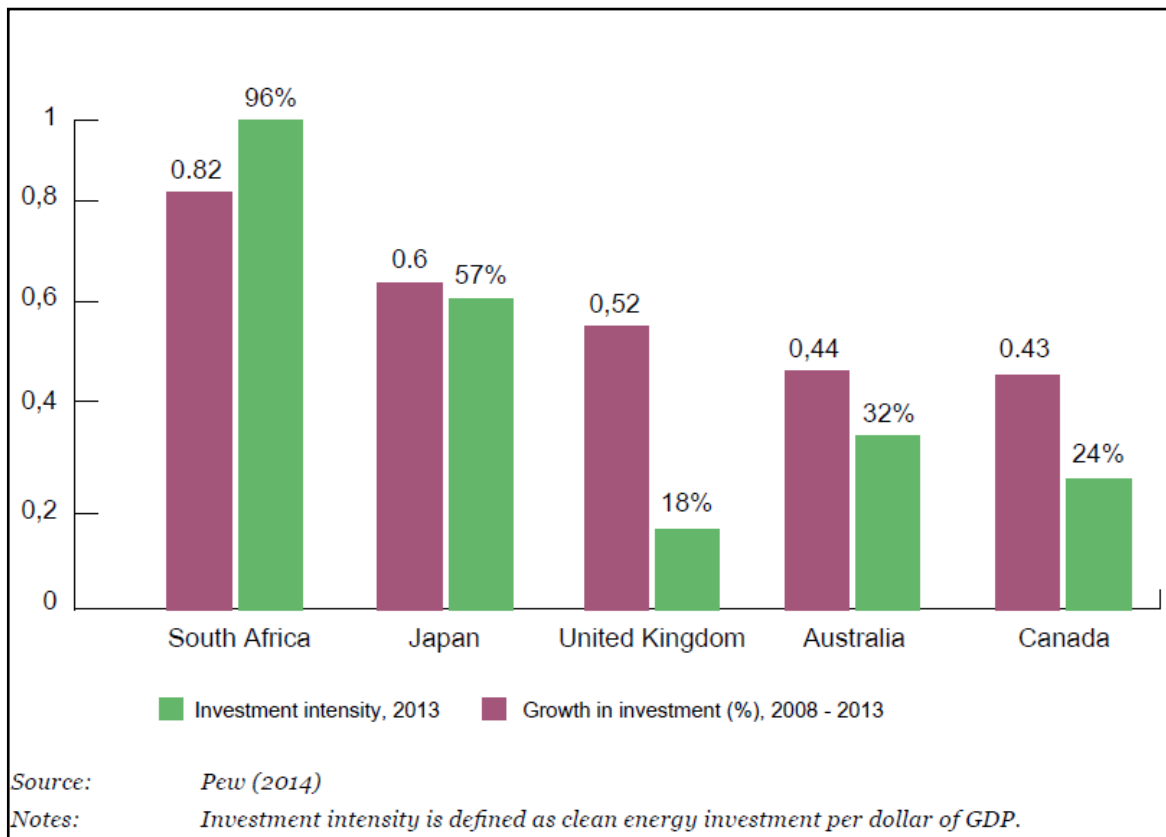


Figure 2.1: South Africa leads as a clean energy investment destination

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
- Socio-economic 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 the 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 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. 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 seventeen 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 Africa¹²

In her thesis, Tait¹³ 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 therefore enabling 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. These benefits would also apply to solar projects. 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 renewable energy 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.

¹² Similar benefits are also likely to be associated with solar energy projects.

¹³ 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

SECTION 3: OVERVIEW OF STUDY AREA

3.1 INTRODUCTION

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

- The administrative context;
- Provincial context;
- Overview of district and local municipalities;
- The site and surrounding land uses.

3.2 ADMINISTRATIVE CONTEXT

The proposed Duneveld PV site is located within the Kai !Garib Local Municipality (KGLM), which forms part of the larger ZF Mgcawu District Municipality (ZFMDM)¹⁴(Figure 3.1). The main land uses in the area are linked to grape farming and agriculture along the Orange (Gariep) River and livestock and game farming away from the river. The town of Keimoes serves as the administrative centre for the KGLM. A number of other solar energy projects are proposed in the area.

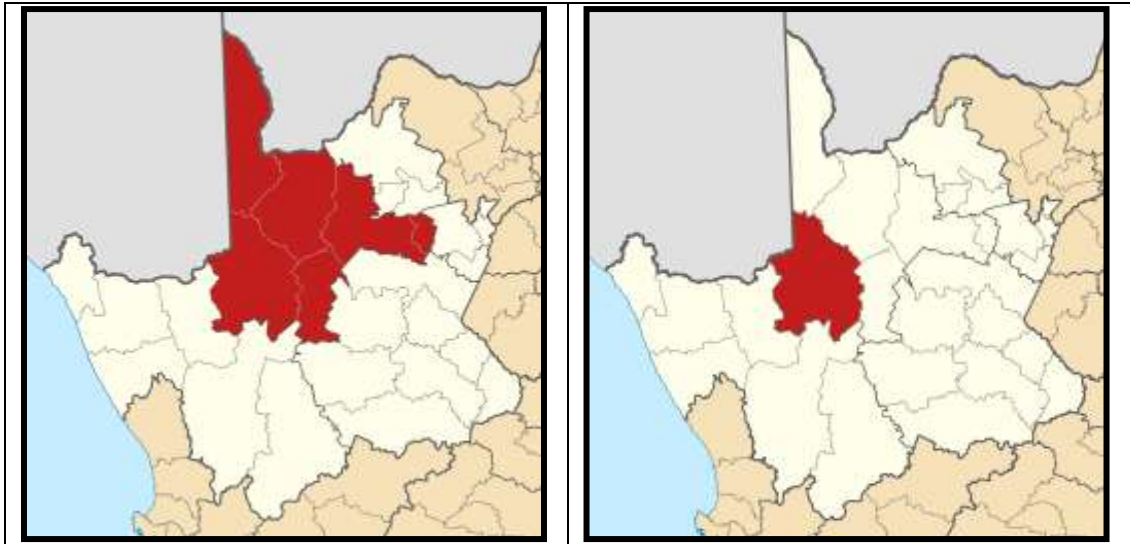


Figure 3.1: Location of ZF Mgcawu District Municipality (left) and Kai !Garib Local Municipality (right) within the Northern Cape Province

¹⁴ ZF Mgcawu District Municipality was previously known as the Siyanda District Municipality

3.3 PROVINCIAL CONTEXT¹⁵

The proposed Duneveld PV SEF is located in the Northern Cape Province, which is the largest province in South Africa and covers an area of 361 830 km² 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 1 193 780 (Community Household Survey, 2016) or 2.2% of the population of South Africa. Of the five districts, Frances Baard has the largest population (32.5%), followed by ZF Mgcawu District Municipality (21.2%), John Taola Gaetsewe (20.3%), Pixley ka Seme (16.4%) and Namakwa (9.7%). The majority of the population in the Northern Cape Province are Black African (48.1%), followed by Coloureds (43.7%) and Whites (7.7%).

In terms of age, 36.5% of the Northern Cape population is between 15 and 34 years old, which is the highest age distribution, followed by 29.2% of those aged 35–64 years, while only 6.6% comprised those aged 65 years and older. Similarly, this pattern is also seen across all districts in the province. The district profile shows that the highest proportions of persons aged 15–34 years were recorded in Pixley Ka Seme, ZF Mgcawu and John Taolo Gaetsewe districts. The figures for these three districts were also above the provincial average of 36.5%. The proportion of persons aged 65 years and older was higher in Namakwa (9.5%) and Frances Baard (8.2%).

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, while 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).

¹⁵ 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 2016 Community Household Survey has been used to update the information.

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 living¹⁶. This trend is unlikely to change in the foreseeable future, mainly due to the marginal economic base of the poorer areas, and the consolidation of the economic base in the relatively better-off areas. 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 (NCSD, 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.

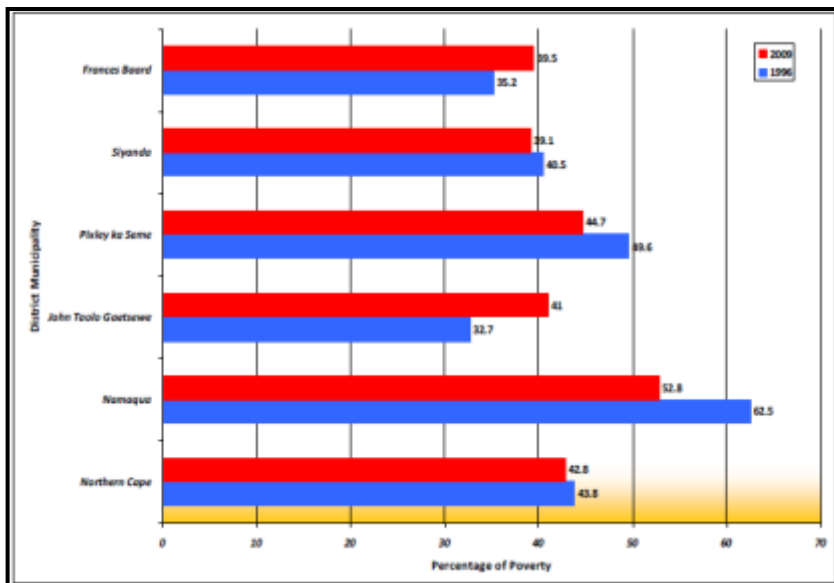


Figure 3.2: Percentage of people living in poverty in the Northern Cape (Source: Global Insight, 2009 as cited in the PGDS, July 2011)¹⁷.

¹⁶ 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 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.

¹⁷ 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 used¹⁸. 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%.

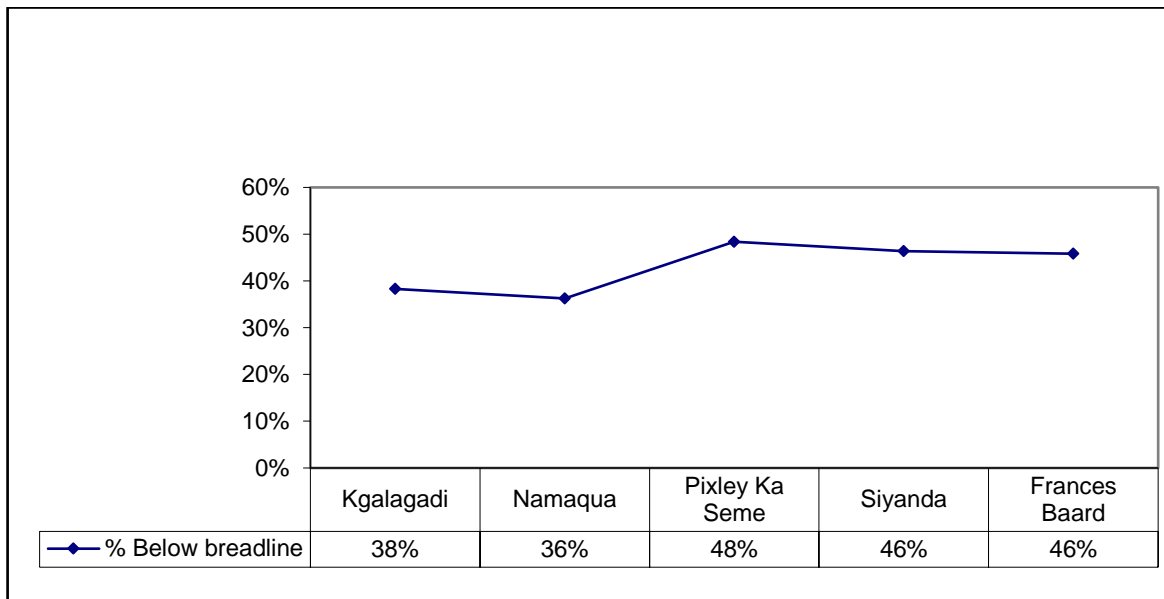


Figure 3.3: Percentage of household income below the poverty breadline by district (Source: Northern Cape PGDS)

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 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

¹⁸ 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.

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).

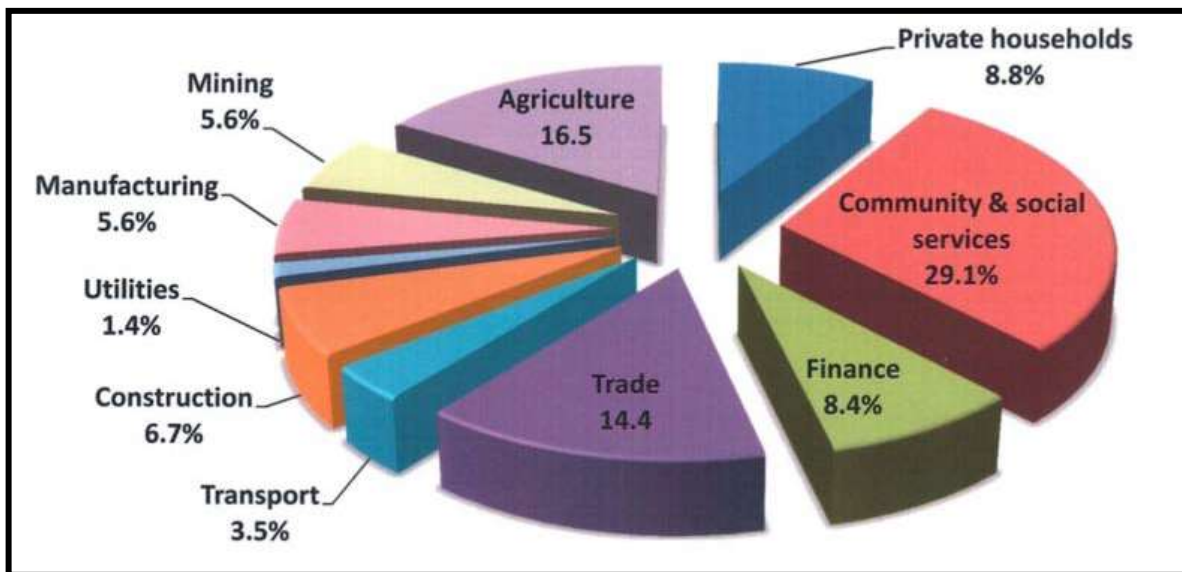


Figure 3.4: Employment by Economic Sector and Industry (Source: Statistics South Africa 2012).

3.4 ZF MGCAWU DISTRICT MUNICIPALITY

The ZF Mgcawu District Municipality (ZFMDM) consists of six Local Municipalities namely, Dawid Kruiper¹⁹; Kai !Garib; //Khara Hais; Tsantsabane, !Kheis and Kgatelopele, and covers an area of more than 100 000 km² (almost 30% of the Northern Cape Province). Of this total, 65% (65 000 km²) 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 the Household Community Survey data the population of the ZFMDM was 252 692 in 2016 compared to 236 763 in 2011. The DLKM and KGLM are home to ~ 70 % of the ZFMDM population (Table 3.1).

Table 3.1: Population of Local Municipalities within the ZFMDM

Local Municipality	Population	Percentage
Dawid Kruiper	107 161	42.4%
Kai !Garib	68 929	27.3%
Tsantsabane	39 345	15.6%
!Kheis	16 566	7.5%
Kgatelopele	20 691	8.2%

Source: Household Community Survey 2016

The Coloured population group make up the dominant group in the ZFMDM, DKLM and KGLM, followed by Black Africans and Whites. 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 Orange River (Gariiep 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, Gariiep 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 in the Northern Cape. The Orange River Wine Cellars Co-op, based in Upington, is the second largest winemaking cooperative in the world and has wine cellars in Groblershoop, Grootdrink, Upington, Keimoes and Kakamas.

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

¹⁹ Dawid Kruiper LM was established after the August 2016 local elections by merging Mier and //Khara Hais local municipalities.

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

Minerals and mining also play 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 challenges are illiteracy, 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 municipality²⁰. The municipality is approximately 7 445 km² 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 of the inhabitants in the KGLM and is critical to the area's 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.

Of relevance to the proposed development is the second Trust community, 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 community of Bloemsmond is located immediately to the south of the site. 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.

²⁰ 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 Municipal Area is divided into 9 wards (Table 3.2). The proposed SEF is located in Ward 8.

Table 3.2: List of Wards in the KGLM

Ward	Areas
1	Augrabies, Noudonsies, Zeekoeistee, 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 65 869 to 68 929 between 2011 and 2016. 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, followed by Black African and Whites. The dominant language was Afrikaans, followed by Setswana, and English.

As expected, the number of households in the KGLM increased from 16 703 in 2011 to 20 016 in 2016. The average household size remained the same at 2.9 (Table 3.3). The number of formal dwellings remained similar at around 88.4%.

The dependency ratio in the KGLM decreased from 41.9 in 2011 to 38.3 in 2016. This improvement indicates that there are fewer people who are dependent on 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 46.8 in 2016. The age dependency ratio is the ratio of dependents (i.e. people younger than 15 or older than 64) to the working age population (i.e. those aged 15-64).

Household income

Based on the data from the 2016 Household Community Survey, 5.1% of the population of the KGLM had no formal income, 2% earned between R 1 and R 4 800, 4% earn between R 4 801 and R 9 600 per annum, 30.7% between R 9 601 and 19 600 per annum, and 27.7% between R 19 600 and R 38 200 per annum (Household Community Survey 2016).

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, 69.5% of the households in the KGLM live close to or below the poverty line. In 2011 this figure was 65.3%. 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 of the economically active population in the KGLM decreased from 10% in 2011 to 6.7% in 2016 (Table 3.3). No information for youth unemployment was collected in 2016. The figure in 2011 was 34.5%, while the national youth unemployment level in 2019 was 39.6%, one of the highest in the world. Youth unemployment in the KGLM is therefore still likely to be high. This was confirmed by representatives from the KGLM. Also, while unemployment figures appear to be low, 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 2011 and 2016 with the percentage of the population over 20 years of age with no schooling dropping from 9.0% to 5.6%. The percentage of the population over the age of 20 with matric also increased from 15.5% to 21.5%. Despite this increase the percentage of the population in the KGLM over the age of 20 with matric is still lower than the ZFMDM (29.8%) and the Northern Cape (29.1%). The overall education levels in the KGLM therefor still remain low.

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

ASPECT	ZFMDM		KGLM	
	2011	2016	2011	2016
Population	236 763	252 691	65869	68929
% Population <15 years	28.4	26.9	24.4	22.9
% Population 15-64	66.4	68.1	70.5	72.3
% Population 65+	5.1	5.0	5.1	4.8
Households	61097	74090	16703	23 016
Household size (average)	3.5	3.4	2.9	2.9%
Formal Dwellings %	79.4%	81.4%	88.4%	88.6%
Dependency ratio per 100 (15-64)	50.5	46.8	41.9	38.3
Unemployment rate (official) - % of economically active population	19.2	11.3	10.0	6.7
Youth unemployment rate (official) - % of economically active population 15-34	22.7		10.0	
No schooling - % of population 20+	9.5	6.1%	9.0%	5.6%
Matric - % of population 20+	21.7	29.8%	15.5	21.5%

Source: Compiled from StatsSA Census 2011 and 2016 Community Household Survey

3.5.3 Municipal services

As indicated in Table 3.4, the access municipal services as measured in terms of flush toilets, refuse removal and electricity, has improved in the KGLM from 2011 to 2016. Despite the improvement in municipal services, the levels in the KGLM remain lower than the levels for the ZFMDM and the Northern Cape Province (with the exception of households with flush toilets).

Table 3.4: Overview of access to basic services in the ZFMDM and KGLM

ASPECT	ZFMDM		KGLM	
	2011	2016	2011	2016
% households with access to flush toilet	63.9	74.2	59.6	73.0
% households with weekly municipal refuse removal	70.3	74.2	53.8	64.3
% households with piped water inside dwelling	48.5	Not available	41.0	Not available
% households which uses electricity for lighting	86.6	95.6	87.4	89.6

Source: Compiled from StatsSA Census 2011 and 2016 Community Household Survey

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 subjects like maths and science;
- De-motivated teachers.

Health

- HIV/AIDS and TB increases;
- 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 (Gariep 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 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) also play a key role in terms of the local economy by providing access to and from markets.

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.

As indicated above, the KGLM IDP notes that the KGLM is positive about the contribution of renewable energy, specifically solar, to the local economy and future economic development. In this regard, there are already six established Independent Power Producers in the KGLM and there are a further 21 applications in place.

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 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 as 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.

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. 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 (Gariep), 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 well developed 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.

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 KHLM's economy is centred on the trade and retail sector, due to its strong tourism sector, leaving the local economy vulnerable for any significant changes in this industry. The IDP therefore highlights the need for the KHLM 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. Therefore, 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 KHLM. Of relevance to the proposed development 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.

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. However, the establishment of an IDZ (Industrial Development Zone) has been replaced by the proposed establishment of a SEZ's (Special Economic Zone). The proposed Upington SEZ (\pm 400 ha) will be a purpose-built industrial estate linked to the Upington Airport and will leverage fixed direct investments in value added and export-oriented manufacturing industries.

3.7 SITE AND SURROUNDING LAND USES

3.7.1 Land uses and settlement patterns

The site (RE Geel Kop Farm No 456) is located to the north of the N14, approximately 8 km north-east of Keimoes, and 23 km south-west of Upington (Photograph 3.1). The N14 links Upington in the east to Springbok and the N7 Cape-Namibia route in the west, via Keimoes, Kakamas and Pofadder. Kanoneiland and a number of smaller islands are located along this intensively cultivated stretch of the Orange (Gariep) River. The study area settlement pattern is associated with a number of small settlements, farmsteads, labourers' housing, and agro-processing facilities and is essentially contained to the area between the Orange (Gariep) River and the N14, with most agro-processing facilities

located in proximity to the N14. No houses or settlements are located to the north of the N14, but a few vineyard blocks and associated processing facilities are located at Kanoneiland Road (Straussheim) and Klippunt to the east of the site.



Photograph 3.1: N14, looking west (towards) Keimoes. The entrance road to the southern portion of RE Geel Kop Farm No 456 is visible on the left

A number of small settlements are located near the northern bank of the Orange (Gariep) River. These include Soverby, Currie's Camp, Mc Taggart's Camp, Bloemsmond, Klippunt, Ses Brugge, Klippunt, Dyasons Klip Settlement, Oranjevallei, Louisvale, Kanoneiland and Kalksloot. A number of these settlements originated on local farms and mission land. Of these settlements, Soverby is located 5.7 km to the south-west (Photograph 3.2), Currie's Camp 2.4 km to the south (Photograph 3.3), and Bloemsmond 2.5 km to the south-east (Photograph 3.4).



Photograph 3.2: Houses in Soverby seen from the main road through the settlement



Photograph 3.3: Houses in Currie's Camp seen from the eastern outskirts of Soverby



Photograph 3.4: Bloemsmond settlement seen from the north from the N14

All the settlements are essentially residential in nature, but also support a few schools, churches and clinics. The communities rely on Upington and, to a lesser extent Keimoes, for retail and higher order services. While most of the housing consists of formal structures, backyard structures occur in most of the settlements. Most of employment opportunities in the area are associated with local agriculture in the area. Due to the strong seasonality of grape farming, seasonal unemployment levels in the communities is high. Many farms in the study area currently also prefer to make use of Tswana labour teams recruited from the area around Kuruman for all major harvesting and pruning.

Agriculture forms the economic and cultural backbone of the study area. Due to the natural aridity of the region, activities are concentrated along the Orange (Gariep) River. The farms in the area were historically laid out as narrow strips stretching inland from the river. The farming activities are concentrated in the areas close to the river, with the remainder of the farm areas located north of the N14 only suitable for extensive grazing. The N14 therefore tends to form a boundary between the settled and cultivated area to the south of the road and grazing land located to the north.

The study area economy is overwhelming linked to grape farming, and to lesser extent stock farming. Water is the main constraining factor to grape farming activities. The focus is on the production of drying grapes and wine grapes, but table grapes are also produced by growers on Kanoneiland. The area is of national significance as a producer

of raisins and sultanas (Photograph 3.5). It is also a major producer of wine grapes, largely processed at local cellars. Some of the grapes are however also sold to cellars as far as afield as the Western Cape. Until a few years ago, the study area was the country's largest producer of grape juice concentrate for the food and beverage sector. However, this sector has been impacted by international competition and most of the plants have been mothballed for the time being.



Photograph 3.5: Raisins drying on a farm on Kanoneiland

The head-offices of the Karsten Group, a large multi-national fruit and vegetable exporting operation, is located on the southern bank of the Orange (Gariep) River, south of Kanoneiland. The Karsten Group is one of the largest exporters of table grapes in the Southern Hemisphere. The Group also has a livestock farming operation bordering onto the site.

There are a limited number of vineyard blocks in the study area located to the north of the N14, all of which are located immediately adjacent to the N14 (Photograph 3.6). This is due to the high costs associated with irrigating lands located at distance from the Orange (Gariep) River. Large drying operations are located on many study area properties. These include the Fruits du Sud operations at the intersection of the N14 and Kanoneiland Road 2.5 km to the east of the site (Photograph 3.7), Klippunt 12 km to the east, and on Geel Kop Farm adjacent to the N14.



Photograph 3.6: Vineyards and packing stores on a portion of Strausheim farm (Fruits du Sud) located to north of the N14



Photograph 3.7: Fruits de Sud's raisin processing facility near the N14-Kanoneiland Road intersection

The areas used for livestock grazing are traditionally used for raising small-stock, especially sheep. Due to the low rainfall, the carrying capacity of the veld is low, approximately 44 hectares to one head of cattle. Due to high levels of stock theft, sheep farming has largely been phased out or radically scaled down on all study area farms adjacent to the N14. This includes RE Geel Kop Farm No 456 as well as adjacent Bloemsmond and Currie's Camp farms, located to the east and west of the site respectively. Cattle, less vulnerable to stock theft, have also been introduced on a number of farms. However, the area is not regarded as optimal for cattle (Photograph 3.8). Currently, the only significant stock farming operation in proximity to the site is associated with the Karsten Group's van Rooisvlei operation, which is located directly to the north of the site. No commercial game farming is carried out in significant proximity to the site. Access to the farming area to the north of the site (e.g. van Rooisvlei farm) is via the D3276 gravel road (Lutzputs Road), which intersects with the N14 approximately 16 km to the east of the site.

The local tourism sector is relatively underdeveloped and mainly associated with through-traffic on the N14. A number of facilities offer a range of accommodation facilities on Kanoneiland and in and around Keimoes. The historic Rebellion Tree located on van Rooisvlei, just to the north of the site, is not currently accessible to the public. Wineries are located on at least two estates to the south of the N14. Bezalel, which specializes in cognac-type brandies is located relatively close to the site. The entrance gate to Bezalel is located to the south of the N14 approximately 6 km east of the site (Photograph 3.9). The visitors' centre is located 800 m south of the N14 and is screened from the road by orchards and vineyards.



Photograph 3.8: Grazing land on portion of the site north of the N14



Photograph 3.9: Entrance to Bezalel wine farm

In terms of existing infrastructure in the area, a 132 kV line linking Eskom's Omnia substation and the Upington MTS, is located to the north of the N14. A portion of the line runs across a section of the site located approximately 200 m north of the N14. A Telkom line is also located immediately to the north of the N14 (Photograph 3.10). The Eskom Upington MTS is located approximately 12.5 km to the east of the site. The facility is located 1.3 km north of the N14 and is accessed via a dedicated entrance road off the D3276 gravel road (Photograph 3.11).



Photograph 3.10: Existing Eskom and Telkom lines located to the north of the N14



Photograph 3.11: Eskom's Upington MTS substation off the D3276 gravel road

Four SEF projects located in the vicinity of the site already feed into the substation. These include Abengoa's Khi One CSP facility, Scatec's Sirius and Dyasonsklip 1 and Dyasonsklip 2 PV facilities, which are located <8 km to the east of the site. The relevant substations and associated Tx lines are located >2.5 km north of the N14 (Photograph 3.12).

The Upington-Keimoes railway line also traverses the study area. The line is located to the north of the N14 east of Dayson's Klip, and south of the N14 west thereafter. Only the portion of the site located to the south of the N14 is affected by the railway line. The line passes directly to the north of the farmstead on RE Geel Kop Farm No 456. . The line currently sees limited use (only a few times a year).



Photograph 3.12: Substation and 132 kV line on Dayson’s Klip farm located just to the west of Scatec’s newly commissioned Daysonsklip 1 SEF

3.7.2 Duneveld site

The Duneveld PV site is located on RE Geel Kop Farm No 456, which is approximately 4 117 ha in extent and includes seven vineyards (40 ha in total) located near the Orange (Gariep) River. The farm straddles the N14. The portion south of the N14 accommodates vineyards, agro-processing and residential uses, a public gravel road and the Upington-Keimoes railway line (Photograph 3.13). This includes the farmstead, farm buildings, and labourer’s housing, which are all located in proximity of the Orange (Gariep) River. A disused private farm school is located just to the north of the farmstead (Photograph 3.14). The portion of the property north of the N14 is used for grazing. Both portions of the property are accessed via private farm roads off the N14.



Photograph 3.13: Farmstead and the railway line



Photograph 3.14: Old farm school building located just to the north of the Geel Kop rail siding

RE Geel Kop Farm No 456 is owned by Mr Koos Snyman, who lives on the property. Mr Snyman farms the property together with his son Francois. The focus of the farming activities is on the production of grapes, supplemented by raising livestock. Grape farming activities are associated with the production of raisins, sultanas and wine grapes (Photograph 3.15). Raisins and sultanas (approximately 130 t/a) are processed on the property at a facility located just to the south of the N14 (Photograph 3.16). Wine grapes (approximately 300 t/a) are sold to Orange River Cellars' winery outside Keimoes. The operation currently provides permanent employment for 8 workers. The workers and their families all reside on the farm. In addition, the operations create 85-90 casual opportunities, the bulk of which (80) is seasonal and associated with harvesting and pruning seasons. Sufficient land for potential vineyard expansion is available on the portion of the farm south of the N14 (F Snyman – pers. comm).



Photograph 3.15: Vineyards and Eskom distribution line located to the south-west of the site



Photograph 3.16: Sultanas in the process of drying on RE Geel Kop Farm No 456

The Duneveld PV site is located on in the section of the farm located to the north of the N14, which consists of undeveloped veld that was historically used for grazing, primarily sheep. This portion of the farm is accessed via a private farm road from the N14 located roughly opposite the entrance to the southern portion of the farm. The entrance gate at the N14 is kept locked (Photograph 3.17). The northern portion accounts for the bulk of the farm and is approximately 2.6 km in width and stretches 17-18 km north of the N14. The carrying capacity of the veld is low, approximately 35 ha per head of cattle. A series of low koppies (the 'Swartkoppies') occupy the central part of the northern portion of the farm. The remainder of the property consists of low lying, treeless veld crisscrossed with shallow ephemeral drainage lines. No structures are located on the northern portion of the farm. Infrastructure is limited to existing internal farm roads, fencing, kraals for working stock, and a number of stock watering points (Photograph 3.18).



Photograph 3.17: Entrance to the site portion of farm north of the N14



Photograph 3.18: Stock watering point in the west-central portion of the portion of the site north of the N14. The hill is on Currie’s Camp to the west

No dedicated labour is associated with this portion of the farm, with labour deployed from the grape operation as and when required. Due to stock theft, stock farming activities on the section north of the N14 have been significantly reduced over the past 15 years. The camps located adjacent to the N14 have proven particularly vulnerable. The current operations consist of a small flock of sheep and a small herd of cattle, fewer than 100 head in total. The farm portion north of the Swartkoppies is however currently considered safe. This is linked to its isolation and distance from public roads. A small herd of Springbuck occur on the northern portion of the farm and are occasionally hunted for biltong by the owners (F Snyman – pers. comm).

The Duneveld PV site is the south-westernmost of a cluster of 5 SEFs proposed in the area located to the south of the Swartkoppies. Of these, the Gordonia PV <50 m to the north and the Bushmansland PV <30m to the east are the closest. The Duneveld site is approximately 500 m to the north of the N14 and approximately 320 m north of existing 132 kV Eskom. The site consists of level veld used for grazing (Photograph 3.19). Existing infrastructure is limited to farm roads and internal fencing. Due to its proximity to the N14, this portion of the farm is considered a high-risk area for stock.



Photograph 3.19: Looking across the Duneveld SEF site from the north-east

The project substation is located in the south-western portion of the site, approximately 30 m from the farm's western boundary with Currie's Camp. Site access is proposed via a new road from the N14. The new road would make use of the existing entrance and would be aligned just inside and parallel to the farm's eastern boundary, before swinging due west north of the Duneveld site. The Duneveld PV would make use of the same proposed project transmission line as the other 6 SEFs proposed on Geel Kop Farm, i.e. an integrated line (as indicated, subject of a parallel Basic Assessment). The farmstead is located 1.9 km to the south-east of the site.

3.7.3 Adjacent properties

Three farms border onto the portion of the farm located to the north of the N14, , namely Currie's Camp, Bloemsmond and Farm 444. Currie's Camp and Bloemsmond both straddle the N14, while Farm 444 forms part of a much larger livestock farming operation located to the north and west of the farm. None of the relevant portions of these properties are inhabited. All are currently used exclusively for stock farming activities.

Bloemsmond Farm 455 is located directly to the east of the site, 1.3km m to the east of the Duneveld site. Bloemsmond is owned by Mr Willie Snyman, brother of the owner of RE Geel Kop Farm No 456. The settlement pattern and primary grape farming activities (vineyards, processing facilities) are located in the southern portion of the property near the Orange (Gariiep) River, while the portion north of the N14 is undeveloped and uninhabited veld used for grazing. Primary activities are the cultivation and processing of raisins and sultanas. The livestock farming operation includes other farms in the Kalahari. Combined operations currently provide permanent employment opportunities to 32 people, all of whom are tenured on Bloemsmond. In addition, the operation provides up to 400 seasonal opportunities, again essentially associated with pruning and harvesting. Up to five SEFs are currently proposed on the portion of Bloemsmond 455 north of the N14 (W Snyman – pers. comm).

Currie's Camp 457/1 is located to the west of the site, approximately 30 m to the west of the Duneveld site. The portion north of the N14 is approximately 4 000 ha in extent. Currie's Camp forms part of former church lands granted to 460 beneficiaries of the Soverby, Currie's Camp and McTaggart's Camp communities in 2000. The land has been pooled and is farmed as a community enterprise by the Blocuso Trust. Thanks to ongoing financial and technical support, a thriving raisin and wine grape farming operation has been established to the south of the N14. Approximately 59 ha of vineyard has been developed (Photograph 3.20). A large pump station, offices, a large shed and drying

operations are located near the intersection of the N14 and the Soverby access road, approximately 3.6 km south west of the Duneveld site (Photograph 3.21).



Photograph 3.20: Vineyards on portion of Blocuso located just to the south of the N14 seen from the access road to Soverby settlement



Photograph 3.21: Farm shed and sultana drying operation on Blocuso

Due to stock theft, members of the relevant communities no longer use the portion north of the N14 for grazing. This portion of the farm is uninhabited and rented out to a commercial farmer for grazing. Blocuso's farming operation currently provides full time employment to 24 people from the relevant communities. An additional 110 seasonal opportunities are associated with the operation. Blocuso also investigated the possibility of accommodating an SEF on the portion of Currie's Camp farm north of the N14, but a site agreeable to both the community and developer could not be identified. A 4x4 trail is located on this portion of the property but sees limited use. The Swartkoppies area holds potential for tourism development (e.g. accommodation), but there are currently no plans on the table (van Rooyen – pers. comm).

Farm 444 is located directly to the north of the site, approximately 13.6 km to the north of the Duneveld site. The property is accessed off the DR 3276 (Lutzputs) gravel road. It forms part of the Karsten Group's local livestock farming operation which also includes 4 adjacent properties. The operation covers an area approximately 15 000 ha in extent.

The van Rooisvlei farmstead, located approximately 1.3 km north of the site, is not inhabited. No staff live on the property. The property is used for raising sheep and cattle. Karsten's local livestock operation employs 15-20 people on a permanent basis. The stock farming operation is managed from Karsten's main Roepersfontein Farm south of Kanoneiland. While the van Rooisvlei operation is not located in proximity to the N14, the operation is still considered vulnerable to stock theft due to its adjacency to the D3276 gravel road (Theron – pers, comm).

Potential near-adjacent receptors include Geel Kop Farm portion 456 (Mr Regenstein) and a portion of Strausheim Farm located to the north of the N14. Geel Kop Farm portion 45 (Mr Regenstein) is located to the west of the site and is located entirely to the south of the N14. Mr Regenstein and his labour force live on the property, which is primarily used for growing drying and wine grapes. Geel Kop portion 456 farm produce is sold at a small seasonal farm stall (Liewe Heksie) located adjacent to N14 across the road from the northern (site) portion of the site (Mr Snyman) (Photograph 3.22). The Regenstein farmstead is located 1.8 km to the south-east of the Duneveld PV site and the farm stall 580 m to the south.



Photograph 3.22: Liewe Heksie farm stall (Geelkop – Regenstein)

Vineyards and buildings on the Strausheim Farm, are located north of the N14 at the Kanoneiland Road intersection, 2.5 km to the north-east of the Duneveld PV SEF site. No residential or tourism uses are associated with the Strausheim operation. Strausheim is a producer farm for the Fruits du Sud dried grapes group, whose main premises are located to the south-east of the intersection. The property is currently traversed by the Eskom line.

3.7.4 Other renewable facilities

The Duneveld PV facility is located within the Upington REDZ. In addition to the Duneveld PV, 6 more PV facilities are proposed on the portion of the farm located to the north of the N14. Of these, four (Bushmanland, Gordonia, Hari and Karroid PV facilities), are proposed south of the Swartkoppies like the Duneveld PV facility. These sites are located within a 5 km radius of the Duneveld site. The remaining two, the Shrubland and GK Solar PV facilities are located to the north of the Swartkoppies, approximately 10 km north of the Duneveld site. The 7 Geel Kop PV facilities would share access road and transmission line infrastructure.

The South African Renewable Energy EIA Application Database (updated January 2020) indicates 20 sites within a 35 km radius of the site on which REFs have been proposed

since 2010²¹. Of the 20, 11 are Solar PV projects, while 7 are Solar CSP, one Solar (undetermined) and 1 Hydro. Historically proposed REF sites border onto the north and east of the site portion of the site. Seven sites are located directly to the north of the N14. Applications or amendment applications have been approved for 16 out of the 20. A total of 11 of the approved projects are located in the Kai Garib Local Municipality. The Renewable Energy Database does not reflect existing SEFs or current applications on RE Geel Kop Farm No 456 and adjacent properties to the east.

Three SEFs have been constructed within a 10 km radius of the Duneveld PV site, and a fourth is currently under construction. All these facilities are located >5 km north of the N14 to the east of the site (Photograph 3.23). Abengoa's 50 MW Khi Solar One facility, the only operational concentrated solar facility in South Africa, is located on McTaggart's Camp 453 approximately 10 km north-east of the Duneveld site and 5.3 km north-west of the Eskom Upington MTS, was commissioned in 2016. The 205 m tower structure is prominently visible from the N14 and adjacent farms.



Photograph 3.23: Abengoa's Khi Solar One CSP (background) with Daysonklip 1 PV SEF in foreground looking east

Scatec gained preferred bidder status for 3 adjacent 86 MW PV SEFs in the study area in 2015. Three of the SEFs have been constructed, namely the Sirius SEF on a portion of McTaggart's Camp directly to the east of the Khi Solar One facility, and Dyasonsklip 1 and 2 on Dayson's Klip 454/RE, directly to the west of the Khi Solar One facility, approximately 7 km to the north-east of the Duneveld PV site. Two additional SEFs have also been approved on Dayson's Klip 454/RE and applications for up to 5 SEFs are currently proposed on Bloemsmond. There are therefore at least 15 SEFs currently proposed in the study area located within a 15 km radius of the Duneveld PV site.

²¹

<https://portal.environment.gov.za/portal/apps/webappviewer/index.html?id=1c45081a7f65490c9ce58fad88e3b9e3>.

SECTION 4: ASSESSMENT OF KEY SOCIAL ISSUES

4.1 INTRODUCTION

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

- 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 energy is strongly supported at a national, provincial and local level. At a national and provincial level the development of and investment in renewable energy is 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 Northern Cape Province (NCP) Provincial Growth and Development Strategy. Renewable energy is also supported at a district and local level. The Duneveld PV is also located within the Upington REDZ, which was formally gazetted in 2018²². The area has therefore been identified as suitable for the establishment of large-scale solar energy facilities.

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;

²² GN114 of 2018

- 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 PV projects the construction phase for a 100 MW PV 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 facility 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 in the area, including Brugge, Klippunt, Dyasons Klip, Oranjevallei, Louisvale, Kanoneiland, Bloemsmond, Curriescamp and Soverby, would be in a position to qualify for some 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 these local communities. Communities from the local towns in the area, including Keimoes and Upington and other towns in the KGLM, may also benefit.

Given the 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 PV facility 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. In addition, the low education and skill levels in the area may also hamper potential opportunities for local communities. Where feasible, the implementation of a training and skills development programme prior to the commencement of construction would also increase the potential to employ local community members. The number of low skilled and semi-skilled positions taken up by members from the local community will depend on the effective implementation of these enhancement measures by the proponent in consultation with the KGLM.

The total wage bill for the construction phase is estimated to be in the region of R 50 million (2020 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 potential benefits for local communities are 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 (March 2019). The study found that to date, a total of 40 134 job years²³ have been created for South African citizens, of which 33 019 job years were in construction and 7 115 in operations. These job years should rise further past the planned target as more projects enter the construction phase. Employment opportunities across all five active bid windows are 101% of the planned number during the construction phase (i.e. 32 602 job years), with

²³ The equivalent of a full time employment opportunity for one person for one year

26 projects still in construction and employing people as of March 2019. The number of employment opportunities is therefore likely to continue to grow beyond the original expectations. By the end of March 2019, 64 projects had successfully completed construction and moved into operation. These projects created 31 633 job years of employment, compared to the anticipated 20 689. This was 53% 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 – BW4 was 89% during construction (against a target of 80%), while it was 95% during operations for BW1 – BW3 (against a target of 80%). 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 13 058 job years. To date 18 253 job years have been realised (i.e. 140% more than initially planned), with 26 projects still in construction. The number of black SA citizens employed during construction also exceeded the planned numbers by 22%. Black South African citizens, youths and rural or local communities have been the major beneficiaries during the construction phases, as they respectively represent 79%, 41% and 49% of total job opportunities created by IPPs to date.

The study also found that the share of black citizens employed during construction (79%) had significantly exceeded the 50% target. Likewise, the share of skilled black citizens (as a percentage of skilled employees) for both construction (67%) and operations (79%) has also exceeded 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 49% and 67% for construction and operations respectively – exceeding 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 PV will be in the region of R 2 billion (2020 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 the KGLM will be limited. However, opportunities may 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 and Upington 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 with LED representatives from the KGLM, Mr Markus and Mr 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 Mr McKay, the Director of Planning 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

Nature: Creation of employment and business opportunities during the construction phase		
	Without Mitigation	With Enhancement
Extent	Local – Regional (3)	Local – Regional (4)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6)	High (8)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (44)	Medium (56)
Status	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	N/A	N/A
Can impact be enhanced?	Yes	
Enhancement: See below		
Cumulative impacts: Opportunity to up-grade and improve skills levels in the area.		
Residual impacts: Improved pool of skills and experience in the local area.		

Assessment of No Go option

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

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 no workers will be accommodated on site. 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.

Non-local construction workers will be accommodated in nearby towns of Keimoes and Upington. The potential risk can 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, the majority of the low skilled (220) and a reasonable number of the semi-skilled (120) work opportunities can be taken up by 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 findings of the SIA indicate that unemployment levels in the KGLM are high. The creation of 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

Nature: Potential impacts on family structures and social networks associated with the presence of construction workers		
	Without Mitigation	With Mitigation
Extent	Local (2)	Local (1)
Duration	Short term for community as a whole (2)	Short term for community as a whole (2)
Magnitude	Moderate for the community as a whole (6)	Low for community as a whole (4)
Probability	Probable (3)	Probable (3)
Significance	Medium for the community as a whole (30)	Low for the community as a whole (21)
Status	Negative	Negative
Reversibility	No in case of HIV and AIDS	No in case of HIV and AIDS
Irreplaceable loss of resources?	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods
Can impact be mitigated?	Yes, to some degree. However, the risk cannot be eliminated	
Mitigation: See below		
Cumulative impacts: Impacts on family and community relations that may, in some cases, persist for a long period of time. Also in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.		
Residual impacts: See cumulative impacts.		

Assessment of No Go option

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

Recommended mitigation measures

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

- Where possible, 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 8, 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.
- 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.

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 PV facility 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 4.3.2. However, in some instances the potential impact on the community may be greater given that they are unlikely to have accommodation and may decide to stay on in the area. In addition, they will not have a reliable source of income. The risk of crime associated with the influx of job seekers is therefore likely to be greater. Experience from other projects has also shown that the families of job seekers may also accompany individual job seekers or follow them at a later date. In many cases the families of the job seekers that become “economically stranded” and the construction workers that decided to stay in the area, subsequently moved to the area. The influx of job seekers to the area and their families can also place pressure on 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 local towns and settlements in the KHEM, such as Keimoes is likely to be low. This is due to 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. Due to the proximity of these towns the risk of labour stranding is likely to be low. The likelihood of job seekers staying on in Keimoes and other settlements in the study area is therefore likely to be low. The risks associated with the influx of job seekers are therefore likely to be low.

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

Nature: Potential impacts on family structures, social networks and community services associated with the influx of job seekers		
	Without Mitigation	With Mitigation
Extent	Local (2)	Local (1)
Duration	Permanent (5) (For job seekers that stay on the town)	Permanent (5) (For job seekers that stay on the town)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Low (27)	Low (24)
Status	Negative	Negative
Reversibility	No in case of HIV and AIDS	No in case of HIV and AIDS
Irreplaceable loss of resources?	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods
Can impact be mitigated?	Yes, to some degree. However, the risk cannot be eliminated	
Mitigation: See below		
Cumulative impacts: Impacts on family and community relations that may, in some cases, persist for a long period of time. Also in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts		

may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.

Residual impacts: See cumulative impacts.

Assessment of No-Go option

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

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 farmers and farm workers in the vicinity of the site. In addition, farm infrastructure, such as fences and gates, may be damaged and stock losses may also result from gates being left open. The local farmers in the area which were 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 workers on the site during the construction phase. Mitigation measures to address these risks are outlined below.

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

Nature: 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		
	Without Mitigation	With Mitigation
Extent	Local (3)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	Medium (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (33)	Low (24)
Status	Negative	Negative
Reversibility	Yes, compensation paid for stock losses and damage to farm infrastructure etc.	Yes, compensation paid for stock losses and damage to farm infrastructure etc.
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Mitigation: See below		
Cumulative impacts: No, provided losses are compensated for.		
Residual impacts: See cumulative impacts.		

Assessment of No-Go option

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

Recommended mitigation measures

Key mitigation measures include:

- 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;
- Strict traffic speed limits must be enforced on the farm;
- All farm gates must be closed after passing through;
- 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 in 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.

4.3.5 Increased risk of grass fires

The presence of construction workers and construction-related activities on the site poses an increased risk of grass fires that could, in turn pose, a threat to livestock, crops, wildlife and farm infrastructure. Local farmers interviewed indicated that grass fires were a concern and posed a threat to their livestock operations. 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 the option of constructing a firebreak around the perimeter of the site prior to the commencement of the construction phase should be investigated. 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

Nature: Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of grass fires		
	Without Mitigation	With Mitigation
Extent	Local (4)	Local (2)
Duration	Short term (2)	short term (2)
Magnitude	Moderate due to reliance on agriculture for maintaining livelihoods (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (36)	Low (24)
Status	Negative	Negative
Reversibility	Yes, compensation paid for stock and crop losses etc.	Yes, compensation paid for stock and crop losses etc.
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Mitigation: See below		
Cumulative impacts: No, provided losses are compensated for.		
Residual impacts: See cumulative impacts.		

Assessment of No-Go option

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

Recommended mitigation measures

The mitigation measures include:

- 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;
- The option of establishing a fire-break around the perimeter of the site prior to the commencement of the construction phase should be investigated;
- 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 event 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 site will be via an access road off the N14. The movement of heavy construction related traffic and the transport of workers to and from the site on a daily basis may pose safety risks to other road users. The stakeholders interviewed indicated that the issues associated with the movement of construction vehicles can be effectively mitigated.

Table 4.6: Assessment of the impacts associated with construction vehicles

Nature: Potential noise, dust and safety impacts associated with movement of construction related traffic to and from the site		
	Without Mitigation	With Mitigation
Extent	Local (2)	Local (1)
Duration	Short Term (2)	Short Term (2)
Magnitude	Medium (6)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Medium (30)	Low (15)
Status	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Mitigation: See below		
Cumulative impacts: 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 not responsible for the damage. Dust impacts to vineyards could also impact on future contracts.		
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 of the week, such as weekends, when the volume of traffic travelling along the N14 may be higher;
- Dust suppression measures must be implemented on un-surfaced roads, 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. 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 therefore be 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 operation. 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

Nature: The activities associated with the construction phase, such as establishment of access roads and the construction camp, movement of heavy vehicles and preparation of foundations for the SEF and power lines will damage farmlands and result in a loss of farmlands for grazing.		
	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)
Duration	Long term-permanent if disturbed areas are not effectively rehabilitated (5)	Short term if damaged areas are rehabilitated (2)
Magnitude	Medium (6)	Minor (2)
Probability	Probable (3)	Highly Probable (4)
Significance	Medium (36)	Low (20)
Status	Negative	Negative
Reversibility	Yes, disturbed areas can be rehabilitated	Yes, disturbed areas can be rehabilitated
Irreplaceable loss of resources?	Yes, loss of farmland. However, disturbed areas can be rehabilitated	Yes, loss of farmland. However, disturbed areas can be rehabilitated
Can impact be mitigated?	Yes, however, loss of farmland cannot be avoided	
Mitigation: See below		
Cumulative impacts: Overall loss of farmland could affect the livelihoods of the affected farmers, their families, and the workers on the farms and their families. However, disturbed areas can be rehabilitated.		
Residual impacts: See cumulative impacts.		

Assessment of No-Go option

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

Recommended mitigation measures

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

- The site for the proposed SEF 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 temporary 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 by the Environmental Consultants appointed to undertake the BA;
- 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 the landowner;
- Benefits associated with the establishment of a Community Trust;

Potential negative impacts

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

4.4.1 Development of renewable energy infrastructure

The establishment of renewable energy infrastructure, such as the proposed SEF, 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 21st century. The study also identifies a number of advantages associated with renewable energy, which include no emissions of carbon dioxide (CO₂) in the generation of electricity and low lifecycle emissions. The construction period for renewable energy projects, such as the proposed SEF, 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. Renewable energy 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 (2017) indicates that the REIPPPP has attracted R48.8 billion in foreign investment and financing in the seven bid windows (BW1 – BW4, 1S2 and IS2). This is more than double the inward FDI attracted into South Africa during 2015 (R22.6 billion). In terms of local equity shareholding, 48% (R31.5 billion) of the total equity shareholding (R66.7 billion) was held by South African's across BW1 to BW4, 1S2 and IS2. This equates to substantially more than the 40% requirement. Foreign equity amounts to R 35.8 billion and contributes 52% to total equity. 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 R75 billion, more than the projected operations procurement spend over the 20 years operational life (R72 billion). The combined (construction and operations) procurement value for BW1 to BW4, 1S2 and IS2 is projected as R147.6 billion, of which R50.1 billion has been spent to date. For construction, of the R46.4 billion already spent to date, R36.6 billion is from the 57 projects which have already been completed. These 51 projects had planned to spend R36.6 billion. The actual procurement construction costs have therefore exceeded the planned costs by 9% for completed projects. Of the R46.6 billion spent on procurement during construction, R41.1 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 R41.1 billion spent on BBBEE during construction already exceeded the R34.8 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 R75 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 32 532 job years²⁴ have been created for South African citizens, of which 29 046 were in construction and 3 486 in operations.

²⁴ The equivalent of a full time employment opportunity for one person for one year

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.

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 SEF, 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.

Table 4.8: Implementation of clean, renewable energy infrastructure

Nature: Development of infrastructure to generate clean, renewable energy		
	Without Mitigation	With Mitigation
Extent	Local, Regional and National (4)	Local, Regional and National (5)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	High (8)
Probability	Highly Probable (4)	Definite (5)
Significance	High (64)	High (85)
Status	Positive	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	Yes, impact of climate change on ecosystems	Reduced CO ₂ emissions and impact on climate change
Can impact be mitigated?	Yes	
Enhancement: See below		
Cumulative impacts: Overall reduction in CO ₂ 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.		
Residual impacts: See cumulative impacts		

Assessment of No-Go option

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

Recommended mitigation measures

Should the project be approved the proponent should:

- Implement a skills development and training programme aimed at maximising the number of employment opportunities for local community members;

- Maximise opportunities for local content, procurement and community shareholding.

4.4.2 Creation of employment and business opportunities and support for local economic development

Based on information from other SEF projects the proposed SEF 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 (March 2019) notes that the operational phase procurement spend over the 20 year for BW1 to BW4, 1S2 and 2S2 will be in the region of R 73.1 billion. The combined (construction and operations) procurement value is projected as R149.9 billion of which R63.1 billion has been spent to date. For construction, of the R55.7 billion already spent to date, R51.1 billion is from the 64 projects which have already been completed. These 64 projects had planned to spend R50.4 billion. The actual procurement construction costs have therefore exceeded the planned costs by 1% for completed projects.

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.

Given the location of the proposed facility, the majority of permanent staff is likely to reside in Keimoes or Upington. 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 Keimoes and Upington 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 McKay and Mr Clarke, the Director of Planning and Head of Engineering Services 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

Nature: Creation of employment and business opportunities associated with the operational phase		
	Without Mitigation	With Enhancement
Extent	Local and Regional (1)	Local and Regional (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Definite (5)
Significance	Low (27)	Medium (50)
Status	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	
Enhancement: See below		
Cumulative impacts: Creation of permanent employment and skills and development opportunities for members from the local community and creation of additional business and economic opportunities in the area		
Residual impacts: See cumulative impacts		

Assessment of No-Go option

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

Recommended enhancement measures

The enhancement measures listed in Section 4.3.1, i.e. to enhance local employment and business opportunities during the construction phase, also apply to the operational phase.

4.4.3 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.

Socio-economic development (SED) contributions

Socio-economic development (SED) contributions represent an important focus of the REIPPPP and is aimed at ensuring 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 SED contributions associated with the 64 IPPs has to date amounted to R 860.1 million. The majority of the spend has been on education and skills development (40.9%), followed by enterprise development (24.2%), social welfare (21.3%), general administration (9%) and health care (4.5%). In terms of education, the IPPs have supported 1 044 education institutions, with a total spend of R 236.7 million between 2015 and March 2018. It is estimated that these contributions have benefitted in the region of 375 737 learners.

The province with the highest SED contribution has been the Northern Cape Province, followed by the Eastern Cape and Western Cape.

Enterprise development contributions

The target for IPPs to spend on enterprise development is 0.6% of revenues over the 20- year project operational life. Enterprise development contributions committed for BW1 to BW4, 1S2 and 2S2 amount to R7.2 billion. Of the total commitment, R5.6 billion is specifically committed directly within the local communities where the IPPs operate, contributing significantly to local enterprise development. Up until the end of March 2019 a total of R 254.3 million had already been made to the local communities located in the vicinity of the 64 operating IPPs.

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. In her conclusion Tait 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 renewable energy projects 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 not 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.

Mr McKay, the Director of Planning at the KGLM, indicated that the benefits from the Community Trust should focus on the local communities in the immediate vicinity of the site.

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

Nature: Establishment of a community trust funded by revenue generated from the sale of energy. The revenue can be used to fund local community development		
	Without Mitigation	With Enhancement²⁵
Extent	Local and Regional (2)	Local and Regional (3)
Duration	Long term (4)	Long term (4)
Intensity	Low (4)	Moderate (6)
Likelihood	Probable (3)	Definite (5)
Significance	Medium (30)	High (65)
Status	Positive	Positive
Reversibility	Yes	Yes
Can impact be enhanced?	Yes	
Enhancement: See below		
Cumulative impacts: Promotion of social and economic development and improvement in the overall well-being of the community		
Residual impacts: See cumulative impacts		

Assessment of No-Go option

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

Recommended enhancement measures

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

- 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.

²⁵ Enhancement assumes effective management of the community trust

- 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.

4.4.4 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 on the footprint of the project. 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)

Nature: 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. (+)		
	Without Mitigation	With Enhancement²⁶
Extent	Local (1)	Local (3)
Duration	Long term (4)	Long term (4)
Intensity	Low (4)	Moderate (6)
Likelihood	Probable (3)	Definite (5)
Significance	Low (27)	Medium (53)
Status	Positive	Positive
Reversibility	Yes	Yes
Can impact be enhanced?	Yes	
Enhancement: See below		
Cumulative impacts: Support for local agricultural sector and farming		
Residual impacts: 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.

²⁶ Enhancement assumes effective management of the community trust

4.4.5 Visual impact and impact on sense of place

The components associated with SEFs will impact on the area's current undisturbed, rural sense of place. However, due to the topography of the site and the location of the proposed SEF, the visibility of the structures from the N14 will be limited. In addition, there are no farmhouses in the area that would be affected by the proposed facility. Furthermore, the visual quality of the area has been impacted by an existing power Eskom transmission line and the solar tower associated with the Khi Solar 1 CSP to the east of the site. None of the farmers interviewed indicated that they were concerned about the potential impact on the area's sense of place.

Table 4.12: Visual impact and impact on sense of place

Nature: Visual impact associated with the proposed solar facility and the potential impact on the area's rural sense of place.		
	Without Mitigation	With Mitigation
Extent	Local (2)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (4)	Highly Probable (4)
Significance	Medium (32)	Low (28)
Status	Negative	Negative
Reversibility	Yes, solar facility can be removed.	
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Mitigation: See below		
Cumulative impacts: Potential impact on current rural sense of place		
Residual impacts: See cumulative impacts		

Assessment of No-Go option

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

Recommended mitigation measures

The recommendations contained in the VIA should also be implemented.

4.4.6 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 area's natural resources, including the relatively undisturbed scenery and landscape. However, there are no tourist related activities in the vicinity of the site that would be impacted by the proposed development. The visual exposure from the N14 is also likely to be limited. The impact of the proposed SEF on the tourism potential of the area and the broader KGLM and NCP is therefore likely to be low. In some instances, the SEF may also attract tourists to the area. However, the significance of this potential benefit is also rated as low positive.

Table 4.13: Potential impact on tourism

Nature: Potential impact of the SEF on local tourism		
	Without Mitigation	With Enhancement / Mitigation
Extent	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (2)	Low (2)
Probability	Probable (3)	Probable (3)
Significance	Low (24) (Applies to both – and +)	Low (24) (Applies to both – and +)
Status	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)
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	
Enhancement: See below		
Cumulative impacts: 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 as significant.		
Residual impacts: See cumulative impacts		

Assessment of No-Go option

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

Recommended mitigation measures

The recommendations contained in the VIA should be implemented.

4.5 ASSESSMENT 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 4.14: Social impacts associated with decommissioning

Nature: Social impacts associated with retrenchment including loss of jobs, and source of income		
	Without Mitigation	With Mitigation
Extent	Local and regional (2)	Local and regional (1)
Duration	Medium Term (2)	Very Short Term (1)
Magnitude	Moderate (6)	Low (4)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	Medium (40)	Low (24)
Status	Negative	Negative
Reversibility	Yes, assumes retrenchment packages are paid to all affected employees	
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Mitigation: See below		
Cumulative impacts: 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.		
Residual impacts: 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 identified by Scottish Natural Heritage study include:

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

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

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 are 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 may also apply to solar facilities. However, the components associated with SEFs are less intrusive than WEFs. The visual impacts are therefore likely to potentially be lower.

As indicated above, the potential impact of the proposed SEF on the area's sense of place is likely to be low. As indicated in Figure 4.1, there are a number of other SEFs located and proposed in the vicinity of the site. 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, due to the topography of the area and the scale of PV solar panels, the visibility of the majority of the SEFs from major roads, such as the N14, is limited. With careful planning, the visual impacts associated with SEFs can also be effectively mitigated. The potential 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) are therefore likely to be low. In addition, the site is located within the Upington Solar REDZ. The area has therefore been identified as being suitable for the establishment of large-scale solar energy facilities.

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.



Figure 4.1: Location of renewable energy projects in the vicinity of the site (site shown as red dot)

Table 4.15: Cumulative impacts on sense of place and the landscape

Nature: Visual impacts associated with the establishment of more than one SEF and the potential impact on the area's rural sense of place and character of the landscape.		
	Without Mitigation	With Mitigation
Extent	Local and regional (2)	Local and regional (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Medium (30)	Low (24)
Status	Negative	Negative
Reversibility	Yes. Solar energy plant components and other infrastructure can be removed.	
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Enhancement: See below		
Cumulative impacts: Impact on other activities whose existence is linked to rural sense of place and character of the area, such as tourism, bird watching, and hunting.		
Residual impacts: See cumulative impacts		

Assessment of No-Go option

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

Recommended mitigation measures

The recommendations of the VIA should be implemented.

4.7 CUMULATIVE IMPACT ON LOCAL SERVICES AND ACCOMMODATION

The establishment of the proposed SEF and the other renewable energy facilities in the KGLM will place pressure on local services in nearby towns, such as Keimoes and Uppington, 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 may 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 towns such as Keimoes and Uppington.

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 the KHLM, 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 Keimoes and the KGLM 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 upgrading 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 4.16: Cumulative impacts on local services

Nature: 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		
	Without Mitigation	With Mitigation²⁷
Extent	Local and regional (3)	Local and regional (1)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	Medium (52)	Low (28)
Status	Negative	Negative
Reversibility	Yes. Solar energy plant components and other infrastructure can be removed.	
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Enhancement: See below		
Cumulative impacts: Negative impact on the local services		
Residual impacts: See cumulative impacts		

Comment on No-Go option

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

Recommended mitigation measures

The Northern Cape Provincial Government, in consultation with the ZFMDM, KGLM and the proponents involved in the development of renewable energy projects in the KGLM, 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

²⁷ 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.

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 create significant positive cumulative impacts. In this regard, the establishment of a number of SEFs in the area will 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, 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 review of the REIPPPP (March 2019) indicates that R 860.1 million has been generated by socio-economic development contribution associated with the current 64 operational IPPs. This has been spent on education and skills development (40.9%), followed by enterprise development (24.2%), social welfare (21.3%), general administration (9%) and health care (4.5%). In terms of education, the IPPs have supported 1 044 education institutions, with a total spend of R 236.7 million between 2015 and March 2018. It is estimated that these contributions have benefitted in the region of 375 737 learners.

In addition, enterprise development contributions committed for BW1 to BW4, 1S2 and 2S2 amount to R7.2 billion. Of the total commitment, R5.6 billion is specifically committed directly within the local communities where the IPPs operate, contributing significantly to local enterprise development. Up until the end of March 2019 a total of R 254.3 million had already been made to the local communities located in the vicinity of the 64 operating IPPs.

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 to 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 4.17: Cumulative impacts on local economy

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

Assessment of No-Go option

There is no impact as it maintains the current status quo. This would represent a lost socio-economic opportunity for the 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 of 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 4.18: Assessment of no-development option

Nature: The no-development option would result in the lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy		
	Without Mitigation	With Mitigation²⁸
Extent	Local-International (4)	Local-International (4)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	Moderate (56)	Moderate (56)
Status	Negative	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	N/A	N/A
Can impact be mitigated?	Yes	
Enhancement: See below		
Cumulative impacts: Reduce carbon emissions via the use of renewable energy and associated benefits in terms of global warming and climate change.		
Residual impacts: See cumulative impacts		

Recommended enhancement measures

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

²⁸ Assumes establishment of a Community Trust

SECTION 5: KEY FINDINGS AND RECOMMENDATIONS

5.1 INTRODUCTION

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

- A review of 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 energy is strongly supported at a national, provincial and local level. At a national and provincial level the development of and investment in renewable energy is 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 Northern Cape Province (NCP) Provincial Growth and Development Strategy. Renewable energy is also supported at a district and local level. The Duneveld PV facility is also located within the Upington Solar REDZ which was formally gazetted in 2018²⁹. The area has therefore been identified as suitable for the establishment of large-scale solar energy facilities.

5.2.2 Construction phase impacts

The key social issues associated with the construction phase include:

Potential positive impacts

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

The construction phase for a 100 MW SEF is expected to extend over a period of 14-18 months and create approximately 300 employment opportunities. Of this total ~ 60%

²⁹ GN 113 and GN114 of 2018

(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 (2020 rand value). Most 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 local settlements, such as Brugge, Klippunt, Dyasons Klip, Oranjevallei, Louisvale, Kanoneiland, Bloemsmond, Curriescamp and Soverby,. 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 meeting local employment targets may be limited. In addition, the low education and skills levels in the area may hamper potential opportunities for local communities.

The potential benefits for local communities are 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 (March 2019). The review found that by the end of March 2019 the 64 renewable energy projects that had been successfully completed had created 31 633 job years³⁰ of employment, compared to the anticipated 20 689. This was 53% more than planned. The study also found that significantly more people from local communities were employed during construction than was initially planned.

The capital expenditure associated with the construction phase will be in the region of R 2 billion (2020 rand value). A percentage of the wage bill will be spent in the local economy which will create opportunities for local businesses in 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 grass fires associated with construction related activities;
- Noise, dust and safety impacts of construction related activities and vehicles;
- Impact on productive farmland.

The findings of the SIA indicate that the significance of all the potential negative impacts with mitigation were **Low Negative**. The potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented. Given that most of the low and semi-skilled construction workers can be sourced from the local area the potential risk posed by construction workers on local family structures and social networks is regarded as low for the community as a whole. Table 5.1 summarises the significance of the impacts associated with the construction phase.

³⁰ The equivalent of a full-time employment opportunity for one person for one year

Table 5.1: Summary of social impacts during construction phase

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

5.2.3 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; and
- Generation of income for affected landowner/s.

Development of renewable energy infrastructure

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 National Climate Change Response White Paper outlines the national response to the impacts of climate change, as well as the domestic contribution to international efforts to mitigate green-house gas emissions. As part of the global commitment, South Africa is targeting an emissions trajectory that peaks at 34% below a "business as usual" case in 2020, 42% below in 2025 and from 2035 declines in absolute terms. The emission reductions between March 2018 and 2019 are estimated to be 10.9 million tonnes of CO². This represents 53% of the total projected annual emission reductions achieved with only partial operation to date. Since operation, the IPPs have generated 35 699 GWh, resulting in 36.2 Mton of CO² emissions being offset and saving 42.8 million kilolitres of water related to fossil fuel power generation.

The REIPPPP had therefore contributed significantly towards meeting South Africa's GHG emission targets and, at the same time, supporting energy security, economic stability and environmental sustainability.

The establishment of renewable energy facilities, such as the proposed SEF, 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 (2020 Rand value). The majority of low and semi-skilled beneficiaries are likely to be historically disadvantaged (HD) members of the community. Given the location of the proposed facility most of permanent staff is likely to reside in the local settlements and towns in the area, including Keimoes and Upington.

Procurement during the operational phase will also create opportunities for the local economy and businesses. In this regard, the overview of the IPPPP (March 2019) notes that the operational phase procurement spend over the 20 years for BW1 to BW4, 1S2 and 2S2 will be in the region of R 73.1 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 2019 IPPP Overview notes that the socio-economic development (SED) contributions associated with the 64 IPPs has to date has amounted to R 860.1 million. The province with the highest SED contribution has been the Northern Cape Province, followed by the Eastern Cape and Western Cape.

Enterprise development contributions committed for BW1 to BW4, 1S2 and 2S2 amount to R7.2 billion. Of the total commitment, R5.6 billion is specifically committed directly within the local communities where the IPPs operate, contributing significantly to local enterprise development. Up until the end of March 2019 a total of R 254.3 million had already been made to local communities located in the vicinity of the 64 operating IPPs. The Green Jobs study (2011), found that the case for renewable energy enhanced by the positive effect on rural or regional development. Renewable energy projects 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 enable 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.

Benefits to landowners

The income from the SEF reduces the risks to the livelihoods of the affected landowners posed by droughts and fluctuating market prices for sheep and farming inputs, such as fuel, feed etc. The additional income from the SEF would improve economic security of farming operations, which in turn would improve job security of farm workers and benefit the local economy.

Potential negative impacts

- 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 Negative** 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 SEF the impact on the areas sense of place with mitigation is likely to be low. The site is also located in the Uppington Solar REDZ. The area has therefore been identified for the development of large-scale solar energy projects.

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

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

5.2.4 Assessment of cumulative impacts

Cumulative impact on sense of place

There are a number of other SEFs located and proposed in the vicinity of the site. 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, due to the topography of the area and the scale of PV solar panels, the visibility of the majority of the SEFs from the only major road in the area, the N14, is limited. With careful planning, the visual impacts associated with SEFs can also be effectively mitigated. The potential cumulative impacts associated with combined visibility and sequential visibility are therefore likely to be low. In addition, the site is located within the Upington Solar REDZ. The area has therefore been identified as being suitable for the establishment of large-scale solar energy facilities.

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 such as Keimoes and Upington, 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, municipal workers, school teachers and the police, may no longer be able to buy or afford to rent accommodation in Keimoes and Upington. 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 Keimoes and Upington, 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 economic development and investment in the KGLM. 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 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 SEF 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. The economic benefits associated with Independent Power

Producers Procurement Programme (IPPPP) have been confirmed by the review undertaken by the Department of Energy, National Treasury and DBSA (March 2019). This benefit is rated as **High Positive** with enhancement.

5.2.5 Decommissioning phase

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.

5.2.6 Assessment of no-development option

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

Conclusions

The findings of the SIA indicate that the development of the proposed Duneveld PV facility 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 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 Duneveld PV facility is therefore supported by the findings of the SIA. The site is also located in the Upington Solar REDZ. The area has therefore been identified for the development of large-scale solar energy projects.

Recommendations

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.

ANNEXURE A

INTERVIEWS

- Fienies, Cllr (2020-03-01). Ward 8 Cllr, Kai !Garib Local Municipality.
- Regenstein, Mr SW (2020-03-01). Geelkop Farm (Regenstein).
- Snyman, Mr Francois (2020-03-01). RE Geel Kop Farm No 456.
- Snyman, Mr Willie (2020-03-02). Bloemsmond Farm.
- Theron, Mr Francois (2020-03-02). Karstens Group livestock farms manager.
- Theunissen, Mr Jaco (2020-03-01). Daysonsklip Farm.
- Van Rooyen, Mr Leonard (2020-03-01). Chairman, Blocuso Trust.

The following representatives from the Kai !Garib Local Municipality were interviewed in 2019 as part of an SIA for a Bloemsmoed SEF located near Kenhardt:

- Mr Mike Clarke, Head of Engineering, Kai !Garib Local Municipality, 20/5/2019;
- Mr Jaco Strauss, adjacent landowner, 20/05/2019;
- Mr MacKay, Director of Planning, Kai !Garib Local Municipality, 21/05/2019;
- Councilor Fillies, Ward 8, 21/05/20-19 (telephonic).

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);
- Kai !Garib Local Municipality Integrated Development Plan (IDP) (2017-2022);
- Green Jobs Study (2011), IDC, DBSA Ltd and TIPS;
- Independent Power Producers Procurement Programme (IPPPP): An Overview (2017), Department of Energy, National Treasury and DBSA;
- Powering the Future: Renewable Energy Roll-out in South Africa (2013), Greenpeace South Africa.

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

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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.



Signature of the specialist:

Tony Barbour Environmental Consulting and Research

Name of company (if applicable):

2 April 2020

Date: