

SOCIAL IMPACT ASSESSMENT
FOR
190 MW BRAKPAN 1 PHOTOVOLTAIC
SOLAR ENERGY FACILITY
WESTERN CAPE PROVINCE

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Prepared for

SAVANNAH ENVIRONMENTAL

By

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EXECUTIVE SUMMARY

INTRODUCTION AND LOCATION

Brakpan 1 Solar Energy Facility (Pty) Ltd. is proposing to establish the Brakpan 1 190 MW Photovoltaic (PV) Solar Energy Facility (SEF) and associated infrastructure located approximately 70 km to the south west of the town of Beaufort West in the Beaufort West Municipality (BWM) in the Western Cape Province. The Brakpan 1 SEF forms part of a cluster known as the Poortjie Wes Cluster (the "Cluster"), which entails the development of six (6) solar energy facilities. The site is located within the Beaufort West Renewable Energy Development Zone (REDZ).

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 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 refer to renewable energy. Renewable energy is also supported at a provincial and local municipal level. The proposed site is also located within the Beaufort West REDZ. The area has therefore been identified as suitable for the establishment of large-scale solar energy facilities and associated infrastructure. The BWM IDP and SDF also support the development of renewable energy.

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 will extend over a period of 14-18 months and create approximately 250 employment opportunities. The total wage bill for the construction phase is estimated to be in the region of R 40 million (2022 Rand value). The majority of the employment opportunities, specifically the low and semi-skilled opportunities, are likely to be available to local residents in the area, specifically residents from Beaufort West. The majority of the beneficiaries are likely to be historically disadvantaged (HD) members of the community. This would represent a significant positive social benefit in an area with limited employment opportunities. However, in the absence of specific commitments from the developer to employ local contractors the potential for meaningful skills to local employment targets the benefits for

members from the local communities may be limited. In addition, the low education and skills levels in the area may also hamper potential opportunities for local communities.

The potential benefits for local communities are confirmed by the findings of the Overview of the IPPPP undertaken by the Department of Energy, National Treasury and DBSA (June 2020). The review found that by the end of June 2020 the construction phase of the 68 renewable energy projects that had been successfully completed had created 33 449 job years¹ of employment, compared to the anticipated 23 619. This was 42% 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 1-1.5 billion (2022 Rand value). A percentage of the wage bill will also be spent in the local economy which will create opportunities for local businesses in Beaufort West. 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. Table 1 summarises the significance of the impacts associated with the construction phase.

¹ 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 / Enhancement	Significance With Mitigation / Enhancement
Creation of employment and business opportunities	Medium (+)	Medium (+)
Presence of construction workers and potential impacts on family structures and social networks	Medium (-)	Low (-)
Influx of job seekers	Low (-)	Low (-)
Safety risk, stock theft and damage to farm infrastructure associated with presence of construction workers	Medium (-)	Low (-)
Increased risk of veld fires	Medium (-)	Low (-)
Impact of construction activities and vehicles	Medium (-)	Low (-)
Loss of farmland	Medium (-)	Low (-)

OPERATIONAL PHASE

Potential positive impacts

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

Development of renewable energy infrastructure

The establishment of renewable energy infrastructure, such as the proposed 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.

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, but 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 be ~ 20. The majority of low and semi-skilled beneficiaries are likely to be HD members of the community. Given the location of the proposed facility the majority of permanent staff is likely to reside in Beaufort West.

Procurement during the operational phase will also create opportunities for the local economy and businesses. In this regard the overview of the IPPPP (June 2020) 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 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 O&M activities. In this regard, O&M 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.
- Support for SMME's.

The 2020 IPPP Overview notes that the SED contributions associated with the 68 IPPs has to date has amounted to R 1.2 billion. The province with the highest SED contribution has been the Northern Cape Province, followed by the Eastern Cape and Western Cape. 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 R1.2 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.

The long-term duration of the contributions from the SEF also enables local municipalities and communities to undertake long term planning for the area. Experience has, however, shown that Community Trusts can be mismanaged. This issue will need to be addressed in order to maximise the potential benefits associated with the establishment of a Community Trust or other community benefit structure (entity). The REIPPPP 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 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. Table 2 summarises the significance of the impacts associated with the operation phase.

Table 2: Summary of social impacts during operational phase

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

CUMULATIVE IMPACTS

Cumulative impact on sense of place

The Poortjies Wes Cluster involves the establishment of seven SEFs. 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 therefore exists. The significance of the impact is rated as **Medium Negative**. However, the proposed site is also located within the Beaufort West REDZ. The area has therefore been identified

as suitable for the establishment of large-scale solar energy facilities and associated infrastructure.

Cumulative impact on services

The establishment of the proposed SEF and the other REFs in the BWM may place pressure on local services, specifically medical, education and accommodation. This pressure will be associated with the potential 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. With effective mitigation the impact is rated as **Medium Negative**.

In addition, 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 renewable energy as an economic driver in the area.

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 BWM, 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 Community Trusts associated with each project will also create significant socio-economic benefits. These benefits should also be viewed within the context of the limited economic opportunities in the area and the impact of the decline in the mining sector in recent years. This benefit is rated as **High Positive** with enhancement.

DECOMMISSIONING

The number of people employed during the operational phase will be in the region of ~ 20. The potential negative social impacts on these employees as a result of decommissioning of the facility can be effectively managed through the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be **Low Negative**.

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 producers 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 Western Cape Province and South Africa. Foregoing the proposed SEF development would therefore not necessarily compromise the development of renewable energy facilities in the

Western Cape or South Africa. However, the socio-economic benefits for the BWM would be forfeited.

The site is also located within the Beaufort West REDZ. The area has therefore been identified as being suitable for the establishment of renewable energy facilities and associated infrastructure.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The findings of the SIA indicate that the development of the proposed 190 MW Brakpan 1 PV SEF and associated infrastructure will create employment and business opportunities for locals in the BWM during both the construction and operational phase of the project.

The establishment of a Community Trust will also benefit the local community. The enhancement measures listed in the report should be implemented in order to maximise the potential benefits. The significance of this impact is rated as **High Positive**. The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the negative environmental and socio-economic impacts associated a coal-based energy economy and the challenges created by climate change, represents a significant positive social benefit for society as a whole. The findings of the SIA also indicate that the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) has resulted in significant socio-economic benefits, both at a national level and at a local, community level. These benefits are linked to foreign Direct Investment, local employment and procurement and investment in local community initiatives. The proposed site is also located within the Beaufort West REDZ. The area has therefore been identified as suitable for the establishment of large-scale solar energy facilities and associated infrastructure. The establishment of the proposed 190 MW Brakpan 1 PV SEF and associated infrastructure including a battery energy storage system (BESS) is therefore supported by the findings of the SIA.

Recommendations

The enhancement and mitigation measures outlined in the SIA and other key specialist reports should be implemented.

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 1.5, Annexure A
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Section 1.6, Annexure B
(c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 1.1, Section 1.2
(cA) an indication of the quality and age of base data used for the specialist report;	Section 1.2, Section 3,
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 4
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Interviews in 2021 (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, Annexure B
(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, Section 5,
(g) an identification of any areas to be avoided, including buffers;	Section 4
(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 Visual Impact Assessment (VIA)
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 1.4,
(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, Section 5
(k) any mitigation measures for inclusion in the EMPr;	Section 4
(l) any conditions for inclusion in the environmental authorisation;	Section 4, Section 5
(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
(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	Comply with the Assessment

<p>specialist report, the requirements as indicated in such notice will apply.</p>	<p>Protocols that were published on 20 March 2020, in Government Gazette 43110, GN 320. This specifically includes Part A, which provides the Site Sensitivity Verification Requirements where a Specialist Assessment is required but no Specific Assessment Protocol has been prescribed. As at September 2020, there are no sensitivity layers on the Screening Tool for Socio-economic-features. Part A has therefore not been compiled for this assessment.</p>
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ACRONYMS

BESS	Battery Energy Storage System
BWM	Beaufort West Municipality
CKDM	Central Karoo District Municipality
DEA&DP	Department of Environmental Affairs and Development Planning
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
IDP	Integrated Development Plan
IPP	Independent Power Producer
kV	Kilovolts
LED	Local Economic Development
LM	Local Municipality
Mtoe	Million tonnes of oil equivalent
MW	Megawatt
PGWC	Provincial Government Western Cape
REDZ	Renewable Energy Development Zone
REIPPPP	Renewable Energy Independent Power Producers Procurement Programme
SEF	Solar Energy Facility
SDF	Spatial Development Framework
SIA	Social Impact Assessment

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SECTION 1: INTRODUCTION

1.1 INTRODUCTION

Brakpan 1 Solar Energy Facility (Pty) Ltd. is proposing to establish the Brakpan 1 190 MW Photovoltaic (PV) Solar Energy Facility (SEF) and associated infrastructure located approximately 70 km to the south west of the town of Beaufort West in the Beaufort West Municipality (BWM) in the Western Cape Province (Figure 1.1). The Brakpan 1 SEF forms part of a cluster known as the Poortjie Wes Cluster (the "Cluster"), which entails the development of six (6) solar energy facilities. The site is located within the Beaufort West Renewable Energy Development Zone (REDZ).

Tony Barbour was appointed to undertake a specialist Social Impact Assessment (SIA) as part of the Basic Assessment (BA) process.

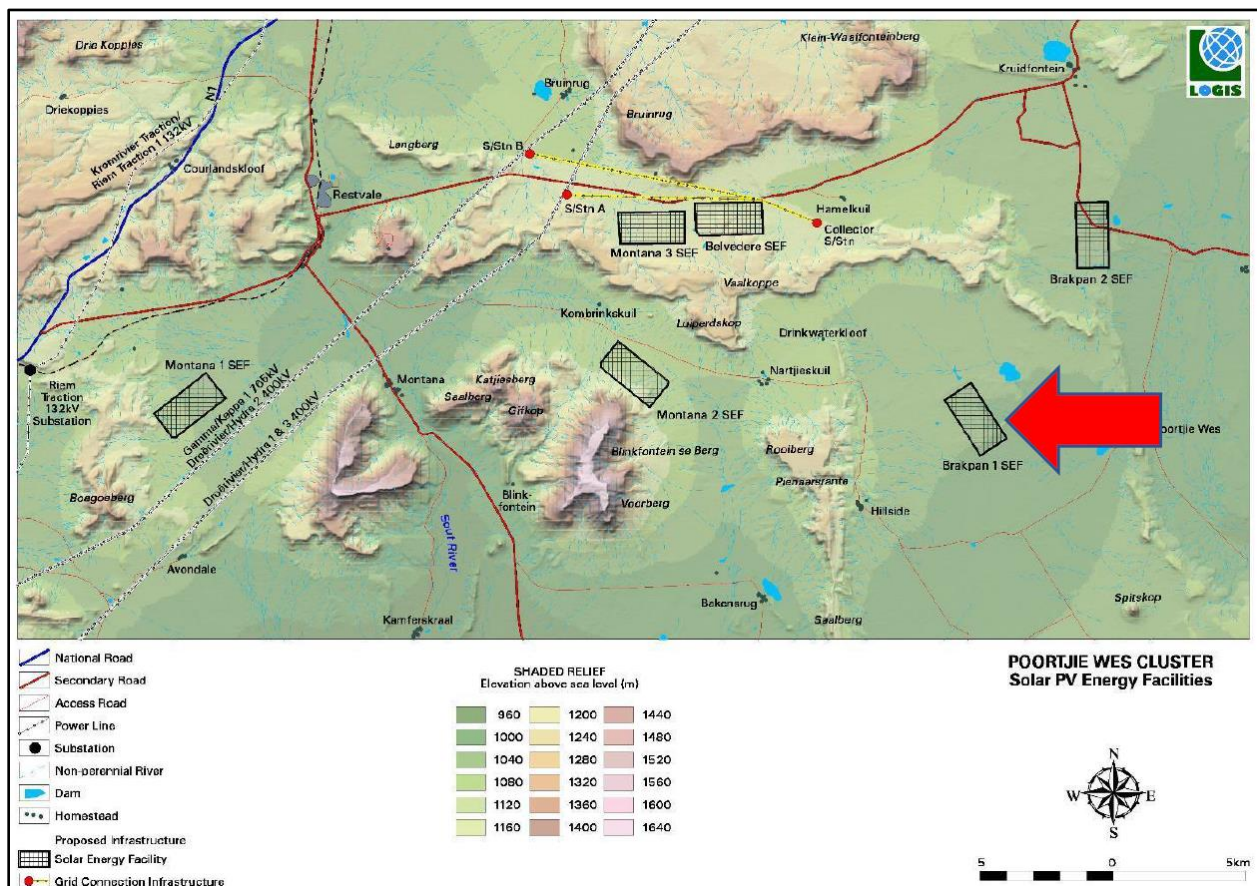


Figure 1.1: Location Brakpan 1 190 MW PV Solar Energy Facility (red arrow)

1.2 TERMS OF REFERENCE AND APPROACH TO STUDY

The terms of reference for the SIA require:

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

The approach to the SIA is based on the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) Guidelines for Social Impact Assessment (DEA&DP, 2007). The key activities in undertaken as part of the SIA process as embodied in the guidelines included:

- 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.
- Site visit.
- Semi-structured interviews with key stakeholders and affected individuals and communities.
- Assessing and documenting the significance of social impacts associated with the proposed intervention.
- Consideration of other renewable energy projects that may pose cumulative impacts; and
- Identification of enhancement and mitigation measures aimed at maximizing opportunities and avoiding and or reducing negative impacts.

The identification of potential social issues associated with the proposed project 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.

1.3 PROJECT DESCRIPTION

Brakpan 1 Solar Energy Facility (Pty) Ltd. the ("Independent Power Producer") proposes to develop the Brakpan 1 solar energy facility and its associated electrical infrastructure the "Project/Facility") approximately 15km south-east-west of Nelspoort and 60km north-east of Beaufort West within the Central Karoo District Municipality in the Western Cape Province. The Project site is located within the Beaufort West Renewable Energy Development Zone ("REDZ 11") and the Central Transmission Corridor. The facility is to be developed with a maximum installed capacity of 220 MW and will have a generating capacity of 190 MW. The Project is earmarked for submission into the South African Government's Renewable Independent Power Producer Procurement Programme ("REIPPPP") or for a Private off-take.

Brakpan 1 Solar Energy Facility is part of a cluster known as the Poortjie Wes Cluster (the "Cluster"). The Cluster entails the development of six (6) solar energy facilities. All six (6) renewable energy ("RE") facilities will connect to the proposed 132kV Belvedere Collector Switching Station (the "Collector Switching Station") via 132kV Overhead Lines ("OHLs"). The

proposed Collector Switching Station will connect to the new Poortjie Wes 400/132kV LILO substation ("Poortjie Wes LILO MTS") via a 132kV OHL.

A technically suitable project site of ~450ha has been identified by Brakpan 1 Solar Energy Facility (Pty) Ltd for the establishment of the PV facility. The project site is located on the properties The Farm Poortjie No. 76, in the Kamdeboo Municipality, division of Murraysburg, Western Cape Province; and Portion 2 of the Farm Belvedere Nr. 73, in the Beaufort West Municipality, division of Murraysburg, Province of the Western Cape. The development footprint for the facility allowing the facility to generate 190MWac will be approximately 395ha and will contain the following infrastructure:

Solar Facility

- PV modules (mono or bifacial) (Photograph 1.1).
- Single axis tracking structures, Fixed Axis Tracking, or Fixed Panels.
- Fixed tilt mounting structure (to be considered during the design phase of the facility).
- Galvanised steel and/or aluminium solar module mounting structures.
- Solar module substructure foundations. These will likely be drilled into the ground, filled with concrete and then have posts fixed inside them. Alternately, ramming may be used.
- 50 to 55 Central Inverter stations.

Building Infrastructure

- Offices.
- Operational and maintenance control centre.
- Warehouse/workshop.
- Panel maintenance and cleaning area.
- Ablution facilities.
- A conservancy tank for storage of sewage underground with a capacity of up to 35m³.
- Guard Houses.

Associated Infrastructure

- On-site substation building - IPP owned (including lightening conductor poles).
- Eskom switching station, to be handed over to Eskom at Commercial Operation Date ("COD") (this forms part of a separate BA).
- Battery energy storage system (BESS) (up to 500MW/500MWh) (Photograph 1.2).
- Internal distribution lines of up to 33 kV.
- Underground low voltage cables or cable trays.
- Internal gravel roads.
- Fencing.
- Stormwater channels.
- Temporary work area during the construction phase.
- Access road to site from the existing District gravel road between Nelspoort and Murraysburg No. MR 587.

Grid infrastructure to be built by the IPP will be owned and operated by Eskom Holdings (SOC) Ltd. ("Eskom"). This includes:

- An onsite Switching Station.
- A 132kV OHL from each facility's onsite Switching Station to the Collector Switching Station.
- Gravel service road beneath the 132 kV power line.

This forms part of a separate Basic Assessment (BA) process.



Photograph 1.1: Typical PV SEF facility



Figure 1.2: Example of Battery Energy Storage System (BESS)

1.4 ASSUMPTIONS AND LIMITATIONS

1.4.1 Assumptions

Technical suitability

It is assumed that the development site represents a technically suitable site for the establishment of a solar energy facility. The site is also located within the Beaufort West Renewable Energy Development Zone (REDZ). The area has therefore been identified as being suitable for the establishment of renewable energy facilities.

Strategic importance of the project

The strategic importance of promoting solar energy is supported by the national and provincial energy policies. However, this does not mean that site related issues can be ignored or overlooked.

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 Beaufort West Renewable Energy Development Zone (REDZ). The area has therefore been identified as being suitable for the establishment of renewable energy facilities.

1.4.2 Limitations

Demographic data

The information contained in some key policy and land use planning documents, such as Integrated Development Plans etc., may not contain data from Community Household Survey if 2016. However, this will not have a material impact on the findings of the study.

1.5 SPECIALIST DETAILS

Tony Barbour, the lead author of this report is an independent specialist with 28 years' experience in the field of environmental management. In terms of SIA experience Tony Barbour has undertaken in the region of 260 SIAs and is the author of the Guidelines for Social Impact Assessments for EIA's adopted by the Department of Environmental Affairs and Development Planning (DEA&DP) in the Western Cape in 2007. Tony Barbour has also undertaken the specialist SIA studies for ~ 100 renewable energy projects, including SEFs. A Copy of Tony Barbour's CV is contained in Annexure C.

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 fifteen years.

1.6 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 any vested or financial interests in the proposed SEF being either approved or rejected. Annexure D contains a signed declaration of independence by the lead author, Tony Barbour.

1.7 REPORT STUCTURE

The report is divided into five sections, namely:

- Section 1: Introduction.
- Section 2: Policy and planning context.
- Section 3: Overview of study area.
- Section 4: Identification and assessment of key issues.
- Section 5: Key Findings and recommendations.

SECTION 2: POLICY AND PLANNING CONTEXT

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 fit²” of the proposed development therefore constitutes a key aspect of the Social Impact Assessment (SIA). In this regard, assessment of “planning fit” conforms to international best practice for conducting SIAs. Furthermore, it also constitutes a key reporting requirement in terms of the applicable Western Cape Department of Environmental Affairs and Development Planning’s *Guidelines for Social Impact Assessment* (2007).

2.2 POLICY AND PLANNING ENVIRONMENT

For the purposes of the meeting the objectives of the SIA the following national, provincial and local level policy and planning documents were reviewed:

- National Energy Act (2008).
- White Paper on the Energy Policy of the Republic of South Africa (December 1998).
- White Paper on Renewable Energy (November 2003).
- Integrated Resource Plan (IRP) for South Africa (2019).
- The National Development Plan (2011).
- New Growth Path Framework (2010).
- National Infrastructure Plan (2012).
- National Integrated Energy Plan (2016)
- White Paper on Sustainable Energy for the Western Cape Province (2010).
- The Western Cape Provincial Strategic Plan 2014-2019 (2014).
- The Western Cape Land Use Planning Act, 2014.
- The Western Cape Provincial Spatial Development Framework (2014 Revision).
- The Western Cape Climate Change Response Strategy (2014).
- The Western Cape Infrastructure Framework (2013).
- The Western Cape Green Economy Strategy Framework (2013).
- The One Cape 2040 Strategy (2012).
- The Western Cape Amended Zoning Scheme Regulations for Commercial Renewable Energy Facilities (2011).
- The Western Cape Draft Strategic Plan (2010).
- Beaufort West Municipality Integrated Development Plan (IDP)(2019/2020).
- Beaufort West Spatial Development Framework (SDF)(2013).

Section 2 also provides a review of the Renewable Energy Programme in South Africa.

² 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.

2.3 NATIONAL POLICY ENVIRONMENT

2.1.1 National Energy Act (Act No 34 of 2008)

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

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

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

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

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

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

The support for renewable energy policy is guided by a rationale that South Africa has an 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 considered.

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.
- 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.
- Lower levels of availability, depending on specific conditions, especially with sun and wind based systems.

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

2.1.3 White Paper on Renewable Energy

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

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

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

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

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

2.1.4 Integrated Energy Plan

The development of a National Integrated Energy Plan (IEP)(2016) 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.
- Objective 6: Diversify supply sources and primary sources of energy.
- Objective 7: Promote energy efficiency in the economy.
- 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 consider 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 term 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.
- Where proactive and socialised investment can be made to provide time-efficient infrastructure access.

2.1.5 National Development Plan

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

2.1.6 The New Growth Path Framework

Government released the New Economic Growth Path Framework on 23 November 2010. The aim of the framework is to enhance growth, employment creation and equity. The policy's principal target is to create five million jobs over the next 10 years and reflects government's commitment to prioritising employment creation in all economic policies. The framework identifies strategies that will enable South Africa to grow in a more equitable and inclusive manner while attaining South Africa's developmental agenda. Central to the New Growth Path is a massive investment in infrastructure as a critical driver of jobs across the economy. In this regard the framework identifies investments in five key areas namely: **energy**, transport, communication, water and housing.

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

2.1.7 National Infrastructure Plan

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

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

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

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

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

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

SIP 9: Electricity generation to support socio-economic development

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

SIP 10: Electricity transmission and distribution for all

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

2.1.8 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 IRP2010, 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.
- 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		Allocation to the extent of the short term capacity and energy gap.
2020	1,433	-557				114	300			
2021	1,433	-1403				300	818			
2022	711	-844			513	400	1,000	1,600		
2023	750	-555				1000	1,600			
2024			1,860				1,600	1000		
2025						1000	1,600			
2026		-1,219					1,600			
2027	750	-847					1,600	2000		
2028		-475				1000	1,600			
2029		-1,694			1575	1000	1,600			
2030		-1,050		2,500		1000	1,600			
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	

<ul style="list-style-type: none"> Installed Capacity Committed/Already Contracted Capacity Capacity Decommissioned New Additional Capacity Extension of Koeberg Plant Design Life Includes Distributed Generation Capacity for own use 	<ul style="list-style-type: none"> 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.
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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 consider demand and supply requirements.

2.1.9 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, 2015) identified eight (8) **Renewable Energy Development Zones** (REDZs) (Phase 1 REDZs). The REDZs identified areas where large scale wind 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. On 17 February 2016, the Cabinet of the Republic of South Africa (Cabinet) approved the gazetting of Renewable

Energy Development Zones (REDZs). 8 REDZs and 5 Power Corridors have been identified. On 26 February 2021, Minister Barbara Dallas Creedy, published Government Notice No. 142, 144 and 145 in Government Gazette No. 44191 which identified 3 additional REDZs (Phase 2 REDZs) for implementation as well as the procedures to be followed when applying for environmental authorisation for electricity transmission or distribution infrastructure or large-scale wind and solar photovoltaic energy facilities in these REDZs. The total number of REDZ is therefore 11 (Figure 2.2). The proposed PV SEF is located within the Beaufort West REDZ.

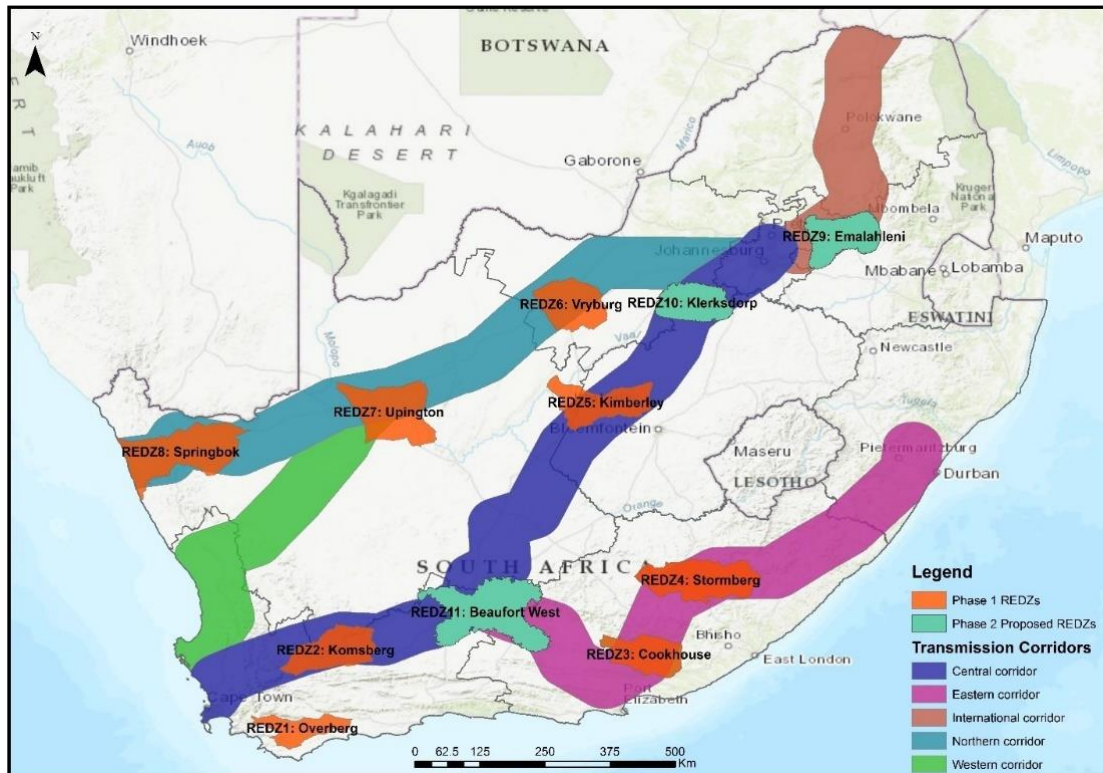


Figure 2.2: Location of Renewable Development Zones and Transmission Corridors in South Africa (Source CSIR)

2.4 PROVINCIAL POLICY AND PLANNING ENVIRONMENT

2.4.1 White Paper on Sustainable Energy for the Western Cape

The White Paper on Sustainable Energy (2010) complements the Climate Change Strategy and Action Plan, specifically by *inter alia* setting targets for renewable energy generation. The White Paper is currently in Final Draft form. Once approved by Provincial cabinet, it will constitute the formal Western Cape’s policy document on which the Western Cape Sustainable Energy Facilitation Bill will be based. The purpose of the White Paper and the envisaged Bill is to create an enabling policy environment in the Western Cape to promote and facilitate energy generation from renewable sources, as well as efficient energy use technologies and initiatives. This objective forms an integrated part of the province’s overarching energy policy objectives, namely:

- To ensure medium-term energy security, sufficient to support economic growth.
- To reduce energy poverty.

- To increase the efficient use of energy.
- To limit the greenhouse emissions footprint (associated with the use of fossil fuels).
- To decrease reliance on finite fossil fuel resources and associated unpredictable commodity markets.

The White Paper forms part of the Provincial Government of the Western Cape's (PGWC) strategy to aimed at removing a number of barriers (e.g., energy pricing, legal, institutional, low levels of investment confidence, insufficient knowledge) currently frustrating the province's energy goals by preventing the adoption and commercialization of clean energy (including electricity generation from renewable sources such as wind and solar) technologies and initiatives. The White Paper notes that, with regard to sources of renewable energy, wind and solar both represent commercially viable options in the province. The document proposes that special focus should be given to these renewables' subsectors and specific associated technologies in particular in order to achieve critical mass of installation, and thus drive down establishment costs and ensure permanent employment opportunities.

The context, vision, identified goals and targets of the White Paper are briefly discussed below:

Context

The White Paper is rooted in an integrated set of high-level provincial policy documents, and in particular, the Western Cape Provincial Growth and Development Strategy (PGDS)³ of 2007 and the Sustainable Development Implementation Plan (SDIP)⁴. These policy documents provide the overarching framework for the White Paper. Information contained in the internal Sustainable Energy Strategy (SES) document, which was prepared in 2007, largely informed the drafting of the White Paper.

Vision

The vision underpinning the White Paper, the so-called "2014 Sustainable Energy Vision for the Western Cape" is the following:

The Western Cape has a secure supply of quality, reliable, clean and safe energy, which delivers social, economic and environmental benefits to the Province's citizens, while also addressing the climate change challenges facing the region and the eradication of energy poverty (White Paper, 15).

Goals

Six goals have been identified in order to realise to this vision. These goals are grouped under economic, environmental and social sustainability categories. These goals are listed below, and each briefly discussed:

- Goal 1: alleviate energy poverty (Social sustainability): This goal is aimed at addressing energy-related under-development amongst the province's poor.

³ The main purpose of the PGDS is to provide a strategic framework for accelerated and shared economic growth in the Western Cape. The PGDS builds on the 12 iKapa strategies which were developed by the relevant PGWC line departments, including the Provincial Spatial Development Framework (PSDF), the Sustainable Development Implementation Plan (SDIP) and the Climate Change Response Strategy (CCRS).

⁴ This plan includes programmes to encourage biodiversity, effective open-space management and the better management of settlements by ensuring the sustainability of services in respect of water, waste, energy and land. The SES and White Paper both effectively form part of SDIP.

- Goal 2: Improve the health of the nation (Social sustainability): The goal is aimed at reducing health and safety risks associated with the use of fuels such as coal, paraffin, and wood, as well as the generation of electricity from fossil fuels. In this regard it is noted that use of renewable sources to generate electricity does not emit harmful substances such as smoke, or oxides of sulphur and nitrogen into the atmosphere. The document notes that improving the health of the nation includes improving the health of the individual through improved indoor climate as well as the outdoor climate.
- Goal 3: Reduce harmful emissions (Environmental sustainability): The White Paper notes that improved energy efficiency and increased use of renewable energy are cost effective methods to reduce Greenhouse Gas emissions, thereby combating Climate Change. Addressing Climate Change opens the door to utilizing additional finance mechanisms to reduce CO2 emissions.
- Goal 4: Reduce negative footprints in our environment (Environmental sustainability): The White Paper notes that the use of fossil fuels has a documented negative impact on the regional and local environment. The negative impact includes but is not limited to individual health, ground water pollution and air pollution. Any reduction in the use of fossil fuels through switching to clean(er) energy sources and more efficient energy uses is therefore desirable.
- Goal 5: Enhance energy security (Economic sustainability): The massive South African blackouts that started first in the Western Cape in early 2006 alerted the Province to its energy vulnerability. It is essential that the Western Cape increases its resilience against external energy supply disruptions and the massive price fluctuations caused by national or international decisions about energy commodities (coal, oil).
- Goal 6: Improve economic competitiveness (Economic sustainability): It has been demonstrated internationally that one of the ways to improve economic competitiveness is by improving industrial and commercial energy efficiency. Support of industrial best practice energy management as a tool to stay competitive and improve the economy is important.

Targets

The PGWC agreed to targets for electricity from renewable sources and for energy efficiency to be achieved by 2014. The purpose of the White Paper is to quantify the relevant targets, and further to provide an incremental implementation plan until 2014. In this regard, four targets have been identified. Of these, two are of direct relevance to the proposed SEF:

- Target for electricity generated from renewable sources: *15% of the electricity consumed in the Western Cape will come from renewable energy sources in 2014, measured against the 2006 provincial electricity consumption (White Paper, 21)*

In this regard, the White Paper notes that in order to reach this target, it will be necessary for the PGWC to ensure that the environment to establish and generate renewable energy is such that a minimum of 15% of the electricity can be produced, and must be consumed, from renewable sources.

- Target for reducing carbon emissions: *The carbon emissions are reduced by 10% by 2014 measured against the 2000 emission levels (p. 23).*

In this regard, the White Paper notes that achieving this target largely depends on achieving the renewables target.

Applicability

The White Paper remains the most recent document in this regard. It was adopted by Provincial Cabinet in 2010. By 2011 DEA&DP had finalized a Draft Western Cape Sustainable Energy Bill⁵. However, in MEC Bredell's Departmental Oversight Report to WC Parliament in November 2013, he indicated that further drafting of the Bill has been suspended, as the process had been overtaken by developments in national legislation⁶.

2.4.2 Western Cape Climate Change Response Strategy

The Western Cape Climate Change Response Strategy (WCCCRS) was adopted in February 2014. It is an update of the 2008 Western Cape Climate Change Response Strategy and Action Plan. The key difference with the 2008 Strategy is a greater emphasis on mitigation, including strategically suitable renewable energy development.

The 2014 WCCCRS was updated in accordance with the National Climate Change Response Policy (2013). It is strongly aligned with the overarching provincial objectives contained in the Western Cape Draft Strategic Plan 2009-2014 (2010), and the WCP 'Green is Smart' Strategy (2013). In line with the National Climate Change Response Policy, the Strategy takes a two-pronged approach to addressing climate change:

- **Mitigation:** Contribute to national and global efforts to significantly reduce Green House Gas (GHG) emissions and build a sustainable low carbon economy, which simultaneously addresses the need for economic growth, job creation and improving socio-economic conditions.
- **Adaptation:** Reduce climate vulnerability and develop the adaptive capacity of the Western Cape's economy, its people, its ecosystems and its critical infrastructure in a manner that simultaneously addresses the province's socio-economic and environmental goals (WCCCRS, 2014: 21).

The Strategy will be executed through an implementation framework which will include an institutional framework for both internal and external stakeholders, with a strong emphasis on partnerships. The framework still has to be prepared. A monitoring and evaluation system is further envisaged in order to track the transition to a low carbon and climate resilient WCP. Policy aspects dealing with mitigation are of specific relevance to renewable energy generation.

Energy and emissions baseline

Based on comprehensive 2009 data for all WCP energy use sectors, the following key findings pertain to overall WCP energy use and emissions:

- Electricity is the key fuel used in the WCP, accounting for 25% of total consumption.
- Approximately 95% of base load electricity is generated from low-grade coal and the remainder by nuclear. The vast bulk of WCP electricity is generated in the north of the country.
- In terms of emissions by sector, electricity is responsible for 55% of total WCP emissions. According to the Strategy, this supports the case for a shift towards renewables and clean energy types.

⁵ www.gov.za/departments-environmental-affairs-and-development-planning-2011-budget-speech-delivered-western-cape.

⁶ Parliament of the Province of the Western Cape - Announcements, Tablings and Committee Reports (2013) *Friday, 15 November 2013*, 202 No 69 – 2013, Fifth session, Fourth Parliament, Item B.1.b (x).

- Transport (55%) was the greatest energy user, followed by industry (33%). Although domestic consumption accounted for only 8%, it accounted for 18% of emissions, again underscoring the emission-intensive nature of electricity generation.

Mitigation potential

According to the Strategy, the main opportunities for mitigation include energy efficiency, demand-side management, and moving towards a less-emission intensive energy mix.

In the short to medium term, four areas with mitigation potential are identified, including promoting renewable energy in the form of both small-scale embedded generation as well as large scale renewable energy facilities. Together with other mitigation interventions, renewable energy generation is anticipated to result in the following socio-economic benefits:

- Reducing fuel costs to households and business.
- Improving the competitiveness of businesses.
- Job creation opportunities with the development of new economic sectors.
- Local business development.
- Improved air quality (with positive health impacts).
- Reducing the negative impact of large carbon footprints, particularly for export products.
- Reducing stress on energy needs of the province and thereby increasing energy security.

Renewable energy as strategic focus area

Initial implementation of the Strategy will focus on select focus areas aligned with the National Climate Change Response Policy Flagship Programmes and the Western Cape Green Economy Strategy Framework. These focus areas will be reviewed every five years – i.e., the next revision is due in 2019. Renewable area is identified as one of nine focus areas. The Strategy document notes that renewable energy is a key area of focus for the Western Cape and forms a fundamental component of the drive towards the Western Cape becoming the green economy hub for Africa.

The role of provincial government is identified as 'supporting the development of the renewable energy industry through promoting the placement of renewable energy facilities in strategic areas of the Western Cape as well as through supporting renewable energy industries.

The document further notes that waste-to-energy opportunities are being investigated in order to facilitate large-scale rollout. Current investigation includes understanding the most appropriate technologies for waste-to-energy projects as well as developing decision support tools for municipalities to implement waste-to-energy programmes).

Priority areas identified for renewable energy development:

- Development of the Renewable Energy economy in the WCP, in terms of both the appropriate placement of renewable energy as well as manufacturing opportunities.
- Development of waste-to-energy opportunities for both municipal and private sector (commercial and industrial) waste systems.
- Development of opportunities around small-scale renewable energy embedded generation activities.

2.4.3 Provincial Strategic Plan 2014-2019

The Western Cape Provincial Strategic Plan (WCPSP) was adopted by Cabinet in 2014. It builds upon the 2009-2014 Draft Provincial Strategic Plan ('Building an Open Opportunity

Society for All') which formed the overarching strategic framework during the incumbent provincial government's first term in office. The WCPSP 2014-2019 sets out the overarching vision and priorities for its second term in office, i.e. until 2019.

The vision statement for the 2014-2019 Plan is 'a highly skilled, innovation-driven, resource-efficient, connected, high-opportunity society for all'. It is hoped that the systems, structures, and budgets which were put in place during the first term would help facilitate implementation of the new Plan. At the same time, the current Plan reflects provincial government's (PGWC) shift from a 'silo-based' (single department) to a transversal (cross-cutting) approach to government. The five strategic goals identified for the 2014-2019 period are:

- Creating opportunities for growth and jobs.
- Improving education outcomes and opportunities for youth development.
- Increasing wellness and safety and tackling social ills.
- Enabling a resilient, sustainable, quality, and inclusive living environment.
- Embedding good governance and integrated service delivery through partnerships and spatial alignment.

Five sets of performance indicators are identified to evaluate implementation of strategies aimed at meeting these goals. In addition, the Plan identifies a number of 'game changers' which would help tackling provincial development issues, and result in palpable 'real' change. It envisages that action plans would be prepared by 2015/2016 for each of these identified 'game changers'. The 'game changers' are clustered around three priority areas. Key aspects of the Plan pertaining to renewable energy are discussed below.

Strategic Goal 1: Energy security as 'game changer'

Economic growth/ job creation (Strategic Goal 1) is one of the 3 priority development areas. Achieving Energy security is identified as one of two 'game changers' for fostering this. In this regard, the Plan notes that inadequate electricity supplies over the next five years and beyond threaten to be a significant impediment to growth. A number of strategic priorities are identified to address the issue, including the development of a WCP green economy. The Plan notes that PGWC has prioritized the development of a green economy, with the further aim of establishing it as the green economy hub of Africa.

The Plan further notes that the WCP has already established itself as the national renewable energy hub. In that regard, it is home to developers which have developed more than 60% of the 64 successful projects in the first three rounds of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), as well as a wide array of firms that provide key support services for the industry (engineering and environmental consultancies, legal advisors, etc.). The WCP has also seen the majority of local manufacturing investments. Three of the 4 PV manufacturers that have been successful in supplying to the REIPPPP projects are located in Cape Town, whilst 2014 also saw major global players opening manufacturing facilities for inverters and wind turbine towers.

Future energy security priorities include scaling up renewable energy generation in the province, including embedded generation such as rooftop solar PV, and the importation of liquid natural gas as an alternative power source to support further rollout of renewable energy and low carbon fuel switching (WCPSP, 2014: p.21).

Strategic Goal 4: Reducing greenhouse emissions and improving air quality

The Plan notes that PGWC is committed to improving the resilience, sustainability, quality and inclusivity of the urban and rural settlements. The Plan further notes that while some resource

conservation and management improvements have been made, the WCP resource base remains under severe pressure.

Water, energy, pollution and waste, transport and resource-use inefficiencies are leading to extensive environmental degradation, poor air quality, loss of biodiversity and agricultural resources, which result in a deterioration of social and economic conditions. These challenges are further exacerbated by population growth and climate change impacts. It is anticipated that climate change will worsen air quality, as its effects will slow air circulation around the world, resulting in an increase in the frequency and severity of disasters (e.g., fires, floods, and coastal erosion) (WCPSP, 2014: p. 35).

Strategic outcomes pursued under Goal 4 include the enhanced management and maintenance of the ecological and agricultural resource-base; sustainable and integrated urban and rural settlements; and an improved climate change response.

Four outcomes are prioritized, including reduced greenhouse gas emissions and improved air quality. In this regard, the Plan notes that, as air quality and climate change are integrally linked, activities such as reducing fossil fuel burning will address both these priorities (WCPSP, 2014: p. 36). The Plan does not discuss reduced fossil fuel burning or renewable energy in any further detail.

In terms of interventions for air quality management, the Plan refers to the Western Cape Air Quality Management Plan (WCAQMP). The WCAQMP (2010) and associated working groups focus on key interventions relating to governance and integrated management of air quality, climate change, town and regional planning and transport planning. The WCAQMP does not address renewable energy generation.

2.4.4 Western Cape Land Use Planning Act

In line with the Spatial Planning and Land Use Management Act, (Act 16 of 2013), the Western Cape Land Use Planning Act 2014 (LUPA) was adopted by PGWC in April 2014. Chapter III (which deals with spatial planning matters) sets out the minimum requirements for drafting a Provincial Spatial Development Framework (PSDF) for the WCP.

Of specific relevance, Section 4 requires a PSDF to (3) 'contain at least (c) provincial priorities, objectives and strategies, dealing in particular with (iii) adaptation to climate change, mitigation of the impact of climate change, renewable energy production and energy conservation'. This requirement would apply to all future revisions of the PSDF. As such, it indicates PGWC's commitment to renewable energy production in order to respond to climate change.

2.4.5 Western Cape Provincial Spatial Development Framework

PSDFs are due for revision every five years. The 2014 Revision of the Western Cape PSDF replaces the 2009 PSDF. The 2014 PSDF was approved by MEC Bredell (Local Government, Environmental Affairs and Development Planning) in April 2014. In his Preface to the 2014 PSDF the MEC indicated that the 2014 PSDF carries the buy-in of all the Provincial departments to inform and guide their sector planning/spatial development strategies and is therefore 'owned' by all Heads of Department (PSDF, p.2).

While it builds on and continues to incorporate the key principles and spatial policies of the 2009 PSDF, the new PSDF replaces the 2009 one as policy framework. A number of reasons necessitated this replacement. These include the fact that the 2009 PSDF was drafted in a

climate of economic buoyancy before the global recession had hit home. The 2009 PSDF also had to be updated in line with new policy such as the One Cape 2040 vision, LUPA, and the National Development Plan (NDP), as well as the results of the 2011 Census. Finally, the 2014 PSDF reflects PGWC's new transversal (cutting across departments) approach to government, while providing greater clarity about planning responsibilities of the three spheres of government.

The new PSDF is based on a set of 5 guiding principles, namely:

- Spatial justice.
- Sustainability and resilience.
- Spatial efficiency.
- Accessibility.
- Quality and Livability.

Under Sustainability and resilience, the PSDF notes that land development should be spatially compact, resource-frugal, compatible with cultural and scenic landscapes, and should not involve the conversion of high potential agricultural land or compromise ecosystems (p. 22). The 2004 Growth Potential Study was also revised in 2013 as part of the PSDF process⁷.

Key spatial challenges are outlined in Chapter 2 of the PSDF. Energy security and climate change response are identified as key high-level future risk factors. The PSDF notes that the WCP is subject to global environmental risks such as climate change, depletion of material resources, anticipated changes to the global carbon regulatory environment, and food and water insecurity. The challenge would be to open up opportunities for inclusive economic growth, and decouple economic growth from resource consumptive activities (i.e. the development of a 'greener' economy, as outlined in the 2013 WCP Green is Smart strategy – see further below).

In this regard, the 2014 PSDF is in response to a number of associated escalating risks, including understanding the spatial implications of known risks (e.g., climate change and its economic impact and sea level rise, flooding and wind damage associated with extreme climatic events); and energy insecurity, high levels of carbon emissions, and the economic impacts of the introduction of a carbon tax (p. 27).

The spatial agenda for the WCP is set out in Chapter 2.6. This agenda is anticipated to deliver on the objectives of greater inclusivity, growth and environmental resilience. The agenda may be summarized as three linked sub-agendas, all addressed in the PSDF:

- (1) Growing the WCP economy in partnership with the private sector, non-governmental and community-based organisations.
- (2) Using infrastructure investment as primary lever to bring about the required urban and rural spatial transitions, including transitioning to sustainable technologies, as set out in the 2013 Western Cape Infrastructure Framework (WCIF), while also maintaining existing infrastructure.
- (3.) Improving oversight of the sustainable use of the Western Cape's spatial assets. This sub-agendum is of specific relevance to climate change response and renewable energy. Its key objective is safeguarding the biodiversity networks, ecosystem services,

⁷ eadp-westerncape.kznsshf.gov.za/sites/default/files/news/files/2013-10-15/2013-growth-potential-study-of-towns-report_0.pdf. The 2014 PSDF is informed by three additional studies, also available at the above link.

agricultural resources, soils, and water, as well as the WCP's unique cultural, scenic and coastal resources on which the tourism economy depends. In addition, it seeks to understand the spatial implications of known risks (e.g. climate change) and to introduce risk mitigation and/or adaptation measures.

Chapter 3.1 deals with the sustainable use of the WCP's assets. These are identified as Biodiversity and Ecosystem services; Water resources; Soils and Mineral resources; Resource consumption and disposal; and Landscape and scenic assets. Policies are outlined for each of these themed assets. The last two themed assets are of specific relevance with regard to renewable energy.

Key challenges facing the WCP are identified as matters pertaining to waste disposal, air quality, energy, and climate change.

Energy

With regard to energy use, the PSDF notes that the Cape Metro (albeit the province's most efficient user) and West Coast regions are the WCP's main energy users. It further notes that the WCP's electricity is primarily drawn from the national grid, which is dominated by coal-based power stations, and that the WCP currently has a small emergent renewable energy sector in the form of wind and solar generation facilities located in its more rural, sparsely populated areas. The PSDF also reiterates PGWC's commitment to shifting the economy towards gas⁸ as transitional fuel (see WCIP below). Most of the energy discussion in the PSDF is dominated by aspects pertaining to natural gas.

With regard to renewable energy, the following policy provisions are of relevance:

- Policy R.4.6: *Pursue energy diversification and energy efficiency in order for the Western Cape to transition to a low carbon, sustainable energy future, and delink economic growth from energy use.*
- R.4.7: *Support emergent Independent Power Producers (IPPs) and sustainable energy producers (wind, solar, biomass and waste conversion initiatives) in suitable rural locations (as per recommendations of the Strategic Environmental Assessments for wind energy (DEA&DP) and renewable energy (DEA))⁹.*

Unlike the 2009 PSDF, the new PSDF does not provide any spatial provisions with regard to REF or transmission line infrastructure. Instead, such determination is envisaged in terms of the WCP WEF SEA, the DEA REF SEA, municipal SDFs, etc.

In this regard the two policy directives contained in the 2009 PSDF that had a direct relevance for SEFs are not contained in the 2014 revision, namely:

- *HR26 (...) transmission lines (...) should be aligned along existing and proposed transport corridors rather than along point to point cross-country routes. (Mandatory directive).*
- *HR27 Wind farms should be located where they will cause least visual impact, taking into consideration the viability of the project. (Guiding directive)¹⁰*

⁸ The PSDF at present envisages mainly from offshore West Coast gas fields via a terminal at Saldanha. The PSDF refers to the potential exploitation of own shale reserves, but also to the environmental sensitivity involved.

⁹ See notes under Regional Methodology Review below.

¹⁰ Assume also applies to solar energy facilities

Climate change

Water scarcity is identified as probably the key risk associated with climate change. Essentially the same primary response objectives outlined in the 2014 Western Cape Climate Change Response Strategy (WCCCRS – see 4. below) are identified in the PSDF. These are energy efficiency, demand management and renewable energy.

Policy provisions are made with regard to climate change adaptation and mitigation. Concerning renewable energy, the following is of relevance:

- R.4.16: *Encourage and support renewable energy generation at scale.*

Landscape and scenic assets

A specialist study was undertaken into the province's cultural and scenic landscapes. This study¹¹ was one of the informants of the 2014 PSDF. It established that the WCP's cultural and scenic landscapes are significant assets underpinning the tourism economy, but that these resources are being incrementally eroded and fragmented. According to the study agriculture is being reduced to 'islands', visual cluttering of the landscape by non-agricultural development is prevalent, and rural authenticity, character and scenic value are being eroded. The mountain ranges belonging to the Cape Fold Belt together with the coastline are identified as the most significant in scenic terms and underpin the WCP's tourism economy.

A number of scenic landscapes of high significance are under threat, mainly from low density urban sprawl, and require strategies to ensure their long-term protection. These include landscapes under pressure for large scale infrastructural developments such as wind farms, **solar energy** facilities, transmission lines and shale gas development in the Central Karoo (p. 54). With regard to renewable energy, the following policy provisions are of relevance:

- R.5.6: *Priority focus areas proposed for conservation or protection include -*
 - *Rural landscapes of scenic and cultural significance situated on major urban edges and under increasing development pressure, e.g. Cape Winelands.*
 - *Undeveloped coastal landscapes under major development pressure.*
 - *Landscapes under pressure for large scale infrastructural developments such as wind farms, **solar energy** facilities, transmission lines and fracking, e.g. Central Karoo.*
 - *Vulnerable historic mountain passes and 'poorts'.*

Chapter 3.2 deals with opportunities in the WCP spatial economy, including with regard to regional infrastructure development. Essentially the same objectives are identified as in the WCIF, including the promotion of a renewable energy sector (p.61). General project-based (EIA and specialist assessment) provisions are made for evaluating the suitability of sites proposed for bulk infrastructure (Policy E.1).

¹¹ DEA&DP Winter and Oberholzer (2013). *Heritage and Scenic Resources: Inventory and Policy Framework for the Western Cape. - A Study prepared for the Western Cape Provincial Spatial Development Framework*. Draft 5. See footnote 1 above.

2.4.6 Western Cape Infrastructure Framework

The Western Cape Infrastructure Framework (WCIF)(2013) was developed by the WCP Provincial Department of Transport and Public Works in terms of the Provincial Government's mandate to coordinate provincial planning under Schedule 5A of the Constitution. The objective of the WCIF is to align the planning, delivery and management of infrastructure to the strategic agenda and vision for the Province, as outlined in the 2009-2014 Draft Provincial Strategic Plan. The One Cape 2040 and 2013 Green is Smart strategy were other key informants.

The document notes that given the status quo of infrastructure in the province, and the changing and uncertain world facing the Western Cape over the 2-3 decades a new approach to infrastructure is needed. Namely one that satisfies current needs and backlogs, maintains the existing infrastructure, and plans proactively for a desired future outcome. The 2040 vision requires a number of transitions to shift fundamentally the way in which infrastructure is provided and the type of infrastructure provided in WCP.

The WCIF addresses new infrastructure development under five major 'systems' (themes), and outlines priorities for each. Energy is one of the 'systems' identified. The document notes that a provincial demand increase of 3% per year is anticipated for the period 2012-2040. Key priorities are in matching energy generation/ sourcing with the demand needed for WCP economic growth. Additionally, the energy focus should be on lowering the provincial carbon footprint, with an emphasis on renewable and locally generated energy.

Three key transitions are identified for the WCP Energy 'system' infrastructure, namely:

- Shifting transport patterns to reduce reliance on liquid fuels.
- Promoting natural gas as a transition fuel by introducing gas processing and transport infrastructure.
- Promoting the development of renewable energy plants in the province and associated manufacturing capacity.

2.4.7 Western Cape Green Economy Strategy Framework

The Western Cape Green Economy Strategy (2013) – 'Green is Smart' - is a framework for shifting the Western Cape economy from its current carbon intensive and resource-wasteful path within a context of high levels of poverty to one which is smarter, greener, more competitive, and more equitable and inclusive. The Strategy is closely aligned with provincial development goals and the 2014 WCCCRS.

The Strategy's point of departure is that while the WCP faces significant challenges in terms of climate change and economic development. Two of the WCP's key economic sectors - both of national importance - agriculture and tourism, are vulnerable to climate change. At the same time, these challenges hold significant potential for opportunities linked to attracting investment, economic development, employment creation, and more resilient infrastructure and patterns of consumption. These opportunities are partly linked to the WCP's existing leadership in some fields of green technology, including knowledge services.

The core objective of the Strategy is to position the WCP as the lowest carbon footprint province in South Africa, and a leading green economy hub on the African continent.

The Strategy framework is made up of 5 drivers of the green economy which are market focused and principally private sector driven and supported by 5 enablers which are either public sector driven, or the product of a collaborative effort.

The five drivers are: smart mobility, smart living and working, smart ecosystems, smart agri-processing and smart enterprise. The relevant cross-cutting enablers are: finance, rules and regulations, knowledge management, capabilities, and infrastructure.

The framework also identifies priorities that would position the WCP as a pioneer and early adopter of green economic activity. These priorities have been identified in terms of the WCP being firstly, a front-runner or pioneer and secondly, an early adopter of innovations and technologies which already exist but are not widely adopted in South Africa. Some priorities are considered game-changers and are singled out as 'high level priorities for green growth'.

Three such 'high level priorities for green growth' are identified, two of which are of relevance here:

- Natural Gas and Renewables: Off-shore natural gas, potential gas baseload power plants and renewable energy IPP programme, together with a greenfield gas infrastructure, will be the game-changer for the Western Cape to be the lowest carbon province in South Africa, and achieve significant manufacturing investment.
- Green Jobs: A green growth path without job growth is unsustainable. There must be early pursuit of priorities with a high rate of job growth potential – notably rehabilitation of natural assets, responsible tourism and the waste sector.

'Under the section dealing with drivers, renewable energy is discussed under 'Smart Enterprise'. The WCP's objective in terms of this driver is to establish the WCP as a globally recognized centre of green living, working, creativity, business, and investment, and thereby attract investment, business, and employment opportunities. Based on existing comparative advantages, three key opportunities are identified, one of which is of relevance here, namely, to establish the WCP as Africa's new energy servicing hub.

In this regard, the Strategy document notes that WCP is well placed to be the most important research and servicing hub for the renewable and natural gas energy sectors in South Africa and on the African continent.

In support of this claim, it notes that the Darling Wind Energy Facility (WEF) was the first operational WEF in the country, and that a number of further WEFs and SEFs have been approved for the province under REIPPP. Estimated investment of REIPPP projects in the Western Cape in the first two rounds is just under R8 billion (wind and solar). WCP professional service firms play a leading advisory role in REIPPP projects across the country.

The WCP is further home to the country's first photovoltaic manufacturers, Tenesol/ SunPower and SolaireDirect. On the back of REIPP, AEG and jointly, Enertronica and Gefran have also established manufacturing facilities in the Cape, with growing interest from other companies. South Africa's first dedicated renewable training centre is being established in the Western Cape at the Cape Peninsula University of Technology (CPUT). The aim of the centre is to prepare a skilled labour pool for the new emerging renewable energies: wind, solar and bio. The first phase will combine theoretical and practical training for wind turbine service technicians and for solar farms. In the long run, the centre will also become a development and research facility for renewable energy.

The Strategy also notes that there are important initial opportunities in the construction of new energy infrastructure. However, the real long-term benefits lie in the servicing of operational infrastructure. In this regard, it is estimated that the annual servicing and maintenance costs of WEFs for instance amount to approximately 10% of the initial capital investment (p.36).

Public and market sector procurement are identified as some of the key enablers. The creation of a streamlined regulatory system – the reduction of ‘red tape’ – is identified as a key prerequisite for creating an enabling environment.

Under the section dealing with enablers necessary to unlock development potential, renewable energy is discussed under “Smart Infrastructure”. The Strategy document notes that existing infrastructure systems, particularly those relating to energy and transport, are carbon intensive, with high costs to the environment. Opportunities for the WCP are linked to tapping into infrastructural development funding by leveraging existing advantages.

With regard to the energy sector, the Strategy proposes that the WCP becomes an early adopter of natural gas processing and transport infrastructure and become the hub of Concentrated Solar manufacture and servicing. Natural gas is identified as the key potential ‘game changer’ of the WCP economy, and at present the best way to transition the economy to a more fully integrated renewables sector as major part of the WCP fuel mix in the long term. In this regard, the relative ease with which gas-fired stations could be activated make them an ideal supplement to less predictable wind and solar sources.

Surprisingly, WEF and Solar PV manufacture and servicing receive no specific mention, while Concentrated Solar (CSP) does. The Strategy document justly notes that while the Northern Cape Province is the best suited for CSP facilities, the WCP has strong existing research capabilities in CSP at the University of Stellenbosch (US), and the WCP’s existing manufacturing sector already has the capacity to manufacture many CSP components.

Potential opportunities of commercialisation of CSP technology for local (RSA, Africa) conditions based on US research could be substantial. This subsector is identified as an important area of collaboration between the two provinces to realise the potential benefits (p 41). The key action at this stage to initiate a WCP manufacturing and servicing centre is to lobby for support for a pilot of South African designed CSP technologies, adapted to SA conditions (p. 43).

2.4.8 One Cape 2040 Strategy

The One Cape 2040 (2012) vision was developed by the Western Cape Government, the City of Cape Town (CoCT) and the Western Cape Economic Development Partnership. It was adopted as policy by CoCT Council in 2012. It is aimed at stimulating a transition towards a more inclusive and resilient WCP economy. It seeks to set a common direction to guide planning and action and to promote a common commitment and accountability to sustained long-term progress.

The 2040 Strategy does not replace any existing statutory plans. Rather, it is intended as a basic reference point and guide for all stakeholders planning for long-term economic resilience and inclusive growth.

Six key transitions are identified which to define the necessary infrastructure-related shifts in the WCP. One of these 6 key transitions is an Ecological transition (‘Green Cape’) from an

unsustainable, carbon-intensive, resource use economy, to a sustainable, low carbon-footprint one. The development of renewable energy projects and natural gas are expected to significantly decrease the WCP's carbon footprint.

2.4.9 Western Cape Amended Zoning Scheme Regulations for Commercial Renewable Energy Facilities (2011)

Amendments to the Western Cape Land Use Ordinance (1985) (LUPO) were promulgated in 2011 in order to guide the development of commercial renewable energy generation facilities (REFs), mainly wind and solar¹². The Zoning Scheme amendments are specifically intended to provide guidance with regard to land use compatibility, and applicable development restrictions and conditions, including provision for mandatory rehabilitation post construction and final decommissioning ("abandonment" in terms of the Provincial Notice¹³). The ambit of the Regulations includes all REFs as well as associated ("appurtenant") infra/ structure(s) operated for commercial gain, irrespective of whether such feed into the electricity grid or not. The section below provides an overview of key points of relevance to the proposed SEF.

Zoning status

- In terms of zoning status, "renewable energy structures" are designated as a consent use in the zone Agriculture I.

Land use restrictions

- Restrictions with regard to height are mainly applicable to wind energy facilities (WEFs) but associated on-site buildings for all REFs are limited to a maximum of 8,5 m (ground to highest point of roof).
- Restrictions with regard to setback are only applicable to WEFs.

Establishment of a Rehabilitation Fund

- Prior to authorisation, the applicant ("owner") must make financial provision for the rehabilitation or management of negative environmental impacts, as well as of negative impacts associated with decommissioning or abandonment of the facility. Such provision should be in the form of a fund to be administered by the Municipality, and should be to the satisfaction of the competent authority (i.e. Department of Energy).

Land clearing/ erosion management

- Land clearing should be limited to areas considered essential for the construction, operation and decommissioning of an REF.
- All land cleared during construction which does not form part of the REF structural footprint, must be rehabilitated in accordance with an approved rehabilitation plan.
- Soil erosion must be avoided at all costs, and any high risk areas should be rehabilitated.

Visual impact management

- Visual and environmental impacts must be considered, to the satisfaction of the competent authority.
- Associated structures (i.e., substations, storage facilities, control buildings, etc.) must be screened from view by indigenous vegetation, and/or located underground, or be joined

¹² Province of the Western Cape (2011). *Provincial Gazette 6894, Friday 29 July 2011*; PN 189/2011 (pp. 1381-6).

¹³ "A Renewable energy structure shall be considered *abandoned* when the structure fails to continuously operate for more than one year" (§ 4(3) (m)).

and clustered to avoid adverse visual impacts. In addition, appurtenant structures must be architecturally compatible with the receiving environment.

- Lighting should be restricted to safety and operational purposes, must be appropriately screened from adjacent land units, and should also be in accordance with applicable Civil Aviation Authority requirements.

Operational management and maintenance

- REFs may not cause or give rise to any noise or pollution, deemed to be a nuisance in terms of applicable Environmental Impact Assessment (EIA) regulations or Municipal by-laws.
- The REF owner/ operator is responsible for maintaining the REF in a good condition, including with regard to painting, structural repairs, on-going rehabilitation measures (e.g., erosion), as well as the upkeep of safety and security measures.

Decommissioning management

- An REF which has reached the end of its lifespan or that has been abandoned must be removed. The owner (operator) is responsible for the removal of such structures in whole, no longer than 150 days after the date of discontinued operation, and the land must be rehabilitated to the condition it was in prior to construction of the facility.
- Decommissioning activities must include the removal of all REF structures, associated structures, as well as transmission lines; the disposal of solid and hazardous waste according to applicable waste disposal regulations; and the stabilisation and re-vegetation of the site. In order to minimise disruptive impacts on vegetation, soils, etc., the competent authority may grant approval not to remove any underground foundations or landscaping.

In conclusion, it should be noted that the relevant provisions are mandatory (compliance requirements) and would therefore have to be implemented by the proponent.

2.4.10 Western Cape Draft Strategic Plan 2009-2014

The 11 Strategic Objectives embodied in the Western Cape Draft Strategic Plan 2009-2014 (2010) ("Building an Open Opportunity Society for All") embody the key overarching strategic objectives identified by Provincial Government for its term in office from 2009-2014. Although the Draft Plan has been replaced by the WCPSP 2014-2019, it remains of relevance. In this regard, the objectives identified, and work groups established in terms of it were some of the key informants of the 2014 WCCCRS. The 2013 WCIP is also explicitly based on the Draft Plan. Of the 11 Outcomes, the following are applicable to REF projects:

- 1. Creating opportunities for growth and jobs.
- 6. Developing integrated and sustainable human settlements.
- 7. Mainstreaming sustainability and optimising resource use and efficiency.
- 9. Reducing and alleviating poverty.

According to the plan to achieve the outcomes pertaining to "Mainstreaming sustainability and optimising resource use and efficiency", key measures include:

- The promotion of energy efficiency in households, commerce, industry and all provincial offices, hospitals, and schools; a green building programme and a green low-cost housing programme to increase the chances of the poor against climate change impacts.

- Development of a wind energy sector and energy production from alternative sources as well as net metering supported by a small-scale feed-in tariff to encourage small-scale renewable energy production.

Proposed socio-economic interventions are underpinned by the Administration's beliefs that "economic growth constitutes the foundation of all successful development; that growth is driven primarily by private sector business operating in a market environment; and that the role of the state is (a) to create and maintain an enabling environment for business and (b) to provide demand-led, private sector-driven support for growth sectors, industries and businesses" (WC Department of the Premier; 2010: 8).

2.5 LOCAL LEVEL POLICY AND PLANNING

2.5.1 Beaufort West Municipality Integrated Development Plan

The vision for the BWM as set out in the IDP (2017-2022) is "Beaufort West, economic gateway in the central Karoo, where people are developed and live-in harmony together". The mission is "to reflect the will of the South African people as reflected in the Constitution and by Parliament. In so doing the municipality aims to:

- To provide excellent services to the residents of Beaufort West Municipality.
- To reduce poverty and promote the empowerment of women, youth and people living with disabilities.
- To create a crime-free, safe, and healthy environment.

The IDP lists the five Key Performance Areas, namely:

- Basic Service Delivery and Infrastructure Development (KPA 1).
- Local Economic Development (KPA2).
- Institutional Development and Municipal Transformation (KPA 3).
- Financial Viability and Management (KPA 4).
- Good Governance and Public Participation (KPA 5).

KPA 1 (Basic Service Delivery and Infrastructure Development) and KPA 2 (Local Economic Development (KPA2) are relevant to the proposed project. However, the IDP notes that the municipality does not have an LED Strategy and Implementation Plan in place.

The key challenges facing the BWM include:

- Electricity capacity constraints
- Poor maintenance of existing public facilities
- High rate of the unemployment and low household income levels.
- (Identification and implementation of more labour intensive catalytic projects)
- Sustainable Economic Growth (Speed up economic growth and transform the economy to create decent work and sustainable livelihoods, Strategy for economic growth and inclusion)

The IDP notes that the key objectives associated with KPA 2 include facilitating investment and maintenance of economic and social infrastructure to ensure infrastructure-led economic growth and development. Linked to this is the creation of an investment friendly environment to attract investment to enable growth and job creation. The proposed development has the ability to create employment and attract investment to the area.

The strategies identified to address the challenges facing the municipality include:

- Facilitate development and growth of SMME's.
- Facilitate Education and Skills Development for Cooperatives & SMME's.
- To provide SMME Support and Capacity building.

The establishment of the proposed PV SEF can assist to support these strategies. The 2017-2022 IDP was informed by a SWOT Analysis which identified a number of challenges facing the municipality of which the following are relevant to the proposed development:

- Access to technology and technological advances.
- Unable to attract skilled staff to the area.
- No formal policy on green energy.
- Rural area with low development opportunities.
- Water scarcity and high electricity costs.
- Revenue and cash constraints with high number of indigents.

The proposed development will not solve all of these challenges. However, the development can contribute towards addressing some of the challenges.

The IDP highlights the risks posed by climate change, noting that the risk is relatively high in Beaufort west Municipality as it is an arid area that has always been prone to drought situations. The sectors that are vulnerable to climate change include agriculture and tourism. In terms of renewable energy, the 2017-2022 IDP notes that innovative solutions can contribute towards growth and development of the municipality, including the introduction of solar energy. The IDP also identifies major infrastructure projects that can be implemented to develop and promote economic development in the area, including large wind and **solar** energy projects subject to appropriate guidelines and siting principles.

A number of community meetings were held as part of the review of the 2017-2022 IDP. The key issues identified in Ward 2 where the proposed project is located included:

- Housing project for Nelspoort, paving of roads, renovation of hall and sport fields.
- Upgrade of water supply infrastructure.
- Upgrading/fencing and provision of toilet and water at cemetery.
- Establishment of a service centre for pensioners.
- Upgrading of the stadium.
- Cleaning of river.
- Provision of school transport for children.

Some of these issues can inform the identification of SED allocations during the operational phase.

2.5.2 Beaufort West Municipality Spatial Development Framework

The spatial vision for the municipality set out in the 2013 Spatial Development Framework is "Wilderness tourism and transport gateway to the people, mountains and plains of the Central Karoo". The SDF notes that the implications of this vision are that the main rural economic resource outside of eco-tourism is extensive agriculture.

The growth of this resource depends on improving the carrying capacity of the land through good veld management practices. The SDF does not comment on the potential impact of

renewable energy projects on the natural environment. However, it does refer to shale gas exploration and uranium mining and the need to ensure that key areas such as CBAs, conservancies and stewardship areas and visually sensitive landscapes contributing to long term heritage and tourism opportunities should be avoided. The same principles are also likely to apply to the establishment of large renewable infrastructure developments. However, as indicated above, the site is located within the Beaufort West REDZ. The SDF was prepared in 2013 and therefore pre-dates the establishment of the REDZs in 2018.

In terms of economic function, the SDF notes that Beaufort West the most important settlement in the municipality and also plays a sub-regional role serving other small towns beyond its boundaries, particularly to the west, e.g. Victoria West, Fraserburg, and Loxton. It is also a major refuelling and service stop on the N1 highway for trucks and is an important station on the national rail route between Cape Town and Gauteng.

The SDF lists five main structuring elements, namely:

- The N1 road and adjacent rail route which is the main transport and socioeconomic artery through the municipality.
- The Nuweveld mountains to the north form an impressive scenic backdrop to the municipality. This area contains large areas of significant CBAs and most of the formal and informal conservation areas in the BWM.
- The Gamka River basin which contains the settlements of Beaufort West and Merweville. This area is used for extensive small stock farming.
- The Sout River Basin to the south-east of Beaufort West which is a large area of significantly degraded land with extremely low stock carrying capacity and low concentrations of people. The proposed project is located in the South River Basin area.
- The area to the west of Murraysburg which forms an almost separate eco and social system. It is the highest, wettest, and most fertile part of the municipality where most of the small areas of intensive farming are found, particularly in the west. In the south the landscape rises up to the Sneeuberg. It is 91kms from Graaff Reinet in the Eastern Cape and 158kms from Beaufort West. This remote location creates a significant challenge as it depends on services delivered from Beaufort West.

Figure 2.3 provides an overview of the proposed SDF concept for the BWM.

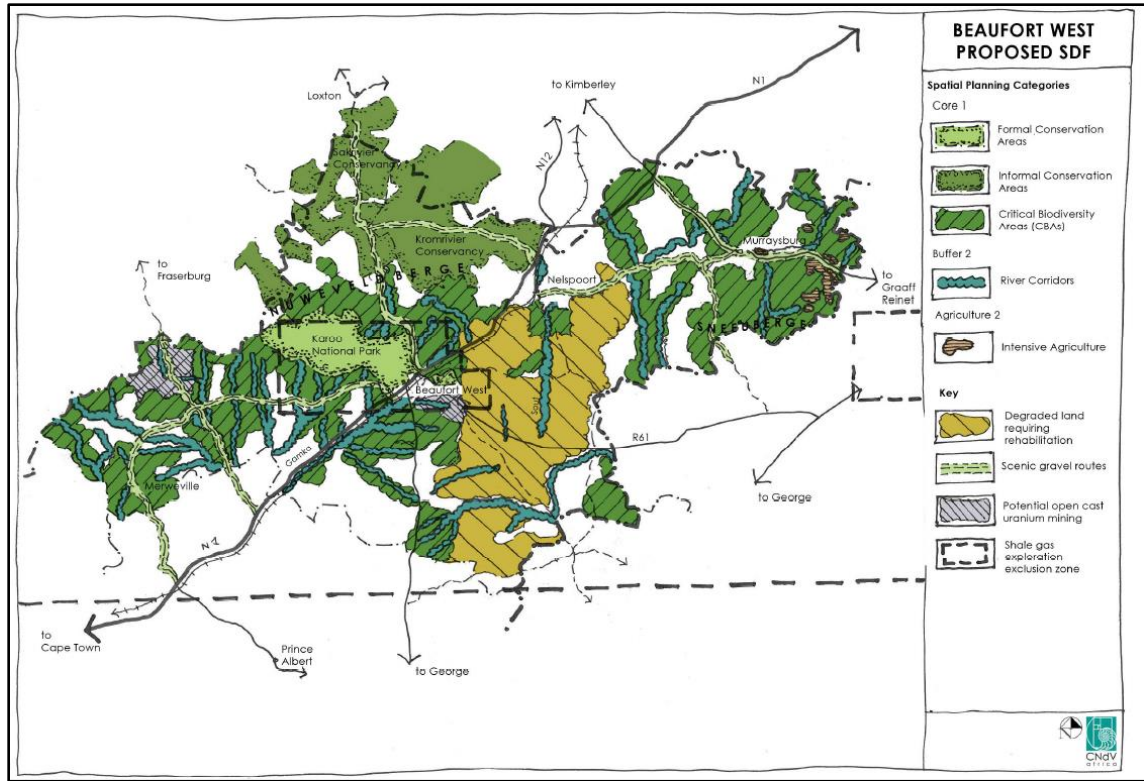


Figure 2.3: Beaufort West Municipality: Broad SDF Concept

Section 5.2.1 of the SDF lists four bio-regions that can be distinguished in terms of the natural environment and economy. Figure 2.4 illustrates the location of the bio-regions within the BWM. Table 2.1 lists the characteristics of each region, including renewable energy potential.

The bio- regions are:

- Nuweveld Highlands.
- Gamka River Basin.
- Sout River Badlands.
- Sneeuwberg Foothills.

The project is located in the Sout River Badlands, which corresponds to the Sout River Basin area (see above).

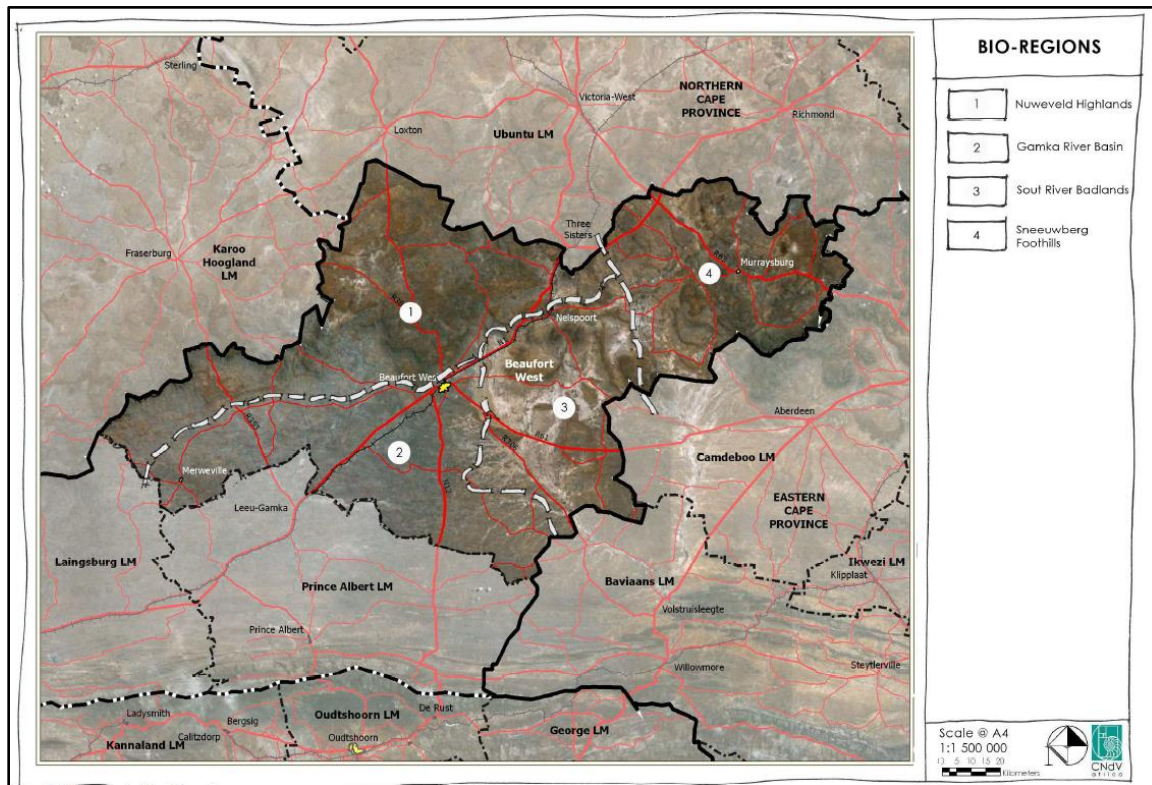


Figure 2.4: Beaufort West bio-regions

Table 2.1: Characteristics of bio-regions

	Nuweveld Highlands	Gamka River Basin	Sout River Badlands	Sneeuwberg Foothills
Altitude (m)	1250-1750	750 - 1250	750 – 1250	1250 - 2000
Population distribution	Very few rural - few – isolated farmsteads and conservation areas	Beaufort W. 40 500 Merweville 1200	Nelspoort 1300	Murraysburg 4500 Rural areas – ± 1 000
Agriculture	Stock farming	Stock farming – better quality veld	Stock farming – low carrying capacity	Mainly extensive, some dryland crops– 5 000 ha Irrigation 1000 ha
Mining	Potential open cast uranium mine on R353 Shale gas exploration except Karoo National Park.	Potential open cast uranium mine on R61 Shale gas exploration	Shale gas exploration	Shale gas exploration
Bio-diversity	Extensive CBAs Nama Karoo	Some CBAs Nama Karoo	Excessive degradation Nama Karoo and Dry Karoo Grassland	Extensive CBAs Nama Karoo
Tertiary	Eco and agri-tourism - hunting	Eco and agri-tourism – hunting, Transport, wholesale, retail and services – Beaufort West town	Possibly some eco-tourism - hunting	Eco and agri-tourism - hunting
Renewable energy potential	Fairly good solar Fairly good wind	Fairly good solar Fairly good wind	Fairly good solar Fairly good wind	Fairly good solar Fairly good wind
Hydrology	Source of numerous non-perennial in relatively undisturbed state	Gamka river basin with rivers in relatively undisturbed to disturbed state	Sout River in extremely disturbed state needing significant rehabilitation including many other non-perennial rivers in bio-region	Numerous perennial and non-perennial rivers in good condition
Landscape character	Classical steep mountain ranges forming impressive backdrop to whole municipality westwards from N1	Flat cosmic plains flowing to the south framed by Nuweberg to the north	Flat desert-like cosmic plain inclining to the south	Romantic landscape of rolling hills rising to the Sneeuwberg in south

As indicated in Table 3.1, the Sout River bio-region has “fairly good solar and wind” potential. The carrying capacity of the area is low, and the landscape is described as “flat, desert like cosmic plain inking to the south”. The largest town in the region is Nelspoort, which used to

be located on the N1 when it followed the rail line but this section has now been bypassed. This has left the village isolated.

Section 5.2.1, Natural Systems Synthesis, notes that the Annual Horizontal Solar Radiation is fairly high – 2000 – 2100 KWh/m², increasing towards the north. Similarly, wind speeds of 6 – 8m/s are also fairly high. The section notes that both these sources could be potential energy generators.

Section 5.4.1.6, Wind and Solar Farm Siting Principles, lists a set of siting principles that are proposed to be used as a first set of questions to guide potential developers of wind and solar farms. The focus is largely on wind farms. However, the following are also relevant to solar farms:

- Slopes by gradient classes.
- Rocky areas.
- Soil type and permeability.
- Natural watercourses and areas with high water table, Rainfall data.
- Vegetation types and sensitivity.
- Road layout and design – slopes to be considered in road layout to reduce erosion potential of road run-off, rock-fall and landslide potential.
- Re-vegetation – steep road verges and cuts require re-vegetation to reduce sedimentation from run-off.
- Soil types and potential for erosion.
- Soil types influence on road construction and re-vegetation.
- Surface Hydrology and Groundwater. Design of roads and treatment of runoff from roads and disturbed surfaces to reduce sedimentation and eliminate erosion.

As indicated above, the proposed project is located within the Sout River bio-region The carrying capacity of the area is low, and the landscape is described as “flat, desert like cosmic plain inking to the south”. The area appears to be well suited for the establishment of PV SEFs.

2.6 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 (June 2020), Department of Energy, National Treasury and DBSA.
- Green Jobs Study (2011), IDC, DBSA Ltd and TIPS.
- Powering the Future: Renewable Energy Roll-out in South Africa (2013), Greenpeace South Africa.
- WWF SA, Renewable Energy Vision 2030, South Africa (2014).
- Jacqueline M. Borel-Saladin, Ivan N. Turok, (2013). The impact of the green economy on jobs in South Africa), South African Journal of Science, *Volume 109 |Number 9/10, September/October 2013.*

- The potential for local community benefits from wind farms in South Africa, Louise Tait (2012), Master's Thesis, Energy Research Centre University of Cape Town.
- Market Intelligence Report: Renewable Energy (2014). Mike Mulcahy, Greencape.

2.6.1 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 June 2020.

The programme's primary mandate is to secure electrical energy from the private sector for renewable and non-renewable energy sources. With regard to renewables, the programme is designed to reduce the country's reliance on fossil fuels, stimulate an indigenous renewable energy industry and contribute to socio-economic development and environmentally sustainable growth. The IPPPP has been designed not only to procure energy but has also been structured to contribute to the broader national development objectives of job creation, social upliftment and broadening of economic ownership.

Energy supply

By the end of June 2020, 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.
- 4 276 MW of electricity generation capacity from 68 IPP projects has been connected to the national grid.
- 49 461GWh of energy has been generated by renewable energy sources procured under the REIPPPP since the first project became operational in November 2013.

Renewable energy IPPs have proved to be very reliable. Of the 68 projects that have reached COD, 64 projects have been operational for longer than a year. The energy generated over the past 12-month period for these 64 projects is 11 079GWh, which is 93% of their annual energy contribution projections (P50) of 11 882GWh over a 12-month delivery period. Twenty-eight (24) of the 64 projects (38%) have individually exceeded their P50 projections.

Energy costs

In line with international experience, the price of renewable energy is increasingly cost competitive when compared with conventional power sources. The REIPPPP has effectively captured this global downward trend with prices decreasing in every bid window. Energy procured by the REIPPPP is progressively more cost effective and has approached a point where the wholesale pricing for new coal-and renewable-generated energy intersect.

Through the competitive bidding process, the IPPPP 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 price for wind power has dropped by 50% to R0.91/kWh, with the BW4 price directly comparable with the per kWh price of new coal generation. Solar PV has dropped most significantly with a price decrease of 75% to R1.10/kWh between BW1 and BW4.

This compares with the industry estimates in April 2020 of R1.45/kWh for Medupi. Considering the on-going delays incompletion, indications are that these costs may even be significantly higher.

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 costs¹⁴), 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.

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 3% higher than the 30% target. This includes black people in local communities that have ownership in the IPP projects that operate in or near their communities and represents the majority share of total South African Entity Participation.

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 21% shareholding by black people in engineering, procurement, and construction (EPC) contractors has been attained for projects that have reached financial closure. This is higher than 20% target. The shareholding by black people in operating companies of IPPs has averaged 24% (against the targeted 20%) for the 68 projects in operation (i.e. in BW1-4).

The target for shareholding by black people in top management has been set at 40%, with an average 67% 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

¹⁴ 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)

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. If the net projected income for the first seven bid windows (BW1-BW4, 1S2 and 2S2) was structured as equal payments overtime, it would represent an annual net income of R1.34 billion per year.

Income to all shareholders only commences with operation of the facility. Revenue generated to date by the 68 operational IPPs amounts to R105 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 R81 billion has been spent to date. For construction, of the R70.2 billion already spent to date, R57.7 billion is from the 68 projects which have already been completed. These 68 projects had planned to spend R52.9 billion. The actual procurement construction costs have therefore exceeded the planned costs by 9% 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 83%, 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 84% with operations slightly lower at 74%. 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 R70.2 billion spent on procurement during construction, R59 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. The R59 billion spent on BBBEE during construction is 15% more than the R51.1 billion that had originally been anticipated by all IPPs procured.

Total procurement spend by IPPs from QSE and EMEs has amounted to R24.7 billion (construction and operations) to date, which exceeds commitments by 96% and is 30% of total procurement spend to date (while the required target is 10%). QSE and EME's procurement spend for construction was R 22 billion, which is 4.4 times the targeted spend for construction of R4.9 billion during this procurement phase.

In terms of procurement from women-owned vendors to date, 5% of total construction procurement spend has been from woman-owned vendors (against a targeted 5%), and 6% of operational procurement spend has been realised from woman-owned vendors to date, thereby exceeding the targeted 5%. In terms of construction spend, R 3.2 billion was undertaken by women-owned vendors, which is almost double the R 1.9 billion estimated for the construction of projects that have reached financial close.

The REIPPPP has therefore created significant employment opportunities for black South African citizens and local communities beyond planned targets. This highlights the importance of the programme in terms of employment equity and the creation of more equal societies.

Local Content¹⁵

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.

The documents notes that for the portfolio as a whole, the expectation would reasonably be for local content spend to fall between 25% and 65% of the total project value (considering the range of targets and minimum requirements). Local content commitments by IPPs amount to R67.6 billion or 45% of total project value (R151.1billion for all bid windows).

Actual local content spend reported for IPPs that have started construction amounts to R57.6 billion against a corresponding project value (as realised to date) of R114 billion. This means that 50% of the project value has been locally procured, exceeding the 45% commitment from IPPs and the thresholds for BW1 – BW4 (25-45%).

To date, the R57.6 billion local content spend reported by active IPPs is already 87% of the R66billion local content expected. This is with 23 projects still in construction, and 68 of the 91 active projects having reached COD (i.e. 75% of the active portfolio complete). For the 68 projects that have reached COD, local content spend has been R 46.96 billion of a committed R46.55 billion, which is 0.9 more than the planned local spend.

Leveraging employment opportunities

To date, a total of 52 603 job years¹⁶ have been created for South African citizens, of which 42 355 job years were in construction and 10 248 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 126% of the planned number during the construction phase (i.e. 33 707 job years), with 23 projects still in construction and employing people. The number of employment opportunities is therefore likely to continue to grow beyond the original expectations. By the end of June 2020, 68 projects had successfully

¹⁵ Local content is expressed as a % of the total project value and not procurement or total project costs.

¹⁶ The equivalent of a full-time employment opportunity for one person for one year

completed construction and moved into operation. These projects created 33 449 job years of employment, compared to the anticipated 23 619. This was 42% 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 91% during construction (against a target of 80%), while it was 91% during operations for BW1 – BW4 (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.

To date, 42 355 job years for SA citizens were achieved during construction, which is 26% above the planned 33 707 job years for active projects. These job years are expected to rise further since 23BW4 projects are still in or entering, construction.

In terms of benefits for local communities, significantly more people from local communities were employed during construction than was initially planned. For active projects, the expectation for local community participation was 13 284 job years. To date 22 935 job years have been realised (i.e. 73% more than initially planned), with 23 projects still in, or entering, construction. The number of black SA citizens employed during construction also exceeded the planned numbers by 53%.

Black South African citizens, youths and rural or local communities have been the major beneficiaries during the construction phases, as they respectively represent 81%, 43% 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 10% and 0.4% 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 (81%) and the early stages of operations (84%) 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 (69%) and operations (80%) has also exceeded the 30% target and minimum threshold of 18%. The share of local community members as a share of SA-based employees was 49% and 68% 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 R1.2 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.

As a percentage of revenue, SED obligations become effective only when operations commence, and revenue is generated. Of the 91 IPPs that have reached financial close (BW1–BW41), 68 are operational. The SED contributions associated with these 68 projects has amounted to R 1.2 billion to date.

In terms of ED and SED spend, education, social welfare, and health care initiatives have a SED focus. SED spend on education has been almost double the expenditure on enterprise development. This is despite enterprise development being a stand-alone commitment category in terms of the IA. This is, in part, due to the fact that some early childhood development programmes have also been incorporated in educational programmes. IPPs have supported 1 123 education institutions with a total of R312 million in contributions, from 2015 to the end of June 2020. A total of 1 142 bursaries, amounting to R183.8 million, have been awarded by 55 IPPs from 2015 until the end of June 2020. The largest portion of the bursaries were awarded to African and Coloured students (97%), with women and girls receiving 56% of total bursaries. The Northern Cape province benefitted most from the bursaries awarded, with 61%, followed by the Eastern Cape (18%) and Western Cape (14%). Enterprise development and social welfare are the focus areas that have received the second highest share of the contributions to date.

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 June 2020 a total of R 384.2 million had already been made to the local communities located in the vicinity of the 68 operating IPPs.

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. A total contribution of R355.4 million has already been made to the local communities (i.e. 93% of the total R384.2 million enterprise development contributions made to date).

Contribution to cleaner energy and water savings

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. These commitments are incorporated into the National Development Plan in Outcome 10 and sub-outcome 3. The REIPPPP contributes constructively to economic stability, energy security and environmental sustainability.

The emission reductions for the programme during the preceding 12 months (June 2019–June 2020) is calculated as 11.5 million tonnes CO₂ (MtonCO₂) based on the 1 1313 GWh energy that has been generated and supplied to the grid over this period. This represents 56% of the

total projected annual emission reductions (20.5MtonCO₂) achieved with only partial operations. A total of 50.2 Mton CO₂ equivalent reduction has been realised from programme inception to date.

The March 2019 Report also notes that since operation, the IPPs have saved 42.8 million kilolitres of water related to fossil fuel power generation. This saving will have increased with the increase in energy generated by renewable energy since 2019. 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.

2.6.2 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 considered. 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 2.2).

The study also found that energy generation is expected to become an increasingly important contributor to green job creation over time, as projects are constructed or commissioned. The international wind power industry employed almost half a million workers worldwide in 2009 – a figure that is expected to grow to over a million in five years from now, according to forecasts by the Global Wind Energy Council.

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

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

Table 2.2: 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
			Large hydro power	272	111	VL, VL, VL	VL, M, VL
	Hydro power	Micro-/small-hydro power	100	0	VL, VL, VL	N, N, N	
		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	
	Liquid fuel	Bio-fuels	Co-generation	10 789	1 050	L, M, H	M, H, H
			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	
		Energy efficient motors	-566	4	VL, VL, VL	VL, VL, VL	
	Industrial	Mechanical insulation	666	89	VL, VL, VL	VL, VL, VL	
ENERGY & RESOURCE EFFICIENCY SUB-TOTAL			67 977	2 686			
EMMISSIONS AND POLLUTION MITIGATION	Pollution control	Air pollution control	900	166	N, VL, VL	N, L, L	
		Electrical vehicles	11 428	10 642	VL, L, H	N, H, VH	
		Clean stoves	2 783	973	VL, VL, L	VL, L, M	
		Acid mine water treatment	361	0	VL, VL, VL	N, N, N	
	Carbon Capture and Storage		251	0	N, VL, VL	N, N, N	
Recycling		15 918	9 016	M, H, H	H, VH, VH		
EMMISSIONS AND POLLUTION MITIGATION SUB-TOTAL			31 641	20 797			
NATURAL RESOURCE MANAGEMENT	Biodiversity conservation & eco-system restoration		121 553	0	H, VH, VH	N, N, N	
	Soil & land management		111 373	0	VH, VH, VH	N, N, N	
NATURAL RESOURCE MANAGEMENT SUB-TOTAL			232 926	0			
TOTAL			462 567	46 049			

Notes:

- VH = very high (total employment potential > 20 000 direct jobs; manufacturing employment potential > 3 000 direct jobs);
- H = high (total employment potential > 8 000 but < 20 000; manufacturing employment potential > 1 000 but < 3 000);
- M = medium (total employment potential > 3 000 but < 8 000; manufacturing employment potential > 500 but < 1 000);
- L = low (total employment potential > 1 000 but < 3 000; manufacturing employment potential > 150 but < 500);
- VL = very low (total employment potential > 0 but < 1 000; manufacturing employment potential > 0 but < 150);

- N = negligible/none (total employment potential = 0; manufacturing employment potential = 0).

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

The study found that there was also significant potential for local involvement in the wind sector (Table 2.3). Local companies can also exploit market opportunities in other African countries with higher wind power potential. This would create additional opportunities for improving economies of scale and enhancing the local industry’s chances to succeed.

Table 2.3: Potential contribution capacity of local industries

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

The study also identifies a number of advantages associated with wind power as a source of renewable energy with a large ‘technical’ generation potential. In this regard wind energy does not emit carbon dioxide (CO₂) in generating electricity and is associated with exceptionally low lifecycle emissions. The construction period for a wind farm is much shorter than that of conventional power stations, while an income stream may in certain instances be provided to local communities through employment and land rental. The study also notes that the greenhouse gases (GHG) associated with the construction phase are offset within a short period of time compared with the project’s lifespan. Wind power therefore provides an ideal means for reaching emission reduction targets in a relatively easy manner. In addition, and of specific relevance to South Africa, wind as an energy source is not dependent on water (as compared to the massive water requirements of conventional power stations), has a

limited footprint and therefore does not impact on large tracts of land, poses limited pollution and health risks, specifically when compared to coal and nuclear energy plants.

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

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

The study notes that South Africa has higher CO₂ emissions per GDP_{PPP} (2002 figures) from energy and cement production than China or the USA (Letete, T et al). Energy accounts for 83% of the total GHG emissions (excluding land use, land use change and forestry) with fuel combustion in the energy industry accounting for 65% of the energy emissions of South Africa (DEA, 2011).

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

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

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

Within the South African context, a presentation by the South African Wind Energy Association (SAWEA) at the NERSA hearings in February 2013 indicated that in the second round of (REIPPPP) the bidding price for wind was 89c/kWh. The estimates for nominal new Eskom coal power range from NERSA's 97c/kWh to Standard Bank's estimate that Kusile will cost R1.38/kWh in 2019. In addition to being more expensive, coal-fired power stations have

fewer job creation possibilities than RE, carry future expenses due to climate change impacts, and have health expense issues due to pollution.

The Greenpeace study notes that it is not only local manufacturers and rural farmers that benefit from RE, but large-scale renewable utilities as well. The report notes that the Lake Turkana Wind Power Project (LTWP), which has a capacity of 310MW and consists of 365 turbines of 850kW, is the largest wind farm in Sub-Saharan Africa. The project is equivalent to 20% of the current installed capacity in Kenya and is the largest single private investment in Kenya's history (LTWP, 2012). At the proposed 9.9 US cents per kWh, it will be the cheapest electricity in Kenya (Kernan, 2012). Wind energy therefore creates significant opportunities for investment and the production of affordable energy without the significant environmental and socio-economic impacts associated with coal and nuclear energy options.

2.6.4 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). In 2013, the average levelised cost of electricity supplied to the grid was R0.82/kWh (Donnelly 2014), so wind-generated power has already achieved pricing parity with the grid.

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

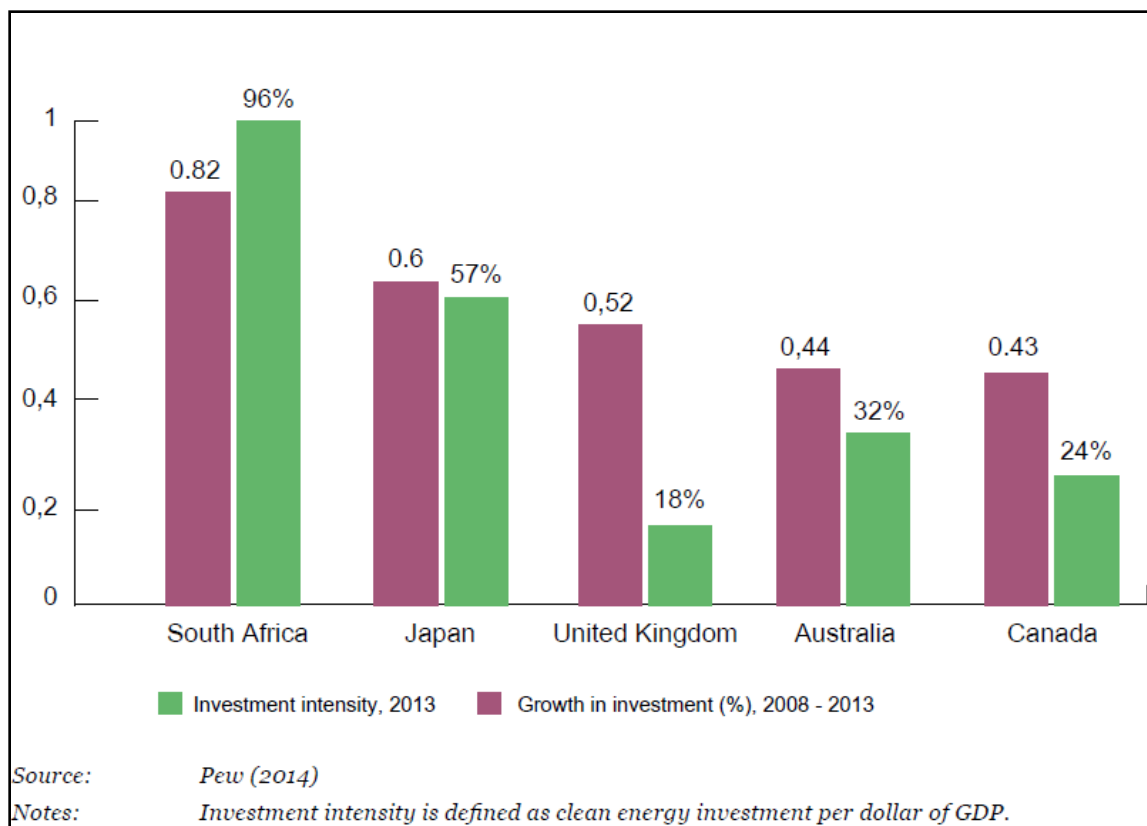


Figure 2.4: South Africa leads as a clean energy investment destination

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

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

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

- 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.

2.6.5 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. 16 Natural resource management is predicted to lead to the greatest number of these at 232 926 long-term jobs. Green energy generation is estimated to produce 130 023 long-term jobs, with energy and resource efficiency measures adding another 67 977 long-term jobs.

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

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

2.6.6 The potential for local community benefits from wind farms in South Africa¹⁷

In her thesis, Tait¹⁸ 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. The BBBEE requirements for developers as set out in the DoE's IPPPP for renewables is the primary driver for such schemes. The procurement programme, in keeping with the objective of maximising the economic development potential from this new sector, includes a specific focus on local communities in which wind farms are located.

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

¹⁷ Similar benefits are likely to be associated with solar farms.

¹⁸ 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

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.

SECTION 3: OVERVIEW OF THE STUDY AREA

3.1 INTRODUCTION

Section 3 provides an overview of the:

- The administrative context.
- The socio-economic context.
- The demographic context.
- The site and surrounding land uses.

3.2 ADMINISTRATIVE CONTEXT

The proposed PV SEF is located within the Beaufort West Municipality (BWM), which is one of three local municipalities that make up the Central Karoo District Municipality (CKDM), within the Western Cape Province (Figure 3.1). The main towns and settlements include Beaufort West, Murraysburg and Merweville. Beaufort West serves as the administrative centre of the BWM and CKDM. The proposed site is located in Ward 2.

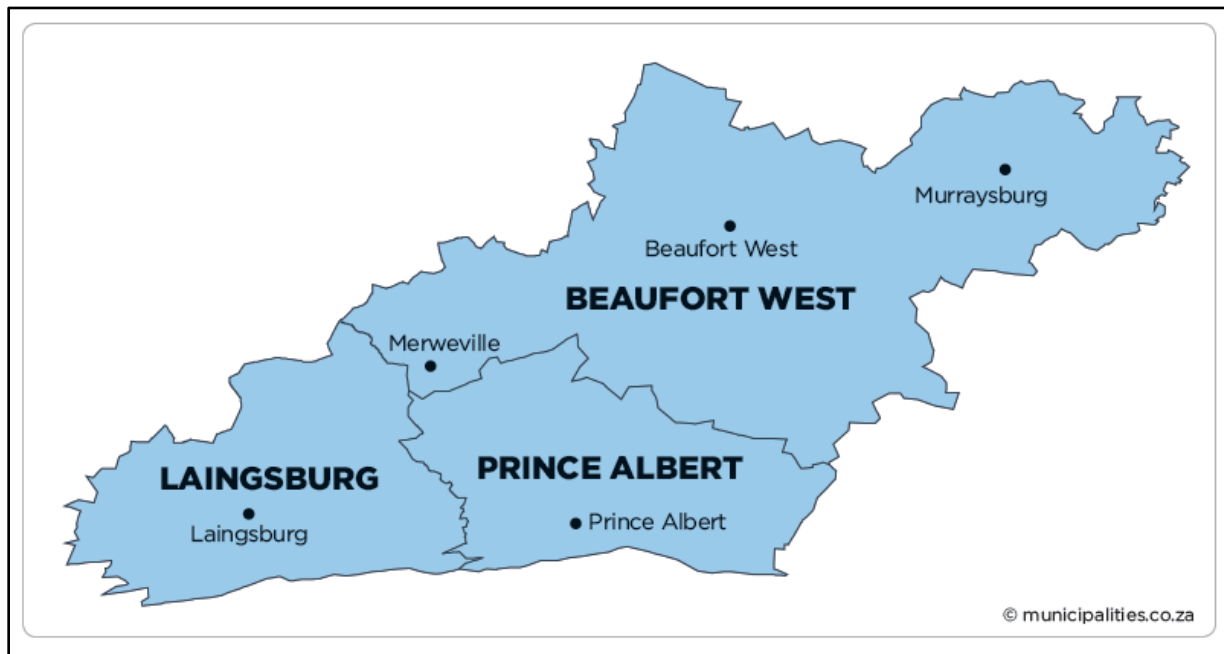


Figure 3.1: Beaufort West Municipality within Central Karoo District Municipality

3.3 DEMOGRAPHIC OVERVIEW BEAUFORT WEST MUNICIPALITY

Population

The population of the BWM in 2016 was 51 080. Of this total, 36.4% were under the age of 18, 56.7% were between 18 and 64, and the remaining 7% were 65 and older. The population of Ward 2 in 2011 was 6 975. Ward 2 is therefore a large, sparsely populated area with no large settlements. Of this total, 28.2% were under the age of 18, 64.9% were between 18 and 64, and the remaining 6.9% were 65 and older. The BWM has a relatively high percentage of people under the age of 18 and over the age of 65. This implies that a larger percentage of the population is dependent on the economically productive sector.

The dependency ratios for the BWM and Ward 2 were 76.5¹⁹ (2016) and 54% (2011) respectively. The national dependency ratio in 2011 was 52.7%, while the Western Cape Province had the lowest provincial dependency level in South Africa, namely 45% in 2011. The municipal level is therefore significantly higher than the national and provincial level.

The dependency ratio is the ratio of non-economically active dependents (usually people younger than 15 or older than 64) to the working age population group (15-64). The higher the dependency ratio the larger the percentage of the population dependent on the economically active age group. This in turn translates reduced revenue for local authorities to meet the growing demand for services²⁰.

In terms of race groups, Coloureds made up 75.1% of the population on the BWM (2016), followed by Black Africans (17.7%) and Whites, 7%. In Ward 2 (2011), Coloureds made up 60.8%, followed by Whites (27%) and Black Africans (10.8%). The main first language spoken in the BWM and Ward 2 was Afrikaans (83% and 82.9% respectively), followed by isiXhosa (13.1%) in the BWM and English (2.9%) in Ward 2.

Households and house types

There are a total number of 14 945 (2016) and 2 020 (2011) households in the BWM and Ward 2 respectively. Of these 99% (BWM) and 81.4% (Ward 2) were formal houses. Only 0.3% of structures in the BWM were shacks. The majority of dwellings in the BWM and Ward 2 are therefore formal structures. Approximately 39.8% of the households in the BWM and 24.2% of the households in Ward 2 were headed by women. The figures are lower than the district level, namely 40.8%, and similar to the provincial level (38%). Despite being lower than the district averages, women headed households tend to be more vulnerable and reflect a lack of employment opportunities in the area, which result in the men leaving to seek work in larger, urban areas.

¹⁹ The traditional approach is based on people younger than 15 or older than 64. The information provided provides information for the age group under 18. The total number of people falling within this age group will therefore be higher than the 0-15 age group. However, most people between the age of 15 and 17 are not economically active (i.e. they are likely to be at school).

²⁰ A high dependency ratio can cause serious problems for a country if a large proportion of a government's expenditure is on health, social security & education, which are most used by the youngest and the oldest in a population. The fewer people of working age, the fewer the people who can support schools, retirement pensions, disability pensions and other assistances to the youngest and oldest members of a population, often considered the most vulnerable members of society.

Household income

Based on the data from the 2011 Census, 9.9% of the population of the BWM had no formal income, 3.3% earned less than R 4 800, 5.8% earned between R 5 000 and R 10 000 per annum, 21.6% between R 10 000 and R 20 000 per annum and 23.7% between R 20 000 and 40 000 per annum (2016). For Ward 2, 8.2% of the population had no formal income, 1.9% earned less than R 4 800, 3.1% earned between R 5 000 and R 10 000 per annum, 16.3% between R 10 000 and 20 000 per annum and 19.4% between R 20 000 and 40 000 per annum (Census 2011).

The poverty gap indicator produced by the World Bank Development Research Group measures poverty using information from household per capita income/consumption. This indicator illustrates the average shortfall of the total population from the poverty line. This measurement is used to reflect the intensity of poverty, which is based on living on less than R3 200 per month for an average sized household (~ 40 000 per annum). Based on this measure, in the region of 64.3% of the households in the BWM and 48.9% in Ward 2 live close to or below the poverty line. The current figures for both the BWM and Ward 2 are likely be higher due to impact of COVID-19 pandemic on the national, provincial, and local economy.

The low-income levels reflect the reliance on season employment in the agricultural sector and limited formal employment opportunities in the BWM. This is also reflected in the high unemployment rates. 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 BWM. This in turn impacts on the ability of the BWM to maintain and provide services.

Employment

The official unemployment rate in the BWM in 2016 was 12.2%, while 44.1% were regarded as not economically active and 8.3% were discouraged work seekers. The figures for Ward 2 in 2011 were 6.2% and 37.1% respectively. These figures are significantly lower than the official unemployment 2011 rates for the Western Cape Province (21.6%) and National (29.8%). These lower rates do not however reflect seasonal unemployment which represents a significant challenge in the agricultural sector in the area.

The 2020 Socio-economic profile of the BWM prepared by the Provincial Government notes that the BWM (24.2%) had the highest unemployment area in the CKDM (22%) in 2019. The rate was also higher than the provincial rate (19.4%). The report notes that the high unemployment rate is particularly concerning given that this estimate is based on the narrow definition of unemployment i.e. the percentage of people that are able to work, but unable to find employment. In turn, the broad definition generally refers to people that are able to work, but not actively seeking employment. The current unemployment rates are likely be higher due to impact of COVID-19 pandemic on the national, provincial, and local economy.

Education

In terms of education levels, the percentage of the population over 20 years of age in the BWM and Ward 2 with no schooling was 5.5% (2016) and 6.8% (2011) respectively, compared to 2.4% for the Western Cape (2016). The percentage of the population over the age of 20 with matric was 32.3% and 28.3% respectively, compared to 35.2% for the Western Cape. The education levels in the BWM and Ward 2 are therefore marginally lower than the provincial levels. This reflects the rural nature of the area and the highlights the vulnerability of the local communities in these areas.

3.4 MUNICIPAL SERVICE LEVELS BEAUFORT WEST MUNICIPALITY

Access to water

Based on the 2016 Household Community Survey, 78.4% of households in the BWM have piped water inside their houses, while 17.7% relied on piped water in their yards. Based on the 2011 Census, 58.1% of households in Ward 2 were provided water by a service provider and 36.6% relied on boreholes. The figures for Ward 2 reflect the rural nature of the area. In addition, due to the rural, dispersed nature of the area, it is both difficult and costly to provide municipal services, hence the reliance on boreholes.

Sanitation

98% of the households in the BWM had flush toilets, while only 0.3% had no access to sanitation facilities. In Ward 2, 82.4% of households had flush toilets and 7.5% had no access to sanitation facilities.

Refuse collection

94.9% of the households in the BWM had their waste collected by a service provider on a regular basis, while 3% relied on their own dump. In Ward 2, 61% had their waste collected by a service provider on a regular basis and 30.3% relied on their own dump. The figures for Ward 2 reflect the rural nature of the area. In addition, due to the rural, dispersed nature of the area, it is both difficult and costly to provide municipal services, hence the reliance on their own dump.

3.5 SOCIO-ECONOMIC OVERVIEW BEAUFORT WEST MUNICIPALITY²¹

In 2018 the economy of the Beaufort West municipal area was valued at R2.2 billion (current prices) and employed 12 515 people. Historical trends between 2014 and 2018 indicate that the municipal area realised an average annual growth rate of 0.6%. While growth within the primary sector remained relatively stagnant between 2014 and 2018 (0.1%), the secondary and tertiary sectors grew at 0.4 and 0.8 % respectively. The economy is overall expected to contract by 1.1% in 2019. Like the rest of South Africa, economic growth in 2020 and 2021 will be negatively impacted by COVID 19. This is expected to affect each of the key economic sectors.

In terms of sectoral contributions, general government (R475.5million), transport, storage, and communication (R369.8million) and the wholesale and retail trade, catering, and accommodation (R329.3million) sectors were the main contributors to growth in the municipal area.

²¹ Based on 2020 Socio-economic Profile: Beaufort West Municipality, prepared by the Western Cape Government

The latter two sectors are however both expected to contract in 2019 (0.6 and 0.1 % respectively). Although the agriculture, forestry and fishing sector contributed a significant number of additional jobs in the CKD between 2014 and 2018 (47 jobs), it is estimated that this sector suffered the largest GDP contraction (8.7 percent) in 2019. The contribution in terms of generating new employment opportunities will therefore be limited.

3.6 OVERVIEW OF STUDY AREA

3.6.1 Introduction

The proposed development area is located in the Beaufort West Local Municipality (BWLM) of the Western Cape Province, approximately 65 km east of the town of Beaufort West. The BWLM is one of three Local Municipalities that make up the Central Karoo District Municipality (CKDM). The administrative seat of the BWLM and CKDM is Beaufort West. The town of Beaufort West, founded in 1818 on the farm Hooyvlakte at the request of the governor at the Cape, Lord Charles Somerset, was the first town to be established in the central Karoo. The town was initially named Beaufort after Henry Somerset, 5th Duke of Beaufort, who was the father of Lord Charles Henry Somerset, then governor of the Cape Colony. The town was renamed Beaufort West in 1869 to avoid confusion with Port Beaufort in the Western Cape as well as Fort Beaufort in the Eastern Cape (Wikipedia). The town and the surrounding area prospered following the introduction of Saxon Merino sheep by John Molteno, a young Anglo-Italian immigrant to South Africa. Beaufort West became the first municipality in South Africa on 3 February 1837 and had the country's first town hall. When the railroad reached the town in 1880 it became a marshalling yard and locomotive depot and today it is the largest town in the Karoo (Wikipedia).

Beaufort West is located near the headwaters of the Gamka River (a tributary of the Gourits River). The confluences of a number of Gamka tributaries – viz. the Kuils-, Hans- and Droeë Rivers – are located to the south of the town. While flow is seasonal, snowmelt from the Nuweveldberge and a number of fountains historically provided year-round water to the town and some adjacent farms. The town currently draws its water supply from a number of dams and boreholes associated with the Gamka system. These are located on municipal and privately-owned farms. The relative importance of groundwater sources has increased significantly during the current drought.

The area is arid the vegetation consists of low-growing karroid scrub, in some places complimented by grasses. Trees and large shrubs are restricted to ephemeral drainage lines and water courses. The natural grazing pattern historically favoured rainfall-induced migratory use (by plains game) over sedentary use. The region is historically a stock farming area. Sheep farming is still the dominant activity, supplemented by (angora) goats and, to a lesser extent, cattle. This is linked to low veld carrying capacities and limited habitat diversity, lack of cover and perennial water sources. Game is also farmed on a number of farms in the area.

Apart from stock farming, Beaufort West's economy is underpinned by its strategic location on the N1. Located more or less midway between Cape Town and Bloemfontein, Beaufort-West is a well-known sleep-over location for travellers on the route. The town offers a number of refuelling and repair facilities to trucks and passenger vehicles. A number of logistics operations are also based in town. Smaller shops – e.g., convenience stores and fast-food outlets – benefit from the passing trade.

The tourist accommodation sector is largely based on passing (as opposed to dedicated) visitor flows associated with the N1 route. Many guest farms around Beaufort West also offer seasonal hunting opportunities on a limited scale. Dedicated tourism is mainly associated with the Karoo National Park (NP) located to the north-west of Beaufort West. The Karoo NP is located ~ 80 km to west of the development area.

Other key roads in the study area include the N12 ('Oudshoorn Road') and the R61 ('Aberdeen Road'). The N12, which links up with Oudshoorn and George, intersects with the N1 ~2.7 km west of Beaufort West (Photograph 3.1). The R61 located approximately 36 km to the south of the site intersects with the N1 in Beaufort West (as Voortrekker Street) (Photograph 3.2) and provides a link to Aberdeen and Graaff-Reinet located to the east in the Eastern Cape Province. The R61 is a key taxi route between the Western and Eastern Cape Provinces and Beaufort West is an important stop on the route (Photograph 3.2). Traffic volumes peak over holiday periods, especially Easter weekend and Christmas season.



Photograph 3.1: Intersection of the N12 with the N1 ~3 km north of Eskom's Droeërivier MTS



Photograph 3.2: Voortrekker St/ R61 ('Aberdeen Road') from the eastern outskirts of Beaufort West



Photograph 3.3: Looking south-east down the R61

Eskom's Droeërvier Main Transfer Station (MTS) is located along the N12 ~3.8 km to the south-west of the Beaufort West built edge. Nine lines (400 kV and 132 kV) currently feed into the MTS from the west, south and east, while a tenth (765 kV) is aligned just to the north of the MTS. Five of the lines are located in two broad corridors located within 2.5 south of the built edge of Beaufort West (Photograph 3.4 and 3.5).



Photograph 3.4: Eskom's Droeërvier MTS, seen from the north from along the N12

Two smaller substations are located on the eastern outskirts of Beaufort West, namely along the N1, and near the intersection of the R61 and the Hopewell gravel road (Photograph 3.5). Two 132 kV lines (actually in- and out-feeding aspects of the same single line) are associated with both substations. The southern and south-eastern approaches to Beaufort West are therefore exposed to five major lines and two existing substations (Photograph 3.6). The relevant area is not considered of great scenic significance. This is largely linked to the largely flat and featureless landscape.



Photograph 3.5: Eskom substation located along the Hopewell Road



Photograph 3.6: Existing 2 x 400 kV line corridor traversing the R61 approximately 5.6 km south-east of Beaufort West

The town of Murraysburg, also located within the BWLM, is located approximately 40 north east of the site (Photograph 3.7). The town was founded in 1856 on a farm named Eenzaamheid (Dutch for "loneliness") and became a municipality in July 1883. The town was named after the Reverend Andrew Murray, the then DRC minister of Graaff-Reinet, and Barend O J Burger, who played a key role in the purchase of the farm Eenzaamheid and the future establishment of the town. The history of the town dates back to the latter part of the 18th century when roaming stock farmers settled in the Sneeuberg region, which fell outside any of the then existing districts of the Cape. This led to the establishment of the town of Graaff-Reinet in 1786. Murraysburg area fell within the district. When the congregation of Richmond was formed in 1843 a large portion of the Murraysburg district formed part of the new congregation. However, due to the large distance between Richmond and Graaff-Reinet

the local farmers in the area indicated that there was a need for a new town. As a result the farm Eenzaamhied was bought from Mr Kootjie Burger and the town of Murraysburg was established (Malherbe, Conradie and Pienaar, Murraysburg 150 years, 2011).

Murraysburg is situated on the R63 regional road, which links the town with the N1 to the west (~ 42km) and the town of Graaf Reinet to the east (~ 90km). The dominant land use in the study area is farming, specifically sheep, Angora goat and game farming (Photograph 1.2). Small scale irrigation linked to the production of lucerne for feedstock also takes place on farms located adjacent to rivers in the area. The small settlement of Nelspoort, with a population of 1700, is the nearest built-up area/town to the site. The settlement is located ~50 km north east of Beaufort West and 5km south east of the N1.



Photograph 3.7: Church in Murraysburg

3.6.2 Overview of the project area²²

The Visual Impact Assessment (VIA, Nuleaf, 2022) notes that the study area is located approximately 15km south-east Nelspoort and 60km north-east of Beaufort West within the Central Karoo District Municipality in the Western Cape Province. The Project site is located within the Beaufort West Renewable Energy Development Zone ("REDZ 11") and the Central Transmission Corridor.

The study area is located on flat land with an elevation of 960-1000m above sea level (a.s.l). The Rooiberg koppie is to the west and south west of the site where the elevation is 1320m a.s.l (Photograph 3.8 and 3.9). Land cover on the site itself consists predominately of

²² The description of the project area is based on the information contained in the Visual Impact Assessment (VIA) (Nuleaf, 2022).

shrubland and bare rock and soil. Scattered areas of wetlands, grassland and old fields lie to the east of the proposed site. The study area is located predominately within the Nama Karoo biome, with rainfall ranging from 123 mm -248 mm per annum. The vegetation type is classified as Gamka Karoo which is a low-lying vegetation type with small portions of Southern Karoo Riviere.

The majority of the study area is sparsely populated and consists of a landscape of wide-open expanses and extreme isolation. The scarcity of water and other natural resources has influenced settlement within this region, keeping numbers low, and distribution limited to the availability of permanent water. Settlements, where they occur, are usually rural homesteads and farmsteads. Access to the study area is via secondary roads which link with one another, providing access to farmsteads.



Source: VIA, Nuleaf 2022

Photograph 3.8: View of the site from secondary access road

Nelspoort, with a population of 1700, is the nearest built-up area/town to the site (Photograph 3.10). Other infrastructure within the study area includes the Gamma/Kappa 1 765 kV, Droerivier/Hydra 2 400 kV and Droerivier/Hydra 1 & 3 400 kV overhead power line, the Riem Traction substation and a freight railway line (Photograph 3.11). The railway line traverses the study area from the west to the north and lies north west of the proposed Belvedere SEF, while the powerlines traverse the study area from the south west to the north and transects the study area. The VIA notes that there here are no formal protected or conservation areas or major tourist attractions /resorts present within the study area. The greater environment has a largely natural and undeveloped character. In terms of visual quality of the receiving environment within the study area, the VIA states that it is high by virtue of the vast and undeveloped nature of the environment. This lends a distinct sense of place to the area. However, the VIA notes that the landscape is not unique.



Source: VIA, Nuleaf 2022

Photograph 3.9: General topography of the site with the Rooiberg in the west



Source: VIA, Nuleaf 2022

Photograph 3.10: Nelspoort settlement



Source: VIA, Nuleaf 2022

Photograph 3.11: Droerivier/Hydra powerlines

SECTION 4: ASSESSMENT OF 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 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 refer to renewable energy. Renewable energy is also supported at a provincial and local municipal level. The proposed site is also located within the Beaufort West REDZ. The area has therefore been identified as suitable for the establishment of large-scale solar energy facilities and associated infrastructure. The BWM IDP and SDF also support the development of renewable energy.

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 jobseekers.
- 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 associated with 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 is expected to extend over a period of 14-18 months and create approximately 250 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% (150) of the employment opportunities will be available to low skilled workers (construction labourers, security staff etc.), 25% (63) for semi-skilled workers (drivers, equipment operators etc.) and 15% (37) for skilled personnel (engineers, land surveyors, project managers etc.). Members from the local communities in the area, specifically Beaufort West, 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.

Given high local unemployment levels and limited job opportunities in the area, this will represent a significant, if localised, social benefit. The remainder of the semi-skilled and majority of the skilled employment opportunities are likely to be associated with the contractors appointed to construct the SEF and associated infrastructure. However, in the absence of specific commitments from the developer to maximise local employment targets the potential opportunities for local employment will be limited. In addition, the low education and skills levels in the area may also hamper potential opportunities for local communities.

The total wage bill for the construction phase is estimated to be in the region of R 40 million (2022 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 capital expenditure associated with the construction of a 100 MW PV will be in the region of R 1-1.5 billion (2022 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. Opportunities may exist for local contractors and engineering companies based in Beaufort West. However, given the technical nature of the project and high import content associated with SEFs' opportunities for the local economy in the BWM are likely to be limited.

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 40 million) will be spent in the local economy which will also create opportunities for local businesses in Beaufort West. Implementing the enhancement measures listed below can enhance these opportunities. The enhancement measures 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 BWM.

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.

The potential benefits for local communities are confirmed by the findings of the Overview of the IPPPP undertaken by the Department of Energy, National Treasury and DBSA (June 2020). The study found that to date, a total of 52 603 job years²³ have been created for South African citizens, of which 42 355 job years were in construction and 10 248 in operations. To date, 42 355 job years for SA citizens were achieved during construction, which is 26% above the planned 33 707 job years for active projects. These job years are expected to rise further since 23BW4 projects are still in or entering, construction.

In terms of benefits for local communities, significantly more people from local communities were employed during construction than was initially planned. For active projects, the expectation for local community participation was 13 284 job years. To date 22 935 job years have been realised (i.e. 73% more than initially planned), with 23 projects still in, or entering, construction. The number of black SA citizens employed during construction also exceeded the planned numbers by 53%.

Black South African citizens, youths and rural or local communities have been the major beneficiaries during the construction phases, as they respectively represent 81%, 43% 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 10% and 0.4% 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 (81%) and the early stages of operations (84%) 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 (69%) and operations (80%) has also exceeded the 30% target and minimum threshold of 18%. The share of local community members as a share of SA-based employees was 49% and 68% for construction and operations respectively – exceeding the minimum threshold of 12% and the target of 20%.

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

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		
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.

Recommended enhancement measures

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

Employment

- Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase.
- 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 BWM 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 BWM 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 BWM, 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.
- Increased exposure to COVID-19.

Non-local construction workers will be accommodated in Beaufort West. 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 and a reasonable number of the semi-skilled 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 BWM and CKDM. 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 BWM are high. The creation employment opportunities for low and semi-skilled workers from the area would therefore represent a positive socio-economic benefit. While the risks associated with construction

workers at a community level will be low, at an individual and family level they may be significant, especially in the case of contracting a sexually transmitted disease or an unplanned pregnancy. This has been borne out from the experiences with other renewable energy projects in the Northern Cape Province, for example projects located near Sutherland and 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		
Residual 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.		

Assessment of No-Go option

There is no impact as the current status quo would be maintained.

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:

- Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase.
- Preparation and implementation of a Community Health, Safety and Security Plan (CHSSP) prior to and during the construction phase.
- The SEP and CHSSP should include a Grievance Mechanism that enables stakeholders to report resolve incidents.
- 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 BWM Councillor for Ward 7, 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 and COVID-19 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. 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 main areas of concern associated with the influx of job seekers include:

- 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, the influx of job seekers is however typically associated with large construction projects that extend over a number of years. The proposed project does not represent a large construction project. The potential for the influx of job seekers is therefore likely to be low. The potential impacts 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		
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:

- Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase.
- Preparation and implementation of a Community Health, Safety and Security Plan (CHSSP) prior to and during the construction phase.

- The proponent, in consultation with the BWM, 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 and/or fences being damaged. Stock theft linked directly or indirectly to the presence of construction workers on the site also poses a risk to farming activities.

The presence of construction workers on the site increases the exposure of farming operations and livestock to the outside world, which, in turn, increased the potential risk of stock theft and crime. The potential risks (safety, livestock, and farm infrastructure) can be effectively mitigated by careful planning and managing the movement of construction on the site workers during the construction phase. 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		
Residual impacts: No, provided losses are compensated for.		

Assessment of No-Go option

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

Recommended mitigation measures

- Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase.
- Preparation and implementation of a Community Health, Safety and Security Plan (CHSSP) prior to and during the construction phase.
- 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 on the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms.
- Contractors appointed by the proponent must ensure that construction workers who are found guilty of stealing livestock and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation.
- It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.

4.3.5 Increased risk of grass fires

The presence of construction workers and construction-related activities on the site poses an increased fire risk, which could, in turn, pose a threat grazing and livestock. Due to the climate and sparseness of vegetation, the study area is not considered veld fire prone. However, all the farming operations depend on grazing and any fires would have the potential to have a significant impact on the already stressed farming operations. The potential fire risk of grass

fires is highest during the dry winter months (April-October). This period also coincides with dry, windy conditions in the area.

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		
Residual impacts: No, provided losses are compensated for.		

Assessment of No-Go option

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

Recommended mitigation measures

The mitigation measures include:

- Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase.
- Preparation and implementation of a Community Health, Safety and Security Plan (CHSSP) prior to and during the construction phase.
- 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 effectively 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 overnight.
- As per the conditions of the Code of Conduct, in the advent of a fire being caused by construction workers and or construction activities, the appointed contractors must compensate farmers for any damage caused to their farms. The contractor should also compensate the fire-fighting costs borne by farmers and local authorities.

4.3.6 Impacts associated with construction related activities

Construction activities on the site, including the movement of heavy construction vehicles, have the potential to create noise, dust, and safety impacts and damage roads, specifically unsurfaced roads. Experience from other projects also indicates that the transportation of construction workers to and from the site can result in the generation of waste along the route (packaging and bottles etc. thrown out of windows etc.). The preparation of the site and associated levelling and clearing of vegetation will expose the soil to wind and result in dust. The dust impacts will be exacerbated during windy periods. The project components are also likely to be transported to the site via the N1, N12 and R61/R63, which are key transport routes linking Gauteng and the Western and Eastern Cape. Access to the site will be via the existing District gravel road between Nelspoort and Murraysburg No. MR 587.

The transport of components to the site therefore has the potential to impact on other road users travelling along these roads, including tourists. Measures will need to be taken to ensure that the potential impacts on motorists using the N1, N12 and R61 are minimised. The potential impacts on travelers and tourists can be effectively mitigated by restricting construction traffic movements to weekdays, and, where possible, limiting activities during over holiday periods, specifically Christmas and Easter holiday periods and other long weekends. The movement of heavy construction vehicles will also damage internal farm roads and other unsurfaced public roads that may be used to access the site. The damage will need to be repaired after the completion of the construction phase.

Table 4.6: Assessment of the impacts associated with construction activities

Nature: Potential noise, dust and safety impacts associated with construction activities and movement of 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		
Residual 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.		

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:

- Preparation and implementation of a Community Health, Safety and Security Plan (CHSSP) prior to and during the construction phase.
- As far as possible, the transport of components to the site along the N1, N12 and R61 should be planned to avoid weekends and holiday periods.
- The contractor should inform local farmers and representatives from the BWM and relevant provincial road authorities of dates and times when abnormal loads will be undertaken.
- The contractor must ensure that damage caused by construction related traffic to the gravel public roads and local, internal farm roads is repaired on a regular basis throughout the construction phase. The costs associated with the repair must be borne by the contractor.
- Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis²⁴, adhering to speed limits and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.
- All vehicles must be roadworthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.
- The Contractor should ensure that workers are informed that no waste can be thrown out of the windows while being transported to and from the site. Workers who throw waste out windows should be fined.
- The Contractor should be required to collect waste along access roads on a weekly basis.
- Waste generated during the construction phase should be transported to the local permitted landfill site.
- EMPr measures (and penalties) should be implemented to ensure farm gates are closed at all times.
- EMPr measures (and penalties) should be implemented to ensure speed limits are adhered to at all times.

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 affected farm owner/s has entered into a lease agreement with the proponent for the use of the land for the proposed SEF. The impact on farm income

²⁴ Treated effluent (non-potable) water should be used for wetting of roads and construction areas

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 limited 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 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		
Residual 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.		

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

4.4 OPERATIONAL PHASE SOCIAL IMPACTS

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

Potential positive impacts

- The establishment of renewable energy infrastructure.
- Creation of employment and business opportunities. The operational phase will also create opportunities for skills development and training.
- Generation of additional income for 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 wind power as a source of renewable energy with a large 'technical' generation potential. In this regard wind energy does not emit CO₂ in generating electricity and is associated with exceptionally low lifecycle emissions. The construction period for a wind farm is much shorter than that of conventional power stations, while an income stream may in certain instances be provided to local communities through employment and land rental. The study also notes that the GHG associated with the construction phase are offset within a short period of time compared with the project's lifespan. Wind 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).

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.

Benefits associated with REIPPPP

The overview of the IPPPP (June 2020) indicates that the REIPPPP has attracted R41.8 billion in foreign investment and financing in the seven bid windows (BW1 – BW4, 1S2 and 2S2). This is more than double the inward FDI attracted into South Africa during 2015 (R22.6 billion). 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 R 29.5 billion and contributes 48% to total equity. As far as B-BBEE is concerned, Black South Africans own, on average, 33% of projects that have reached financial close, which is slightly above the 30% target.

The total projected procurement spent 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 R81 billion has been spent to date. For construction, of the R70.2 billion already spent to date, R57.7 billion is from the 68 projects which have already been completed. These 68 projects had planned to spend R52.9 billion.

In terms of employment, to date, a total of 52 603 job years²⁵ have been created for South African citizens, of which 42 355 were in construction and 10 248 in operations. Black South African citizens, youths and rural or local communities have been the major beneficiaries

²⁵ The equivalent of a full-time employment opportunity for one person for one year

during the construction phases, as they respectively represent 81%, 43% and 49% 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 9% of projects that have reached financial close. This is well above the 5% target. In addition, an average of 21% shareholding by black people in engineering, procurement and construction (EPC) contractors has been attained for the 68 projects in operation (BW1-4). This is higher than the 20% target.

The SED of wind power therefore provides an ideal means for reaching emission reduction targets in a relatively easy manner. In addition, and of specific relevance to South Africa, wind as energy source is not dependent on water (as compared to the massive water requirements of conventional power stations), has a limited footprint and therefore does not impact on large tracts of land, poses limited pollution and health risks, specifically when compared to coal and nuclear energy plants.

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 R1.2 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. The SED contributions associated with the 68 operational IPPs has to date amounted to R 1.2 billion. In terms of allocation, education, social welfare, and health care have been the main focus of SED initiatives.

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 WEF, 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	
Residual 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.	

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 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. Most 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, several 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 BWM IDP.

and businesses. In this regard the overview of the IPPPP (June 2020) notes that the operational phase procurement spend over the 20 year for BW1 to BW4, 1S2 and 2S2 is estimated to be the region of R 76.8 billion. The combined (construction and operations) procurement value is projected as R149.9 billion of which R81 billion has been spent to date. For construction, of the R70.2 billion already spent to date, R57.7 billion is from the 68 projects which have already been completed. These 68 projects had planned to spend R52.9 billion. The actual procurement construction costs have therefore exceeded the planned costs by 9% 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 O&M activities. In this regard, O&M employment linked to renewable energy generation plants will also be substantial in the longer term.

Given the location of the proposed facility most of permanent staff is likely to reside in Beaufort West. In terms of accommodation options, a percentage of the non-local permanent employees may purchase houses, while others may decide to rent. Both options would represent a positive economic benefit for the region. A percentage of the monthly wage bill earned by permanent staff will be spent in the regional and local economy. This will benefit local businesses in the relevant towns. The benefits to the local economy will extend over the anticipated 20-year operational lifespan of the project. The local hospitality industry is also likely to benefit from the operational phase. These benefits are associated with site visits by company staff members and other professionals (engineers, technicians etc.) who are involved in the company and the project but who are not linked to the day-to-day operations.

Table 4.9: 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		
Residual 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		

Assessment of No-Go option

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

Recommended enhancement measures

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

4.4.3 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 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 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 contributions

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 68 IPPs has to date amounted to R 1,2 billion, with a total contribution of R23.1 billion (across seven bid windows) committed to SED initiatives. Assuming an even, annual revenue spread, the average contribution per year would be R1.2 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.

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 June 2020 a total of R 384.2 million had already been made to the local communities located in the vicinity of the 68 operating IPPs.

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

Based on the findings of the review it is clear that the establishment of Community Trusts associated with renewable energy projects create significant benefits for local rural communities. In addition to the benefits for local communities, the establishment of a WEF

has a limited impact on the current agricultural land uses that underpin the local economic activities in the area and consumes 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. In addition, the establishment of a SEF is not likely to have a significant impact on the current agricultural land uses that underpin the local economic activities in the area.

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 Enhancement²⁶
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		
Residual impacts: Promotion of social and economic development and improvement in the overall well-being of the community		

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 BWM should liaise with the proponents of other renewable energy projects in the area to investigate how best the Community Trusts can be established and managed so as to promote and support local, socio-economic development in the region as a whole.
- The BWM should be consulted as to the structure and identification of potential trustees to sit on the Trust. The key departments in the BWM that should be consulted include the Municipal Managers Office, IDP Manager and LED Manager.

²⁶ Enhancement assumes effective management of the community trust

- 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. The additional income will reduce the risk to his livelihoods posed by droughts and fluctuating market prices for livestock and farming inputs, such as fuel, feed etc. This represents a significant benefit for the affected landowner.

Table 4.11: Assessment of benefits associated with income generated for the affected farmer

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 Enhancement
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		
Residual impacts: Support for local agricultural sector and farming		

Assessment of No-Go option

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

Recommended enhancement measures

Implement agreements with affected landowner.

4.4.5 Visual impact and impact on sense of place

The proposed PV SEF has the potential to impact on the areas existing rural sense of place. The findings of the VIA (Nuleaf, 2022) are summarized below:

- The potential visual impact of the facility on sensitive visual receptors within 1km (residents of homesteads/dwellings and users of the secondary roads), in close proximity to the proposed facility is likely to be **low**.
- The possible visual impact of the facility on the residents' homesteads and users of secondary road on the periphery of the 1km offset and within the region beyond is likely to be of **low** significance.
- The potential visual impact of the associated infrastructure on residents of homesteads/dwellings and users of the secondary road within close proximity of the proposed facility is likely to be of **low** significance and may be mitigated to **negligible** should the possible best practice mitigation measures be implemented.
- The potential visual impact of construction on sensitive visual receptors in close proximity to the facility is likely to be of **low** significance before mitigation and **negligible** post mitigation.
- The anticipated visual impact of operational lighting at night on sensitive visual receptors within the study area is likely to be of **moderate** significance and may be mitigated to **low** should the possible best practice mitigation measures be implemented.
- The potential visual impact of the proposed development on the visual quality of the landscape and sense of place of the region is likely to be of **moderate** significance both before and after mitigation.

The overall conclusion of the VIA is that the post mitigation significance of the visual impacts is predominately **low to negligible**. No visual impacts with a high residual significance are anticipated.

The VIA notes that the visual impacts are not considered to be fatal flaws for a development of this nature particularly due to the remote location of the study area and very low density of visual receptors. The development of the proposed Brakpan 1 Solar Energy Facility is therefore supported from a visual perspective, subject to the implementation of the suggested best practice mitigation measures listed in the VIA. The site is also located within the Beaufort West REDZ. The area has therefore been identified as suitable for the establishment of renewable energy facilities, including SEFs.

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 and adjacent land uses.		
	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (33)	Low (27)
Status	Negative	Negative
Reversibility	Yes, solar facility can be removed.	
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Mitigation: See below		
Residual impacts: Support for local agricultural sector and farming		

Assessment of No-Go option

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

Recommended mitigation measures

The recommendations contained in the Final VIA should also be implemented.

4.4.6 Potential impact tourism

The potential for the proposed PV SEF to impact on the tourism sector and the perception of visitors to the area is likely to be negligible. There are no tourism facilities located in the study area. The site is also located within the Beaufort West REDZ. The area has therefore been identified as suitable for the establishment of renewable energy facilities, including SEFs. The areas sense of place has also been altered by the existing transmission lines that traverse the area.

Table 4.13: Potential impact on tourism

Nature: Potential impact of the SEF on local tourism operations and visitors. The impact will be linked to the potential visual impacts and the perception of people visiting the area.		
	Without Mitigation	With Enhancement / Mitigation
Extent	Local (2)	Local (1)
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 facility can be removed.	
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Enhancement: See below		
Residual impacts: Potential impact on current rural sense of place.		

Assessment of No-Go option

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

Recommended mitigation measures

The recommendations contained in the Final 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		
Residual 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.		

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 PVSEFs.

The Poortjies Wes Cluster involves the development of seven SEFs. 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 therefore exists. However, the site is located within the Beaufort West REDZ. The area has therefore been identified as suitable for the establishing of large scale renewable energy facilities.

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.		
	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Local (1)	Local and regional (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Low (27)	Medium (30)
Status (positive/negative)	Negative	Negative
Reversibility	Yes. Solar energy plant components and other infrastructure can be removed.	
Loss of resources?	No	No
Can impacts be mitigated?	Yes	
Confidence in findings: High.		
Mitigation: See below		

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 BWM has the potential to place pressure on local services in nearby towns, specifically Beaufort West. Services affected include medical, education and accommodation. This pressure will be associated with the influx of workers to the area associated with the construction phases, and to a lesser extent, the operational phases. 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, specifically during the construction phase. 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 Beaufort West and other towns in the BWM.

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 projects in the area. These benefits will create opportunities for investment in the BWM, including the opportunity to up-grade and expand existing services. The proposed site is also located within the Beaufort West REDZ. The area has therefore been identified as suitable for the establishment of large-scale solar energy facilities and associated infrastructure.

The Community Trusts associated with each project will generate revenue that can be used by the BWM, in consultation with the Western Cape Provincial Government, to invest in up-grading local services where required. It should also be noted that it is the function of national, provincial, and local government to address the needs created by economic 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 BWM.

Table 4.16: Cumulative impacts on local services

Nature: The establishment of a number of renewable energy facilities in the BWM has the potential to place pressure on local services, specifically medical, education and accommodation		
	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Local (1)	Local and regional (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Low (27)	Medium (30)
Status (positive/negative)	Negative	Negative
Reversibility	Yes. Solar energy plant components and other infrastructure can be removed.	
Loss of resources?	No	No
Can impacts be mitigated?	Yes	
Confidence in findings: High.		
Mitigation: See below		

Comment on No-Go option

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

Recommended mitigation measures

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

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 socio-economic opportunities for the BWM, which, in turn, will result in positive social benefits. The positive cumulative impacts include the creation of employment, skills development and training opportunities, and downstream business opportunities.

The Overview of the REIPPP (2020) confirms the benefits associated with renewable energy projects for local and regional economies. In this regard R 1.2 billion has been generated by socio-economic development contributions associated with the 68 operational IPPs. IPPs have supported 1 123 education institutions with a total of R312 million in contributions, from 2015

to the end of June 2020. A total of 1 142 bursaries, amounting to R183.8 million, have been awarded by 55 IPPs from 2015 until the end of June 2020. The largest portion of the bursaries were awarded to African and Coloured students (97%), with women and girls receiving 56% of total bursaries. The Northern Cape province benefitted most from the bursaries awarded, with 61%, followed by the Eastern Cape (18%) and Western Cape (14%). Enterprise development and social welfare are the focus areas that have received the second highest share of the contributions to date.

In addition, 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 June 2020 a total of R 384.2 million had already been made to the local communities located in the vicinity of the 68 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.

Table 4.17: Cumulative impacts on local economy

Nature: The establishment of a number of solar energy facilities in the BWM will create employment, skills development and training opportunities, creation of downstream business opportunities.		
	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Local (1)	Local and regional (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Definite (5)
Significance	Low (27)	High (60)
Status (positive/negative)	Positive	Positive
Reversibility	Yes. Solar energy plant components and other infrastructure can be removed.	
Loss of resources?	No	No
Can impacts be mitigated?	Yes	
Confidence in findings: High.		
Enhancement: See below		

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 BWM.

Recommended mitigation measures

The proposed establishment of suitably sited renewable energy facilities within the BWM should be supported.

4.9 ASSESSMENT OF NO-DEVELOPMENT OPTION

As indicated above, South Africa currently relies on coal-powered energy to meet more than 90% of its energy needs. As a result, South Africa is one of the highest per capita producers of carbon emissions in the world and Eskom, as an energy utility, has been identified as the world's second largest producer carbon emissions. The No-Development option would represent a lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy. Given South Africa's position as one of the highest per capita producers 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 Western Cape Province and other parts of South Africa. Foregoing the proposed SEF development would therefore not necessarily compromise the development of renewable energy facilities in the Western Cape and or South Africa. However, the socio-economic benefits for the BWM 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 Mitigation²⁷
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		
Residual impacts: Reduce carbon emissions via the use of renewable energy and associated benefits in terms of global warming and climate change.		

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.

²⁷ Assumes establishment of a Community Trust

SECTION 5: KEY FINDINGS AND RECOMMENDATIONS

5.1 INTRODUCTION

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

- A review of the issues identified during the Scoping Process.
- A review of key planning and policy documents pertaining to the area.
- Site visit and semi-structured interviews with interested and affected parties.
- A review of social and economic issues associated with similar developments.
- 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 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 refer to renewable energy. Renewable energy is also supported at a provincial and local municipal level. The proposed site is also located within the Beaufort West REDZ. The area has therefore been identified as suitable for the establishment of large-scale solar energy facilities and associated infrastructure. The BWM IDP and SDF also support the development of renewable energy.

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 is expected to extend over a period of ~16-18 months and create approximately 250 employment opportunities. Of this total ~ 60% (150) will be available to low-skilled workers (construction labourers, security staff etc.), 25% (63) to semi-skilled workers (drivers, equipment operators etc.) and 15% (37) 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 40 million (2022 Rand value). The majority of the employment opportunities, specifically the low and semi-skilled opportunities, are likely to be available to local residents in the area, specifically residents from Beaufort West. The majority of the beneficiaries are likely to be historically disadvantaged (HD) members of the community. This would represent a significant positive social benefit in an area with limited employment opportunities. However, in the absence of specific commitments from the developer to employ local contractors the potential for meaningful skills to local employment targets the benefits for members from the local communities may be limited. In addition, the low education and skills levels in the area may also hamper potential opportunities for local communities.

The potential benefits for local communities are confirmed by the findings of the Overview of the IPPPP undertaken by the Department of Energy, National Treasury and DBSA (June 2020). The review found that by the end of June 2020 the construction phase of the 68 renewable energy projects that had been successfully completed had created 33 449 job years²⁸ of employment, compared to the anticipated 23 619. This was 42% 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 1-1.5 billion (2022 Rand value). A percentage of the wage bill will also be spent in the local economy which will create opportunities for local businesses in Beaufort West. 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 the majority 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.

²⁸ 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 / Enhancement	Significance With Mitigation / Enhancement
Creation of employment and business opportunities	Medium (+)	Medium (+)
Presence of construction workers and potential impacts on family structures and social networks	Medium (-)	Low (-)
Influx of job seekers	Low (-)	Low (-)
Safety risk, stock theft and damage to farm infrastructure associated with presence of construction workers	Medium (-)	Low (-)
Increased risk of veld fires	Medium (-)	Low (-)
Impact of construction activities and vehicles	Medium (-)	Low (-)
Loss of farmland	Medium (-)	Low (-)

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.
- Generation of income for affected landowner/s.

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.

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, but 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 would be ~ 20. The majority of low and semi-skilled beneficiaries are likely to be HD members of the community. Given the location of the proposed facility the majority of permanent staff is likely to reside in Beaufort West.

Procurement during the operational phase will also create opportunities for the local economy and businesses. In this regard the overview of the IPPPP (June 2020) 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 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 O&M activities. In this regard, O&M 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.
- Support for SMME's.

The 2020 IPPP Overview notes that the SED contributions associated with the 68 IPPs has to date has amounted to R 1.2 billion. The province with the highest SED contribution has been the Northern Cape Province, followed by the Eastern Cape and Western Cape.

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 R1.2 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.

The long-term duration of the contributions from the SEF also enables local municipalities and communities to undertake long term planning for the area. Experience has, however, shown that Community Trusts can be mismanaged. This issue will need to be addressed in order to maximise the potential benefits associated with the establishment of a Community Trust or other community benefit structure (entity). The REIPPPP 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 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.

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 (+)	High (+)
Creation of employment and business opportunities	Low (+)	Medium (+)
Establishment of Community Trust	Medium (+)	High (+)
Generate income for affected landowner/s	Low (+)	Medium (+)
Visual impact and impact on sense of place	Medium (-)	Low (-)
Impact on tourism	Low (-)	Low (-)

5.2.4 Assessment of cumulative impacts

Cumulative impact on sense of place

The Poortjies Wes Cluster involves the establishment of seven SEFs. 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 therefore exists. The significance of the impact is

rated as **Medium Negative**. However, the proposed site is also located within the Beaufort West REDZ. The area has therefore been identified as suitable for the establishment of large-scale solar energy facilities and associated infrastructure.

Cumulative impact on services

The establishment of the proposed SEF and the other REFs in the BWM may place pressure on local services, specifically medical, education and accommodation. This pressure will be associated with the potential 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. With effective mitigation the impact is rated as **Medium Negative**.

In addition, 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 renewable energy as an economic driver in the area.

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 BWM, 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 Community Trusts associated with each project will also create significant socio-economic benefits. These benefits should also be viewed within the context of the limited economic opportunities in the area and the impact of the decline in the mining sector in recent years. 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 producers 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 Western Cape Province and South Africa. Foregoing the proposed SEF development would therefore not necessarily compromise the development of renewable energy facilities in the Western Cape or South Africa. However, the socio-economic benefits for the BWM would be forfeited.

5.3 CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The findings of the SIA indicate that the development of the proposed 190 MW Brakpan 1 PV SEF and associated infrastructure will create employment and business opportunities for locals in the BWM during both the construction and operational phase of the project.

The establishment of a Community Trust will also benefit the local community. The enhancement measures listed in the report should be implemented in order to maximise the potential benefits. The significance of this impact is rated as **High Positive**. The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the negative environmental and socio-economic impacts associated a coal-based energy economy and the challenges created by climate change, represents a significant positive social benefit for society as a whole. The findings of the SIA also indicate that the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) has resulted in significant socio-economic benefits, both at a national level and at a local, community level. These benefits are linked to foreign Direct Investment, local employment and procurement and investment in local community initiatives. The proposed site is also located within the Beaufort West REDZ. The area has therefore been identified as suitable for the establishment of large-scale solar energy facilities and associated infrastructure. The establishment of the proposed 190 MW Brakpan 1 PV SEF and associated infrastructure including a BESS is therefore supported by the findings of the SIA.

Recommendations

The enhancement and mitigation measures outlined in the SIA and other key specialist reports should be implemented.

ANNEXURE A

INTERVIEWS

REFERENCES

- National Energy Act (2008).
- White Paper on the Energy Policy of the Republic of South Africa (December 1998).
- White Paper on Renewable Energy (November 2003).
- Integrated Resource Plan (IRP) for South Africa (2019).
- The National Development Plan (2011).
- New Growth Path Framework (2010).
- National Infrastructure Plan (2012).
- National Integrated Energy Plan (2016)
- White Paper on Sustainable Energy for the Western Cape Province (2010).
- The Western Cape Provincial Strategic Plan 2014-2019 (2014).
- The Western Cape Land Use Planning Act, 2014.
- The Western Cape Provincial Spatial Development Framework (2014 Revision).
- The Western Cape Climate Change Response Strategy (2014).
- The Western Cape Infrastructure Framework (2013).
- The Western Cape Green Economy Strategy Framework (2013).
- The One Cape 2040 Strategy (2012).
- The Western Cape Amended Zoning Scheme Regulations for Commercial Renewable Energy Facilities (2011).
- The Western Cape Draft Strategic Plan (2010).
- Beaufort West Municipality Integrated Development Plan (IDP)(2019/2020).
- Beaufort West Spatial Development Framework (SDF)(2013).

INTERNET

- <https://www.steenbokkie.co.za> (Steenbokkie PNR).

ANNEXURE B

METHODOLOGY FOR THE ASSESSMENT OF POTENTIAL IMPACTS

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

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

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

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

S = Significance weighting

E = Extent

D = Duration

M = Magnitude
P = Probability

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

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

ANNEXURE C

10 Firs Avenue, Claremont, 7708, South Africa
(Cell) 082 600 8266
(E-Mail) tony@tonybarbour.co.za

Tony Barbour's has 28 years' experience as an environmental consultant, including 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 260 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, Senegal, Sudan and Armenia.

ANNEXURE D

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;

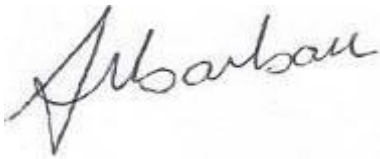
I will comply with the Act, Regulations and all other applicable legislation;

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):

117 May 2022

Date: