SOCIAL IMPACT ASSESSMENT

MERCURY PV SOLAR ENERGY FACILITY CLUSTER
NORTHERN PV SEF CLUSTER

FREE STATE PROVINCE

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Prepared

By

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EXECUTIVE SUMMARY

INTRODUCTION AND LOCATION

Landscape Dynamics Environmental Consultants were appointed to manage the Basic Assessment (BA) proposes for the proposed Mercury PV Solar Energy Facility (SEF) Cluster located ~ 22 km south east of Klerksdorp in the Moqhaka Local Municipality (MLM), Free State Province. The site is located in the Klerksdorp Renewable Energy Zone (REDZ). The Mercury PV Cluster consists of seven 100 MW PV SEFs. For the purposes of the BA process the Cluster has been divided into two sub-clusters, namely the Northern PV SEF Cluster which consist of four PV SEFs and the Southern PV SEF Cluster which consists of three PV SEFs.

Tony Barbour Environmental Consulting was appointed to undertake a specialist Social Impact Assessment (SIA) as part of the EIA process. The SIA assesses the Northern PV SEF Cluster which consists of:

- Zaaiplaats 100 MW Solar PV1.
- Kleinfontein 100 MW Solar PV1.
- Biesiefontein 100 MW Solar PV1.
- Vlakfontein 100 MW Solar PV1.

SUMMARY OF KEY FINDINGS

The assessment section is divided into:

- Assessment of compatibility with relevant policy and planning context ("planning fit").
- Assessment of social issues associated with the construction phase.
- Assessment of social issues associated with the operational phase.
- Assessment of social issues associated with the decommissioning phase.
- Assessment of power line alignments.
- Assessment of the "no development" alternative.
- Assessment of cumulative impacts.

The key social issues and associated significance ratings for the construction and operation phase apply to each of the four 100 MW PV SEFs associated with the Northern PV SEF Cluster, namely the:

- Zaaiplaats 100 MW Solar PV1.
- Kleinfontein 100 MW Solar PV1.
- Biesiefontein 100 MW Solar PV1.
- Vlakfontein 100 MW Solar PV1.

POLICY AND PLANNING ISSUES

The findings of the review of key policy and planning documents indicates that renewable energy is 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, highlight the importance of renewable energy. The proposed

project also supports a number of objectives contained in the Free State Province Provincial Growth and Development Strategy and Free State Green Economy Strategy. At a district and local level, the Moqhaka Local Municipality IDP and SDF support the development of renewable energy. The site is also located within the Klerksdorp REDZ. The area has therefore been identified as suitable for the establishment of renewable energy facilities.

CONSTRUCTION PHASE

Potential positive impacts

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

The construction phase for a 100 MW SEF is expected to extend over a period of ~18 months and create approximately 250-300 employment opportunities, depending on the final design. Of this total ~ 60% will be available to low-skilled workers (construction labourers, security staff etc.), 25% to semi-skilled workers (drivers, equipment operators etc.) and 15% 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 30 million (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 the area.

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 Klerksdorp and Orkney. 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 years[1] 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 for a single 100 MW PV SEF would be in the region of R 2 billion (2022 Rand value). The total capital expenditure associated with the Mercury PV SEF Northern Cluster would be ~ R 8 billion (2022 Rand value). The total number of employment opportunities associated with the Mercury PV SEF Northern Cluster would be ~ 1 000, with a total wage bill of ~ R 120 million (2022 Rand value).

[1] The equivalent of a full-time employment opportunity for one person for one year

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 for a single 100 MW PV SEF. Table 2 summarises the significance of the impacts associated with the construction phase for four (4) 100 MW PV SEFs associated with the Mercury Northern Cluster.

Table 1: Summary of social impacts during construction phase (single 100 MW PV SEF)

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 (-)

Table 2: Summary of social impacts during construction phase (Mercury PV Northern Cluster 4 x 100 MW PV SEFs)

Impact	Significance No Mitigation / Enhancement	Significance With Mitigation / Enhancement
Creation of employment and business opportunities	Medium (+)	High (+)
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.
- Create opportunities to improve security.

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. Since operation, the Independent Power Producers (IPPs) have generated 35 699 GWh, resulting in 36.2 Mton of CO_2 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.

Creation of employment and business opportunities

The total number of permanent employment opportunities associated with a single 100 MW SEF would be ~ 20, increasing to ~ 80 for four PV SEFs. 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 Klerksdorp and Orkney.

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.

SED opportunities will be created by each of the PV SEFs associated with the proposed Northern Cluster. 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 farming outputs and inputs, such as fuel, feed etc. The additional income from the SEF would therefore improve economic security of farming operations, which in turn would improve job security for farm workers and benefit the local economy. However, the income would need to compensate the losses associated with the current farming activities.

Opportunity to improve security
The provision of security for the proposed PV SEFs can create an opportunity to improve security for local landowners in the area.

Potential negative impacts
- The visual impacts and associated impact on sense of place.
- Impact on property values.
- 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 3 summarises the significance of the impacts associated with the operation phase for a single 100 MW PV SEF. Table 4 summarises the significance of the impacts associated with the operation phase for four (4) 100 MW PV SEF PV SEFs associated with the Mercury Southern Cluster.

Table 3: Summary of social impacts during operational phase (single 100 MW PV SEF)

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 (+)
Improve security	Medium (+)	High (+)
Visual impact and impact on sense of place	Low (-)	Low (-)
Impact on property values	Medium (-)	Low (-)
Impact on tourism	Low (-)	Low (-)

Table 4: Summary of social impacts during operational phase (Mercury PV Southern Cluster 4 x 100 MW PV SEFs)

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 (+)
Improve security	Medium (+)	High (+)
Visual impact and impact on sense of place	Low (-)	Low (-)
Impact on property values	Medium (-)	Low (-)
Impact on tourism	Low (-)	Low (-)

CUMULATIVE IMPACTS

Cumulative impact on sense of place

The site is located within the Klerksdorp REDZ. 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 area has been identified as suitable for the establishment of large scale renewable energy facilities. The cumulative impact on the areas sense of place associated with the Northern PV SEF Cluster is therefore rated as **Low Negative.**

Cumulative impact on services
The establishment of the proposed SEF and the other REFs in the MLM and CoMLM 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 associated with the Northern PV SEF Cluster can be mitigated by employing local community members. With effective mitigation the impact is rated as **Low 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 Northern PV SEF Cluster and other renewable energy projects in the area also has the potential to create a number of socio-economic opportunities for the MLM and CoMLM, 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

Given the relatively small number of people employed during the operational phase (~ 20 for a single 100 MW PV SEF and ~ 80 for four 100 MW PV SEFs), the potential negative social impact on the local economy associated with decommissioning of the Northern PV SEF Cluster 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 plants should be allocated to cover the costs associated with closure and the rehabilitation of disturbed areas.

NO-DEVELOPMENT OPTION

The No-Development option would represent a lost opportunity for South Africa to supplement is 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 proposed SEF development proposal is not unique. In that regard, a significant number of renewable energy development, including SEFs, are currently proposed in the Free State Province and South Africa. Foregoing the proposed development of the Northern PV SEF Cluster would therefore not necessarily compromise the development of renewable energy facilities in the Free State or South Africa. However, the socio-economic benefits for the MLM and CoMLM would be forfeited.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The findings of the SIA indicate that the development of the each of the four 100 PV SEFs associated with the Northern Cluster of the Mercury PV SEF Cluster will create employment and business opportunities for locals during both the construction and operational phase of the project. The enhancement measures listed in the report should be implemented in order to maximise the potential benefits The findings of the SIA also indicate that all of the potential negative impacts can also be effectively mitigated.

The establishment of Community Trusts associated with each of the four 100 MW PV SEFs will also benefit the local community in the area. 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 site is also located within the Klerksdorp REDZ. The area has therefore been identified as suitable for the establishment of renewable energy facilities. The establishment of the Zaaiplaats 100 MW Solar PV1, Kleinfontein 100 MW Solar PV1, Biesiefontein 100 MW Solar PV1 and Vlakfontein 100 MW Solar PV1 is therefore supported by the findings of the SIA. The enhancement measures listed in the report should be implemented in order to avoid and or minimise the potential negative impacts and maximise the potential benefits associated with development of each of the four proposed 100 MW PV SEFs.

Recommendations

The following recommendations are made to address the potential negative impacts:

- The final design and layout should ensure that the loss of productive farmland is avoided and or minimised.
- Damage to local farm roads caused by construction traffic must be repaired on an on-going basis throughout and on completion of the construction phase.

- The proponent should prepare a Stakeholder Engagement Plan (SEP) and Community Health, Safety and Security Plan (CHSSP) prior to commencement of construction phase.

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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 *curriculum vitae*;	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 2020 (Annexure A)
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 1.2, 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	Comply with the

protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	Assessment 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.

ACRONYMS

DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning
DM	District Municipality
HD	Historically Disadvantaged
EIA	Environmental Impact Assessment
FDDM	Fezile Dabi District Municipality
MLM	Moqhaka Local Municipality
IDP	Integrated Development Plan
IPP	Independent Power Producer
kV	Kilovolts
LED	Local Economic Development
LM	Local Municipality
MW	Megawatt
PGDS	Provincial Growth and Development Strategy
SDF	Spatial Development Framework
SEF	Solar Energy Facility
SIA	Social Impact Assessment

SECTION 1: INTRODUCTION

1.1 INTRODUCTION

Landscape Dynamics Environmental Consultants were appointed to manage the Basic Assessment (BA) proposes for the proposed Mercury PV Solar Energy Facility (SEF) Cluster located ~ 22 km south east of Klerksdorp in the Moqhaka Local Municipality (MLM), Free State Province (Figure 1.1). The site is located in the Klerksdorp Renewable Energy Zone (REDZ). The Mercury PV Cluster consists of seven 100 MW PV SEFs. For the purposes of the BA process the Cluster has been divided into two sub-clusters, namely the Northern PV SEF Cluster which consist of four PV SEFs and the Southern PV SEF Cluster which consists of three PV SEFs.

Tony Barbour Environmental Consulting was appointed to undertake a specialist Social Impact Assessment (SIA) as part of the EIA process. This SIA assesses the Northern PV SEF Cluster which is made up of:

- Zaaiplaats 100 MW Solar PV1.
- Kleinfontein 100 MW Solar PV1.
- Biesiefontein 100 MW Solar PV1.
- Vlakfontein 100 MW Solar PV1.

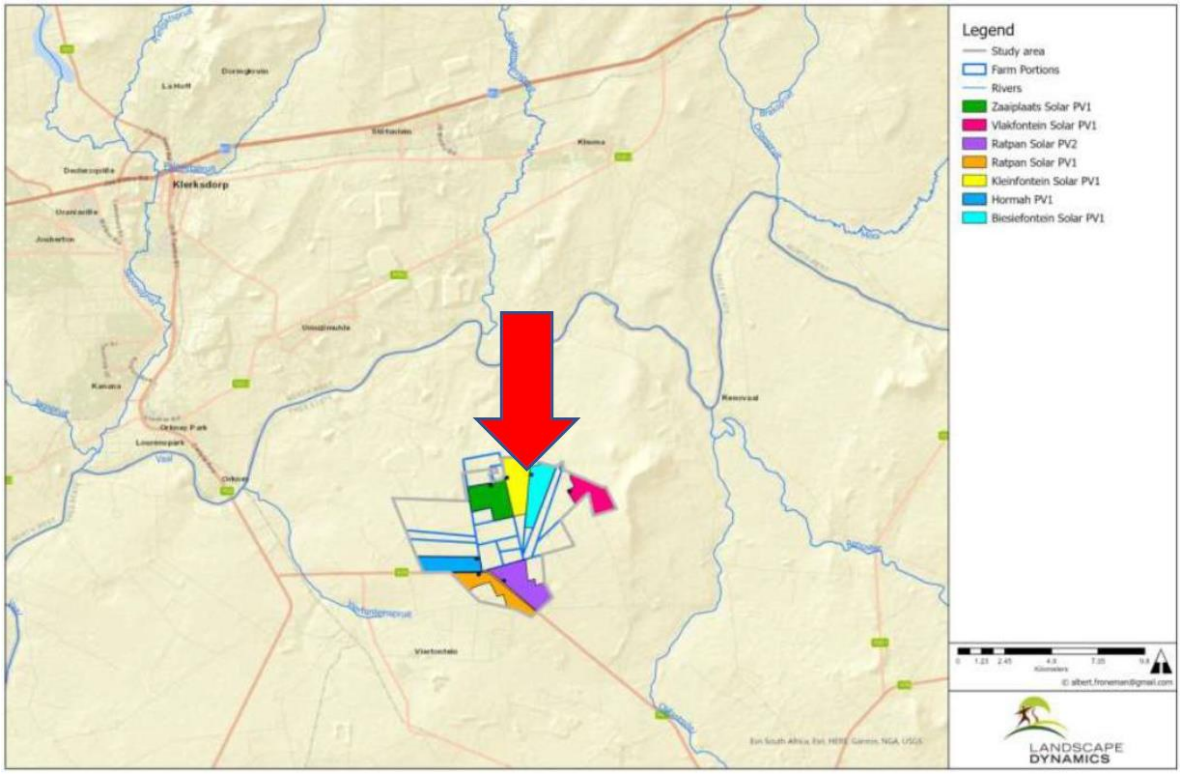


Figure 1.1: Location of Mercury PV SEF Cluster. Red Arrow indicates the Northern Cluster

1.2 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.

The SIA is informed by the Social Scoping Study undertaken by Lisa Opperman of Savannah Environmental (Pty) Ltd in 2020.

1.3 PROJECT DESCRIPTION

As indicated above, the proposed Mercury PV SEF Cluster consists of seven 100 MW PV SEFs and has been divided into two sub-clusters, namely the Northern PV SEF Cluster which consist of four PV SEFs and the Southern PV SEF Cluster which consists of three PV SEFs (Figure 1.2). The Northern PV SEF Cluster consist of:

- Zaaiplaats 100 MW Solar PV1 (Green, Figure 1.2).
- Kleinfontein 100 MW Solar PV1 (Yellow, Figure 1.2).
- Biesiefontein 100 MW Solar PV1 (Light Blue, Figure 1.2).

- Vlakfontein 100 MW Solar PV1 (Pink, Figure 1.2).

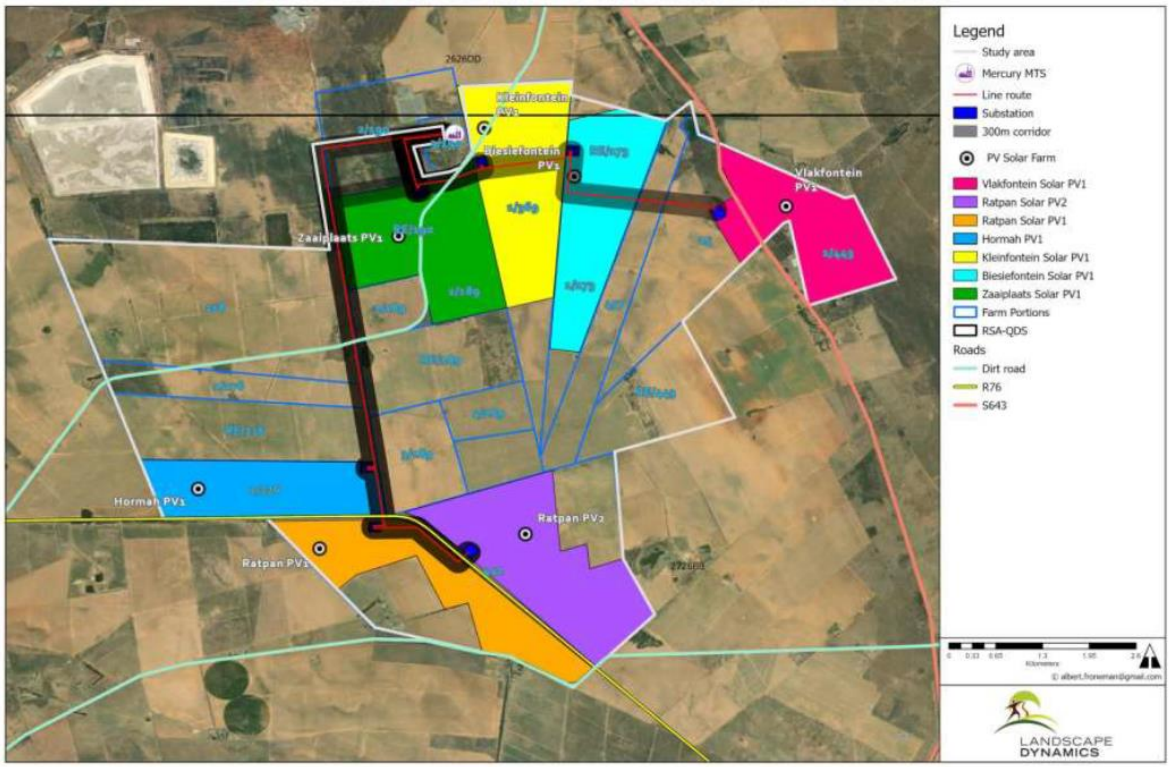


Figure 1.2: Location of Northern PV SEF Cluster (Green, Yellow, Light Blue and Pink)

Table 1.1 lists the farms the four PV SEFs associated with the Northern Cluster are located on.

Table 1.1: Northern PV SEF Cluster Farms

PV SEF	Farm
Zaaiplaats 100 MW Solar PV1	• Remainder of the Farm Zaaiplaats No 190 • Portion 2 of the Farm Fraai Uitzicht No 189
Kleinfontein 100 MW Solar PV1	• Portion 1 of the Farm Kleinfontein No 369
Biesiefontein 100 MW Solar PV1	• Remainder of the Farm Biesiefontein No 173 • Portion 1 of Biesiefontein No 173
Vlakfontein 100 MW Solar PV1	• Vlakfontein Nr 15 • Remainder of Jackalsfontein Nr 443

Infrastructure associated with the solar PV facility will include the following:

- Solar PV array comprising PV modules and mounting structures.
- Inverters and transformers.
- Cabling between the project components.
- On-site facility substation to facilitate the connection between the solar PV facility and the Eskom electricity grid.
- Battery Energy Storage System (BESS).

- Site offices and maintenance buildings, including workshop areas for maintenance and storage.
- Laydown areas.
- Access roads, internal distribution roads and fencing around the development area.

Construction phase
The construction of a single 100 MW PV SEF and associated infrastructure is expected to extend over a period of ~ 18 months. The capital expenditure associated with the establishment of the 100 MW SEF is estimated to be in the region of R 2 billion (2022 Rand value). The construction phase will create approximately ~250-300 employment opportunities. Staff will be transported to the site on a daily basis. Overnight site worker presence will be limited to security staff.

Operation phase
The operational phase for each 100 MW PV SEF will extend over a period of 20 years and create in the region of 20 permanent employment opportunities per annum.

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.

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

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

However, the study recognises the strategic importance of solar energy and the technical, spatial and land use constraints required for solar energy facilities. The site is also located within the Klerksdorp REDZ. The area has therefore been identified for the development of renewable energy facilities and the associated infrastructure.

1.4.2 Limitations

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

1.5 SPECIALIST DETAILS

Tony Barbour, the lead author of this report is an independent specialist with 30 years' experience in the field of environmental management. In terms of SIA experience Tony Barbour has undertaken in the region of 300 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 ~ 130 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 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 SIA Report, are independent and do not have any vested or financial interests in the proposed PV 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: Summary of key policy and planning documents relating to solar energy and the area in question
- Section 3: Overview of the study area
- Section 4: Identification and assessment of key social issues
- Section 5: Summary of key findings and recommendations.

SECTION 2: POLICY AND PLANNING ENVIRONMENT

2.1 INTRODUCTION

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

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

National
- 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 Energy Plan for South Africa (2016).
- Integrated Resource Plan (2019).
- The National Development Plan (2011).
- New Growth Path Framework (2010).
- National Infrastructure Plan (2012).
- The Strategic Environmental Assessment (SEA) for wind and solar PV energy in South Africa (CSIR, 2015).

Provincial and municipal
- Free State Provincial Spatial Development Framework (PSDF).
- Free State Green Economy Strategy (2014).
- Free State Investment Prospectus (2019).
- Fezile Dabi District Municipality Integrated Development Plan (2022-21).
- Fezile Dabi District Municipality Climate Change Vulnerability Assessment and Response Plan (2016).
- Moqhaka Local Municipality Integrated Development Plan (2017-2022).
- Moqhaka Local Municipality Spatial Development Framework (2019-2020).
- City of Matlosana Local Municipality Integrated Development Plan (2019-20).
- City of Matlosana Local Municipality Spatial Development Framework (2009).

The closest towns to the site are Klerksdorp and Orkney located within the City City of Matlosana Local Municipality (CoMLM) in the North West Province. The City of Matlosana Local Municipality Integrated Development Plan and Spatial Development

[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.

Framework were therefore also reviewed. The section also provides an overview of the South African Renewable Energy sector.

2.2 NATIONAL POLICY

2.2.1 National Energy Act (Act No 34 of 2008)

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

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

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

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

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

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

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

2.2.3 White Paper on Renewable Energy

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

The White Paper notes that while South Africa is well endowed with renewable energy resources that have the potential to become sustainable alternatives to fossil fuels, these have thus far remained largely untapped. As signatory to the Kyoto Protocol[3], Government is determined to make good the country's commitment to reducing greenhouse gas emissions. To this purpose, Government has committed itself to the development of a framework in which a national renewable energy framework can be established and operate.

South Africa is also a signatory of the Copenhagen Accord, a document that delegates at the 15th session of the Conference of Parties (COP 15) to the United Nations Framework Convention on Climate Change agreed to "take note of" at the final plenary on 18 December 2009. The accord endorses the continuation of the Kyoto Protocol and confirms that climate change is one of the greatest challenges facing the world. In terms of the accord South Africa committed itself to a reduction target of 34% compared to business as usual. In this regard the IRP 2010 aims to allocate 43% of new energy generation facilities in South Africa to renewables.

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

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

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

2.2.4 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, considering 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.

2.2.5 National Development Plan

The National Development Plan (NDP) contains a plan aimed at eliminating poverty and reducing inequality by 2030. The NDP identifies 9 key challenges and associated

remedial plans. Managing the transition towards a low carbon national economy is identified as one of the 9 key national challenges. Expansion and acceleration of commercial renewable energy is identified as a key intervention strategy.

2.2.6 New Growth Path Framework

The aim of the New Economic Growth Path Framework is to enhance growth, employment creation and equity. Central to the New Growth Path is a massive investment in infrastructure as a critical driver of jobs across the economy. In this regard the framework identifies investments in five key areas namely: ***energy***, transport, communication, water and housing.

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

2.2.7 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 strengthening the delivery of basic services. The plan also supports the integration of African economies. In terms of the plan Government will invest R827 billion over the next three years to build new and upgrade existing infrastructure. The aim of the investments is to improve access by South Africans to healthcare facilities, schools, water, sanitation, housing, and electrification. The plan also notes that investment in the construction of ports, roads, railway systems, ***electricity plants***, hospitals, schools, and dams will contribute to improved economic growth.

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

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

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

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

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

- Support bio-fuel production facilities.

SIP 9: Electricity generation to support socio-economic development

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

SIP 10: Electricity transmission and distribution for all

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

2.2.8 Integrated Resource Plan

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. 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 on 18 October 2019, updating the energy forecast for South Africa from the current period to the year 2030. The IRP is an electricity capacity plan which aims to provide an indication of the country's electricity demand, how this demand will be supplied and what it will cost.

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

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

- 1 500 MW of coal.
- 2 500 MW of hydro.
- 6 000 MW of solar PV.
- 14 400 MW of wind.
- 1 860 MW of nuclear.
- 2 088 MW for storage.
- 3 000 MW of gas/diesel.
- 4 000 MW 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 (Decommis-sioning)	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			500
2024			1,860				1,600		1000	500
2025						1000	1,600			500
2026		-1,219					1,600			500
2027	750	-847					1,600		2000	500
2028		-475				1000	1,600			500
2029		-1,694			1575	1000	1,600			500
2030		-1,050		2,500		1000	1,600			500
TOTAL INSTALLED CAPACITY by 2030 (MW)	33,364		1,860	4,600	5,000	8,288	17,742	600	6,380	
% Total Installed Capacity (% of MW)	43		2.36	5.84	6.35	10.52	22.53	0.76	8.1	
% Annual Energy Contribution (% of MWh)	58.8		4.5	8.4	1.2*	6.3	17.8	0.6	1.3	

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

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

Figure 2.1: Summary of energy allocations and commitments

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

In terms of renewable energy four bidding rounds have been completed for renewable energy projects under the REIPPPP. The most dominant technology in the IRP 2019 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 1 600 MW for wind technology commencing in the year 2022 up to 2030. The solar PV allocation of 1 000 MWs 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 2 000 MW 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.

2.2.9 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 renewable energy facilities can be developed in a manner that limits significant negative impacts on the environment while yielding the highest possible socio-economic benefits to the country. 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 Creecy, 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 Cluster is located within the Klerksdorp REDZ.

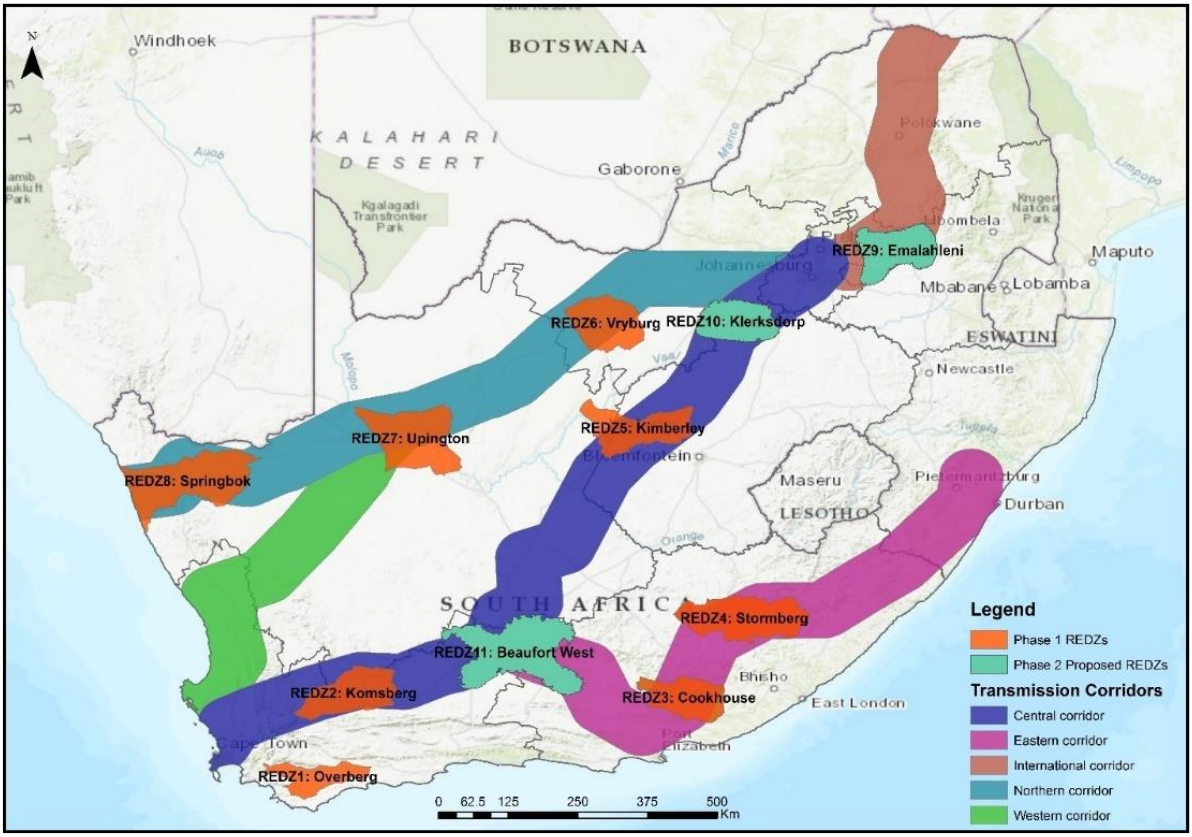


Figure 2.2: Location of Renewable Development Zones and Transmission Corridors in South Africa *(Source CSIR)*

2.3 PROVINCIAL AND MUNICIPAL

2.3.1 Free State Provincial Spatial Development Framework

The Executive Summary (Inception Report) notes that the Free State Provincial Spatial Development Framework (PSDF) is a provincial spatial and strategic planning policy that responds to and complies with, in particular, the National Development Plan Vision 2030 and the National Spatial Development Perspective (NSDP). The latter encourages all spheres of government to prepare spatial development plans and frameworks (such as the PSDF) that promote a developmental state in accordance with the principles of global sustainability as is advocated by, among others, the South African Constitution and the enabling legislation.

The Free State Provincial Growth and Development Strategy states that sustainable economic development is the only effective means by which the most significant challenge of the Free State, namely poverty, can be addressed. The PSDF gives practical effect to sustainable development, which is defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.

The PSDF is prepared in accordance with bioregional planning principles that were adapted to suit the site-specific requirements of the Free State. It incorporates and complies with the relevant protocols, conventions, agreements, legislation and policy at all applicable levels of planning, ranging from the international to the local. The Rondavel Solar PV Facility will contribute to sustainable and economic development goals of the Free State PSDF, once completed and formally adopted.

2.3.2 Free State Green Economy Strategy

The Green Economy Strategy for Free State Province (2014) was developed in alignment with the national green economy strategy elaborated in the National Green Economy Framework and Green Economy Accord, as well the Free State Provincial Growth and Development Strategy. The development process was spearheaded by the Department of Economic Development, Tourism and Environmental Affairs (DETEA).

The objective was to develop a green economy strategy to assist the province to, amongst others, improve environmental quality and economic growth, and to develop green industries and energy efficiency within the province.
The Rondavel Solar PV Facility will contribute to the aim of energy efficiency and green industry whilst promoting economic growth and is therefore consistent with this strategy and Climate Change Response Plan.

2.3.3 Free State Investment Prospectus

The Free State Investment Prospectus (2019) identifies the development of renewable energy as a key sector. The prospectus states that opportunities are opening up in the Province for the energy sector, including renewable energy. Rezoning for the development of multiple solar energy facilities has already been undertaken in the province. The development of a Solar Park in the Xhariep region is seen as a driver of growth along the banks of the Orange River.

Considering the future opportunities available for the development of renewable energy facilities (including solar PV facilities) the development of the proposed Solar PV Facility is considered to be in-line with the Investment Prospectus of the Province.

2.3.4 Fezile Dabi District Municipality Integrated Development Plan

The Vision of the Municipality as set out in the Integrated Development Plan (IDP, 2020-21) is "Improving the lives of citizens and progressively meeting their basic, social and economic needs, thereby restoring the community confidence and trust in government". The Mission of the Municipality is to "…strive to be a more responsive and accountable municipality towards sustainable development."

The IDP identifies Local Economic Development as a Key Performance Area (KPA4). Based on the fact that the proposed development is considered to be sustainable with little resource use required and that the development will encourage local economic

development it is considered that the proposed PV Solar Facility is in-line with the objectives of the IDP.

2.3.5 Fezile Dabi District Municipality Climate Change Vulnerability Assessment and Response Plan

The Rondavel Solar PV Facility indirectly contributes to the overall climate change response plan of the Fezile Dabi District Municipality (2016) by providing energy without reliance on fossil fuels and therefore exacerbating climate change at ta provincial and national level.

2.3.6 Moqhaka Local Municipality Integrated Development Plan

The Moqhaka Local Municipality IDP (2017-22) has, under the local economic development goal, the following aims:

- Create an environment that promotes the development of the local economy and facilitate job creation.
- To expand the electrification programme to any remaining areas and roll out solar energy in any identified areas at prescribes standards.

In addition, the IDP also indicates that an Energy Master Plan is currently being developed, with the primary aim of ensuring enough energy is available to support existing and developmental needs. The proposed PV Solar PV Facility development thus directly addresses various aims of the Moqhaka Local Municipality IDP.

2.3.7 Moqhaka Local Municipality Spatial Development Framework

The Spatial Development Framework (SDF, 2019-20) identifies ten spatial related directives and objectives. Directive number 8 refers to Surface Infrastructure. The objectives of this directive specifically refer to the promotion of development of renewable energy supply schemes. The SDF also identifies the need for new bulk transmission lines based on the envisaged new development in the area. Considering the above, the development of the proposed PV Solar Facility is in line with the SDF.

2.3.8 City of City of Matlosana Integrated Development Plan

The City of Matlosana is part of the Dr Kenneth Kaunda District Municipality in the North West province. The municipality includes the towns of Klerksdorp, Jouberton, Alabama, Orkney, Kanana, Stilfontein, Khuma, Tigane and Hartbeesfontein.

In terms or the IDP the vision is "A proficient and prosperous municipality that delivers high quality services to the citizens''. The associated mission statement is "To render equitable, sustainable and high-quality basic services to The citizens of Matlosana''.

The IDP is informed by five national Key Performance Indicators (KPIs), namely:

- KPI 1: Service delivery and infrastructure development
- KPI 2: Municipal institutional development and transformation
- KPI 3: Local economic development
- KPI 4: Municipal financial viability and management
- KPI 5: Good governance and public participation

KPI 3: Local economic development, is the most relevant to the proposed development. The strategic objective of KPI 3 is to create an enabling environment for economic growth, rural development, and employment opportunities.

The IDP also lists the medium-term strategic priorities for the period 2017-2022, of which support for sustainable and inclusive local economic development is relevant to the proposal. The IDP also lists a number of critical strategic enablers that are required to support the strategic priorities, including the need for skills development and capacity building and the establishment of strategic partnerships between the private and public sector. Some of these priorities can be supported by the Socio-Economic Development (SED) contributions associated with the proposed development.

2.3.9 City of City of Matlosana Spatial Development Framework

The spatial development vision for the CoMLM is "*To strive to enhance integrated socio-economical and physical development in a sustainable manner".* Section 7.2.2 list the objectives of the SDF. The following are relevant to the proposed development:

- Capitalizing on the location of Matlosana on the N12 Treasure Corridor (SDI) of National and Provincial importance.
- Enhancement of Matlosana as prominent Primary Regional Node as well as a priority / investment area within the North West Province.
- Enhancement of sustainable development which involves, the protection, sustainable use and proper management of the environment and proper land use management.
- Alignment and identification of economic opportunities along major development corridors.

The SDF highlights the importance to infrastructure linkages, specifically the key role played by the N12 (Treasure Corridor) which should serve as a concentration for appropriate new development initiatives such as industrial, commercial, nodal, residential, tourism and mixed land use development. In terms of industrial development, the SDF supports the development of commercial and light industrial development adjacent to the N12 in order to strengthen the N12 Treasure Corridor.

The SDF also identifies land use management guidelines, and notes that land use management has two key goals, namely: of which the following are relevant to the proposed development.

- It must provide effective protection to both the natural environment and member of the public from negative impacts of land development and land use change.
- It must provide effective protection to both the natural environmental and members of the public and al spheres of government so that there is shared and consisting understanding of the scale, extent and nature of permissible land development.

In terms of the SDF, land use management systems of the municipality should be sustainable, which requires the protection of natural, environmental, and cultural resources, preserving prime agricultural land and ensuring the best use of available resources.

In terms of the SDF, Klerksdorp is identified as a Primary Development Node and the N12 (Treasure Corridor) is the primary infrastructure communication axis that runs in west-east direction.

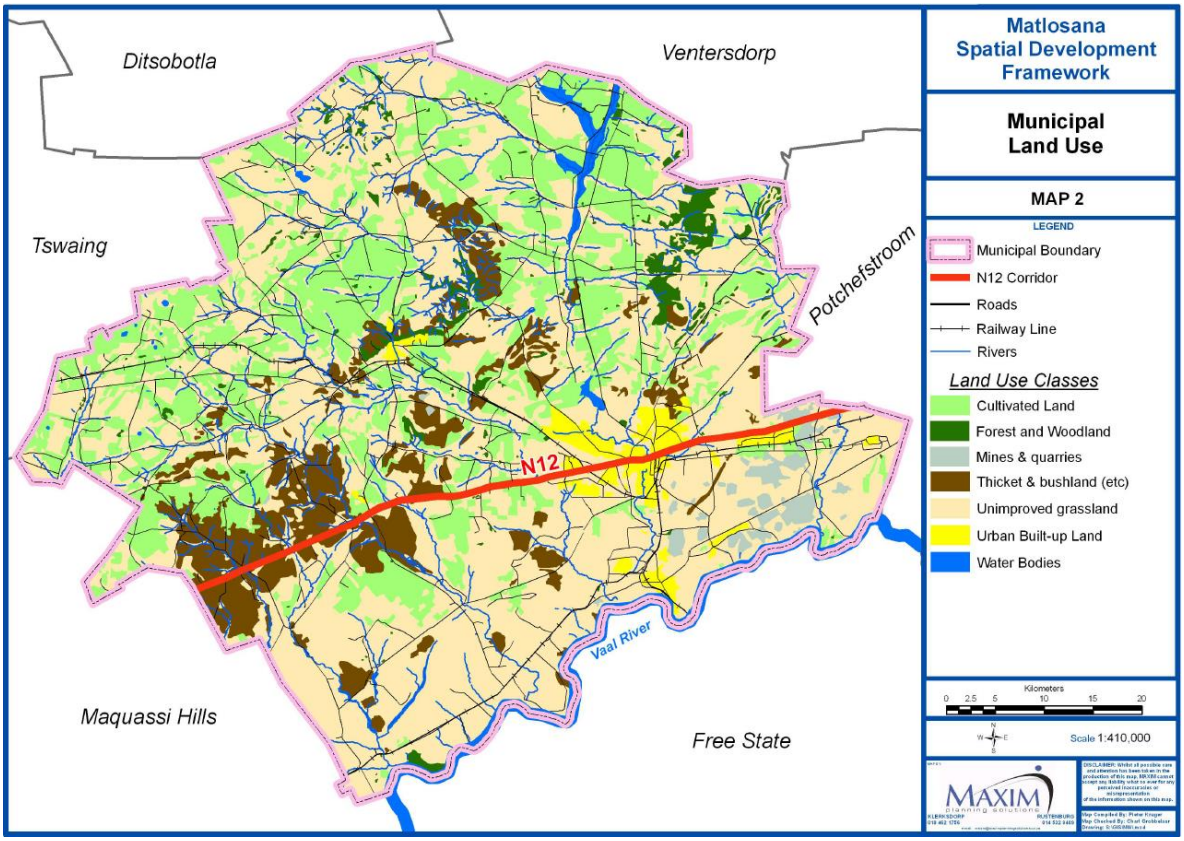


Figure 2.3: Land use map City of Matlosana

2.4 OVERVIEW RENEWABLE ENERGY SECTOR IN SOUTH AFRICA

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

The following documents were reviewed:

- Independent Power Producers Procurement Programme (IPPPP): An Overview (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; and
- Market Intelligence Report: Renewable Energy (2014). Mike Mulcahy, Greencape.

2.4.1 Renewable Energy Independent Power Producers Procurement Programme (REIPPPP): 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 costs[4]), 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

[4] 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)

investments has been structured and secured as local community equity. An individual community's dividends earned will depend on the terms of each transaction corresponding with the relevant equity share. To date all shareholding for local communities have been structured through the establishment of community trusts. For projects in BW1 to BW4, 1S2 and 2S2, qualifying communities will receive R26.9 billion net income over the life of the projects (20 years). The report notes that the bulk of the money will however only start flowing into the communities from 2028 due to repayment obligations in the preceding years (repayment obligations are mostly to development funding institutions). However, despite the delay this represents a significant injection of capital into mainly rural areas of South Africa. 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 Content[5]

The report notes that the REIPPP programme represents the country's most comprehensive strategy to date in achieving the transition to a greener economy. Local content minimum thresholds and targets were set higher for each subsequent bid window. The report notes that for a programme of this magnitude, with construction procurement spend alone estimated at R73.1 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 with23 projects still in construction, and 68 of the 91active 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 years[6] have been created for South African citizens, of which 42 355 job years were in construction and 10 248 in operations. These job years

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

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 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

[6] The equivalent of a full-time employment opportunity for one person for one year

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. This represents 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-utcome3. 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.

2.4.2 Green Jobs Study

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

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

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

The analysis reveals the potential of an unfolding green economy to lead to the creation of approximately 98 000 new direct jobs, on average, in the short term, almost 255 000 in the medium term and around 462 000 employment opportunities in the formal economy in the long term. The number of jobs linked to the power generation was estimated to be ~ 12 500 in the short term, 57 500 in the medium

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

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

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

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

Notes:

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

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

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

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

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

Table 2.2: Potential contribution capacity of local industries

Industry	Product/services	Share in turbine cost[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 CO_2 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 very short period of time compared with the project's lifespan. Wind power therefore provides an ideal means for reaching emission reduction targets in a relatively easy manner. In addition, and of specific relevance to South Africa, wind as 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 is owned by local communities. A major drawback for wind energy is that, due to the natural variation in wind power on a daily and/or seasonal basis, back-up base-load generation capacity is imperative to provide stability to the energy supply. Furthermore, as with other renewable energy sources, wind power has relied on incentive measures throughout the world for its development, although its relative competitiveness has been improving continuously.

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

The study notes that South Africa has higher CO_2 emissions per GDPppp (2002 figures) from energy and cement production than China or the USA. 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 National Energy Regulator of South Africa (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 310 MW 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.

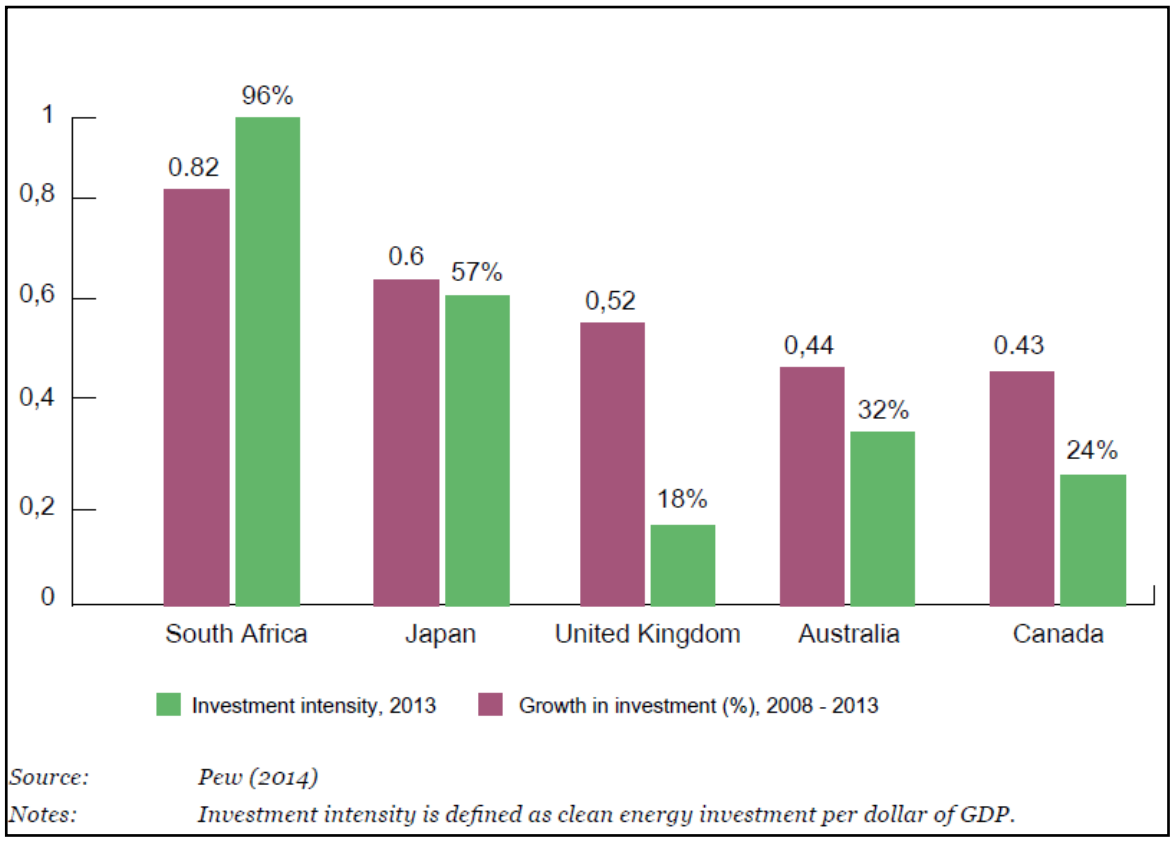
2.4.4 World Wildlife Fund SA, Renewable Energy Vision 2030

In its vision the World Wildlife Fund (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 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 LCOE 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 2.3).



Source: *Pew (2014)*

Notes: *Investment intensity is defined as clean energy investment per dollar of GDP.*

Figure 2.3: 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 flexibly on an 'as needed' basis, as electricity demand grows. This is vital in a highly uncertain environment.

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

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

In terms of employment, the paper refers to the IDC *Green Jobs R*eport (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 DBSA and Trade and Industrial Policy Strategies. Many role players from other organisations were also consulted, including the World Wide Fund for Nature, the Green Building Council, the Economic Development Department and private companies involved in green industries.

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

2.4.6 Potential for local community benefits[7]

In her thesis, Tait[8] 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 B-BBEE 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 B-BBEE 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 B-BBEE 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

[7] These benefits also apply to solar facilities.
[8] 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

responsibilities of business in all sectors definitely has a South African flavour, borne out of the political history of the country and the imperatives for social transformation laid out in the constitution.

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

2.4.7 Market Intelligence Report: Renewable Energy

A study undertaken by GreenCape in 2014 found that the bidding programme is placing increasing pressure on developers to include locally manufactured "key components". The increasing local content requirements are leading to increasing interest in setting up manufacturing opportunities in the country, specifically in the Western Cape.

SECTION 3: OVERVIEW OF STUDY AREA

3.1 INTRODUCTION

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

- The administrative context.
- Overview of the Provincial, District and Local context.
- Demographic overview of the local municipality.
- Overview of the site and adjacent land uses.

3.2 ADMINISTRATIVE CONTEXT

The proposed PV SEF sites are located within the Mpqhaka Local Municipality (MLM), which forms part of the Fezile Dabi District Municipality (Figure 3.1). The Free State Province comprises four (4) Districts, namely Fezile Dabi, Lejweleputswa, Thabo Mofutsanyana and Xhariep (Figure 3.1). The town of Kroonstad serves as the administrative centre for the MLM. The closest large towns to the site are Klerksdorp and Orkney, which are located within the City of Matlosana Local Municipality (CoMLM) in the North West Province.

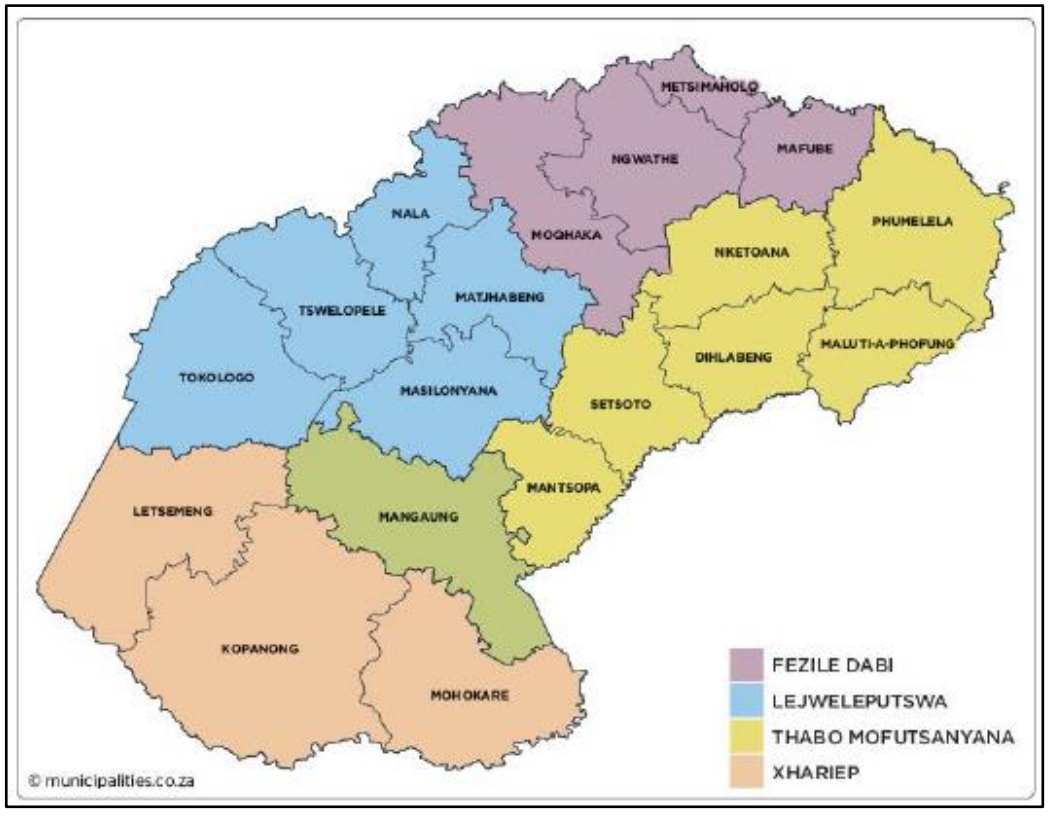


Figure 3.1: Districts of the Free State Province

3.3 FREE STATE PROVINCE

The Free State Province lies in the centre of South Africa, located between the Vaal River in the north and the Orange River in the south. The region is one of flat, rolling grassland and fields of crops, rising to mountains in the north-east. The province is the granary of South Africa, with agriculture central to its economy, while mining in the goldfield reefs is its largest employer.

Economic towns include Welkom, Kroonstad, Parys, QwaQwa, and Bethlehem. The Free State is the third-largest Province in South Africa, but it has the second-smallest population and the second-lowest population density. The culture is centred on traditional cultures but built on the influences of the early European settlers. Close to 2.8-million people live in the Free State, with two-thirds speaking Sesotho, followed by Afrikaans, Zulu, Tswana, Xhosa, and English.

The Free State is strategically placed to take advantage of the national transport infrastructure. Two corridors are of particular importance: the Harrismith node on the N3 corridor between Gauteng and KwaZulu-Natal, and the N8. The N1 connects Gauteng to the Western Cape. Bram Fischer International Airport in Bloemfontein handles about 250 000 passengers and 221 000 tons of cargo a year. Manufacturing also features in the provincial economic profile. This sector makes up 14% of the provincial output, with petrochemicals (via Sasol) accounting for more than 85% of the output.

3.4 FEZILE DABI DISTRICT

The Fezile Dabi District Municipality (FDDM) is a Category C municipality, formerly known as the Northern Free State District Municipality, situated in the north of the Free State. It is bordered by the North West, Gauteng and Mpumalanga Provinces to the north, Thabo Mofutsanyana District to the south, and Lejweleputswa District to the west. The municipality is the smallest district in the province, making up 16% of its geographical area. The main attraction site, the Vredefort Dome, being the third-largest meteorite site in the world, is located within the district.

Various towns are situated within the municipal area which includes Cornelia, Deneysville, Edenville, Frankfort, Heilbron, Koppies, Kragbron, Kroonstad, Oranjeville, Parys, Renovaal, Sasolburg, Steynsrus, Tweeling, Vierfontein, Viljoenskroon, Villiers and Vredefort.

The main economic sectors of the area include trade (22%), community services (20%), manufacturing (13%), households (13%), agriculture (12%), finance (7%), construction (6%) and transport (5%). Fezile Dabi District comprises four Local Municipalities (LMs) namely, Moqhaka, Metsimaholo, Ngwathe and Mafube LMs (Figure 3.2).

Figure 3.2: Local Municipalities of Fezile Dabi District

3.5 MOQHAKA LOCAL MUNICIPALITY

The Moqhaka Local Municipality (MLM) is a Category B municipality situated within the southern part of the Fezile Dabi District Municipality (FDDM) in the Free State Province. It is the largest of four municipalities in the district, making up over a third of its geographical area. The former Kroonstad, Steynsrus and Viljoenskroon Transitional Local Councils and sections of the Riemland, Kroonkop and Koepel Transitional Rural Councils are included in the municipality. The seat of local government is Kroonstad.

The Greater Kroonstad area is the centre of a large agricultural community that plays an important role in the economy of the district. Subsequently, industrial activities contribute significantly to the district's economy. The Department of Correctional Services and the School of Engineers military bases are situated in the town. Kroonstad has recently become a distinguished holiday destination due to the ultra-modern and popular holiday resort of Kroonpark, adjacent to the Vals River. The urban area is situated adjacent to the N1 National Road and located adjacent to one of the largest and most important four-way railway junctions in South Africa.

The Viljoenskroon/Rammulotsi urban area is located within an area of extreme agricultural significance. The urban area plays a significant role in providing residential opportunities to the adjacent goldfields and mining activities in the North West province. The Provincial Roads P15/1 and P15/2 from Kroonstad to Klerksdorp in the North West province extend through the area from north to south and plays a significant role.

The Steynsrus/Matlwangtlwang urban area is situated approximately 45km east of Kroonstad and 92km west of Bethlehem. The major link road between Bethlehem and Kroonstad stretches adjacent to the urban area. The main economic sectors in the area include Agriculture, commercial transport, business services and mining.

3.6 LOCAL MUNICIPAL DEMOGRAPHIC OVERVIEW

Population

The population of the MLM in 2016 was 154 731. Of this total, 32% were under the age of 18, 60.3% were between 18 and 64, and the remaining 7.7% were 65 and older. The MLM therefore has a relatively large young population. This creates challenges in terms of creating employment opportunities.

In terms of race groups, Black Africans made up 87.9% of the population on the MLM, followed by Whites, 9.2% and Coloureds, 2.6%. The main first language spoken in the MLM was Sesotho (87.9%), followed by Afrikaans (11.1%) and IsiXhosa (2.2%).

The high percentage of young people also means that a large percentage of the population is dependent on a smaller productive sector. 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 services. The national dependency ratio in 2011 was 52.7%, similar to that of the e Free State Province (52.9%). The dependency ratio for the MLM 2011 was 51%. The traditional approach is based people younger than 15 or older than 64. The 2016 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).

Using information on people under the age of 18 is therefore likely to represent a more accurate reflection of the dependency ratio. Based on these figures, the dependency ratio for the MLM (2016) was 65.8%. This figure is significantly higher than the national, provincial, and municipal levels in 2011. The higher dependency ratio reflects the limited employment opportunities in the area and represent a significant risk to the district and local municipality.

Households and house types

Based on the information from the 2011 Census most of the households in the MLM reside in formal houses (77.1%). This figure is similar to the District (76.8%) and Provincial (74.4%) figures. Approximately 13.1% of the households in the MLM reside in informal structures.

Based on the information from the 2016 Community Household Survey and 2011 Census 40.9% of the households in the MLM are headed by females. The high number of female headed households at the local municipal and ward level reflects the lack on formal employment and economic opportunities in the MLM. As a result, job seekers from the MLM need to seek work in the larger centres, specifically Gauteng. The majority of the job seekers are likely to be males. This is due to traditional rural patriarchal societies where the role of the women is usually linked to maintaining the house and raising the children, while the men tend to be the ones that migrate to other areas in search of employment.

Household income
Based on the data from the 2011 Census, 8.6% of the population of the MLM had no formal income, 5% earned less than R 4 800, 7.4% earned between R 5 000 and R 10 000 per annum, 22.6% between R 10 000 and R 20 000 per annum and 23.8% between R 20 000 and 40 000 per annum (2016).

The poverty gap indicator produced by the World Bank Development Research Group measures poverty using information from household per capita income/consumption. This indicator illustrates the average shortfall of the total population from the poverty line. This measurement is used to reflect the intensity of poverty, which is based on living on less than R3 200 per month for an average sized household (~ 40 000 per annum). Based on this measure, in the region of 67.4% of the households in the MLM live close to or below the poverty line. The low-income levels reflect the limited employment opportunities and dependence on the agricultural sector. 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 MLM. This in turn impacts on the ability of the NLM to maintain and provide services.

Employment
The official unemployment figures for the MLM were 18.3%. The figures also indicate that the majority of the population are not economically active, namely 44.2%. These figures are similar to the official unemployment rate for the Free State Province (17.5%) and FDDM (18.8%). This reflects the limited employment opportunities in the area, which in turn are reflected in the low income and high poverty levels.

Education
In terms of education levels, the percentage of the population over 20 years of age in the MLM with no schooling was 5.4% in 2011, compared to 3% for the Free State Province. The percentage of the population over the age of 20 with matric was 27.8%, compared to 30.5% for the Province.

3.7 OVERVIEW OF MUNICIPAL SERVICES

Access to water
Based on the information from the 2016 Community Survey 90.6% of households were supplied by a regional or local service provider. However, only 50% of the households had piped water inside their houses, while 44.9% relied on piped water inside the yard. The figures for the FDDM were 48.3% and 45.7% respectively. Only 37.6% of households in the Free State Province have piped water inside their homes.

Sanitation
Based on the information from the 2016 Community Survey, 92.6% of households have access to flush or chemical toilets. 4.9% rely on pit latrine, while 1.5% have no access to toilet facilities. The figures in terms of access to flush or chemical toilets are higher than the FDDM (82.5%).

Refuse collection
Based on the information from the 2016 Community Survey, 89.9% of households have their refuse collected by a local authority of private company. 3.4% rely on communal dumps, while 5.7% have their own dump.

3.8 OVERVIEW OF SITE AND LAND USES

3.8.1 Introduction

The Mercury North PV Cluster is located in the northern Free State Province (FSP), approximately 5 km south of the Vaal River, in the south-central portion of the Klerksdorp Renewable Energy Development Zone (REDZ) (Figure 3.3). The Vaal River constitutes the provincial boundary with the North-West Province (NWP). Administratively, the site falls within the Moqhaka Local Municipality (seated in Kroonstad), one of four local municipalities which constitute the Fezile Dabi District Municipality (Sasolburg).

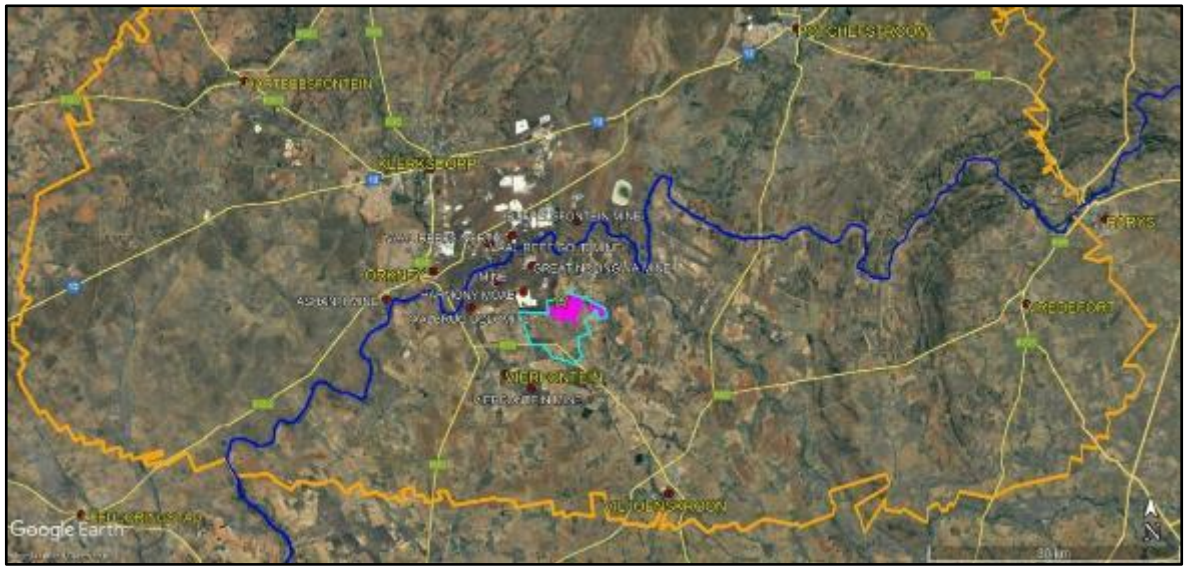


Figure 3.3: Mercury North PV Cluster (pink fill) and larger Mercury PV development area (light blue outline) in context. Dark blue line indicates the provincial boundary (Vaal River), orange outline the Klerksdorp REDZ, and orange star Eskom's Mercury substation.

The area south of the Vaal River is essentially rural in nature including a number of mining operations immediately to the south of the river (Photograph 3.1). The town of Viljoenskroon/ Rammulatosi (Moqhaka) is located approximately 20 km to the south-east of the site, and the small Vierfontein mining settlement ~8 km to the south-west. Larger and more proximate urban areas are located to the north of the Vaal and are historically associated with gold mining. These include Orkney, Vaal Reefs, and Klerksdorp to the north-west, and Stilfontein to the north. Viljoenskroon functions as a local agricultural service centre. Klerksdorp (~20 km) and Potchefstroom (~36 km), both north of the Vaal, are the nearest large towns. Klerksdorp is located within the CoMLM.

Photograph 3.1: Mining operations in area to south of the Vaal River

The R76 Viljoenskroon Road constitutes the key road in the immediate study area (Figure 3.4 and Photograph 3.2). The R76 provides a link between the R30 (Bothaville-Klerksdorp) and Viljoenskroon, where it intersects with the R59 (Bothaville-Vredefort). Interviewees indicated that the road is in a very poor state. This was confirmed during the site visit. Study area properties are accessed directly off the R76 or the intersecting N-S aligned S729 and Vermaasdrift Road. A number of properties are only accessible via internal (private) farm roads within larger farms. The W-E aligned S642 (Vierfontein Road) to the south of the site provides a link between Vierfontein and the R501 (Potchefstroom).

Figure 3.4: Mercury North PV Cluster (pink fill) in relation to affected and adjacent properties (yellow), existing Eskom lines (orange) and local road network, viz Viljoenskroon Road (red), S729 (blue), S642 (purple), Vermaasdrift Road (light pink) and S643 (green).

Photograph 3.2: R76 Viljoenskroon Road and R30 intersection

Photograph 3.3: S729 Road showing typical flat landscape and existing power lines

The Vaal River provides a rough demarcation line between primarily mining-linked land uses located to its north, and agricultural ones to its south. However, a number of mining operations are located to the immediate south of the river). The broader area is historically an important deep-level gold mining area. The sector has been in progressive decline for a number of decades. This is linked to the high costs associated with deep-level mining operations and rising production costs. Active mining has been scaled down at a number of operations. Some focus has shifted to the recovery of uranium from historic tailings.

As indicted above, mining also extends to the south of the Vaal, mostly in proximity to the river, but with the Vierfontein mine (13 km to the south) an outlier. Harmony's Moab Khotsong's mining operation occupies much of the area north-west of the site up to the Vaal. Moab Khotsong began production in 2003 and is currently one of the deepest mines in the world (>3 km). Three ore bodies are mined, including Zaaiplaats adjacent to the north-west of the site. Ores are processed via reverse leaching at a plant at Great Nolingwa Mine for the recovery of gold and uranium.[9]

The Northern Free State is a major producer of staple crops and livestock. Study area farming activities are typically based on a mix of dryland cropping and raising livestock, mainly beef cattle. Employment opportunities are mainly linked to cropping activities, with livestock operations requiring substantially less labour. The region is intensively cropped, an almost-continuous patchwork of fields often occupying entire properties. In the study area irrigated cropping is largely (but not exclusively)

[9] https://www.harmony.co.za/business/sa/moab-khotsong

associated with the immediate confines of the Vaal River Valley. Farming operations typically consist of a number of properties, often but not necessarily contiguous. Larger operations often lease additional land. There is a tendency towards larger operations in order to maintain a viable economy of scale in the face of continuously rising input costs. Key crops include maize, soy, and wheat. Cropping operations are sensitive to traffic which may impede access to silos during harvesting times (various crops), and infrastructure which may impede the movement of implements and crop dusters (e.g., overhead power line pylons and lines).

Fields on a few properties have been allowed to revert to veld, but the majority of properties are actively cropped. Relatively few sizeable tracts of veld have survived in the immediate study area. The natural grazing resource is typically supplemented with harvest residue. The study area's location in proximity to large urban areas to the north of the Vaal makes it suitable for finishing beef cattle for the market in feedlots. Two grain silo complexes, a feed factory and an abattoir are located in Viljoenskroon. Silos are also located at Vierfontein (Photograph 3.4).

Photograph 3.4: Silos to the south of Viljoenskroon Road

The study area settlement pattern is sparse and concentrated along public roads. As indicated, operations typically consist of a number of properties, many of which are used exclusively for agricultural purposes (i.e., contain no structures). Owners typically reside on base farms in the broader study area or in Viljoenskroon. The consolidation of properties into larger operations has meant that farmsteads on a number of properties have become redundant, and are either no longer inhabited, or leased out as accommodation to local mines, etc. Farm labourer families continue to reside on a few farms (mainly base farms), but the general tendency is towards making use of labourers residing in Viljoenskroon/ Rammulotsi transported in on a daily basis.

Eskom's large Mercury substation is located immediately to the north of the site (Photograph 3.5). Ten lines currently feed in/out of Mercury, viz. 4 x 400 kV lines and 6 x 132 kV lines. Nine of the relevant lines feed in/out from the west. These include 132 kV lines feeding into a number of smaller substations associated with mines in the area.

Photograph 3.5: Eskom Mercury Substation

The Vaal River is the only major tourism anchor in the local area, with a number of resorts located along its banks. The nearest, Wawielpark, is located ~6 km to the north of the site (Photograph 3.6). The Wilde Voel Private Nature area is also located ~ 3-4 km to the north of the site. Other accommodation facilities in the broader area cater mainly to essential travel. No significant scenic resources are located in the study area. This is linked to the predominance of transformed landscapes (mining, seasonal monoculture cropping) and the relatively flat landscape (limited sight distances).

Photograph 3.6: Entrance to Wawielpark Holiday Resort on the Vaal River

3.8.2 Site properties

The Mercury North cluster is proposed on (portions of) 7 contiguous and near-contiguous properties (Figure 3.5).

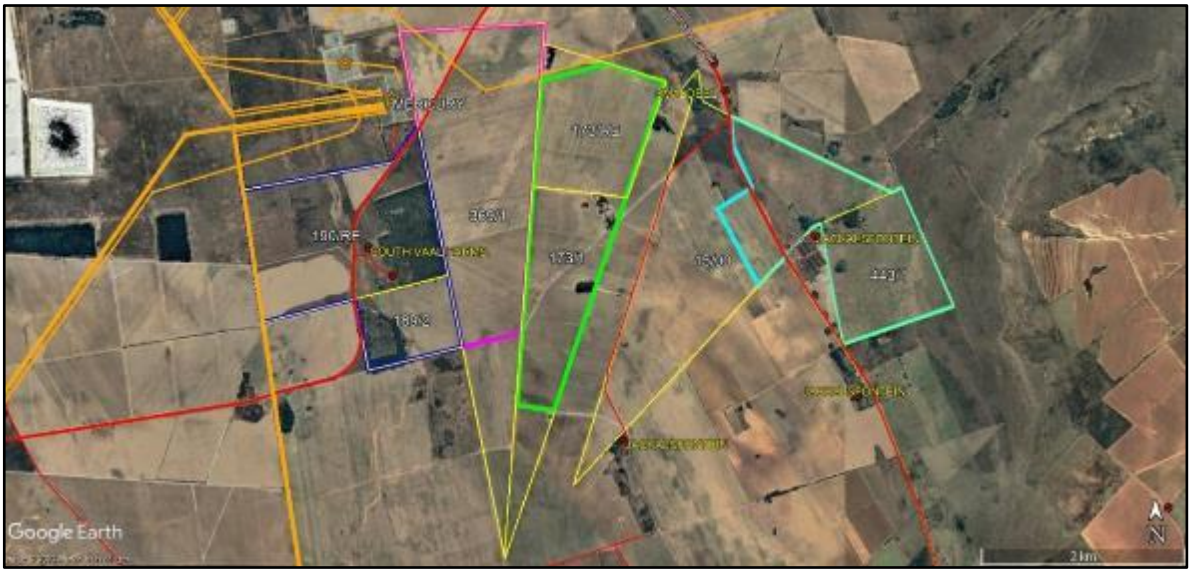


Figure 3.5: Proposed Zaaiplaats PV (dark blue outline), Kleinfontein PV (pink), Biesiefontein PV (green) and Vlakfontein PV (light blue) sites in

relation to site properties, road network (red lines) and existing Eskom lines (orange).

The 7 relevant properties are owned by three different land owners, viz. Mr Peet Botha (Zaaiplaats PV site), Ms Beverley Gossayn (Kleinfontein PV, Biesiefontein PV), and Mr John Gossayn (Vlakfontein) (Table 3.1).

Table 3.1: Overview of affected North Cluster properties

PROPERTY	OWNER	FARMED	LAND USES
Zaaiplaats 190/RE	Peet Botha Family Trust	Mr Peet Botha	Residential; Dryland cropping, grazing; Zaaiplaats PV site
Fraai Uitzicht 189/02			Dryland cropping, grazing; Zaaiplaats PV site
Kleinfontein 369/1	Gossayns Beleggings (Ms Beverley Gossayn)	Mr John Gossayn	Dryland cropping, grazing; Kleinfontein PV site
Biesiefontein 173/RE	Beverley Gossayn Trust		Dryland cropping, grazing; Biesiefontein PV site
Biesiefontein 173/1			Dryland cropping, grazing; Biesiefontein PV site
Vlakfontein 15	Alic Gossayn Pty Ltd		Dryland cropping, grazing; Vlakfontein PV site
Jackalsfontein 443/1			Dryland cropping, grazing; Vlakfontein PV site

Mr Gossayn also farms the properties which belong to his sister, Ms. Beverley Gossayn. The site properties therefore effectively form part of two farming operations, namely those of Mr Peet Botha (Peet Botha Boerderye) and Mr John Gossayn (Alic Gossayn Pty Ltd). Both operations significantly extend beyond the site properties. Mr Gossayn and Ms Gossayn both reside in Viljoenskroon. Mr Botha resides on Paradys (base farm), approximately 4.6 km north-east of the site. The site properties are primarily used for cropping purposes, supplemented by grazing. The relevant portions of Biesfiefontein and Kleinfontein and the portion of Vlakfontein south of the Vermaasdrift road consist of high potential soils and are essentially cropped in their entirety. Most of Zaaiplaats 190/RE and Jackalsfontein 443/1 are considered less suitable for cropping. Dwellings are located only on Zaaiplaats 190/RE. The farmstead is inhabited by a farm manager. The labourers' houses on the property are currently leased out to Harmony Moab (Peet Botha, pers. comm) (Photograph 3.7).

Photograph 3.7: Dwellings located on Zaaiplaats PV SEF area located to the east of S729 Road

An Eskom power line runs along the western boundary of the Zaaiplaats PV SEF (Photograph 3.8). Photograph 3.9 provides an overview of area occupied by the Kleinfontein and Biesiefontein PV SEFs from the Vermaasdrift Road, located to the east of two sites. The Eskom transmission line runs along the northern section of the cluster.

Photograph 3.8: Eskom power lines located to west of Zaaiplaats PV SEF

Photograph 3.9: View looking west from Vermaasdrift Road towards Kleinfontein and Biesiefontein PV SEF sites

3.8.3 Adjacent properties

The Mercury North PV Cluster site is adjacent to 17 properties (Figure 3.6).

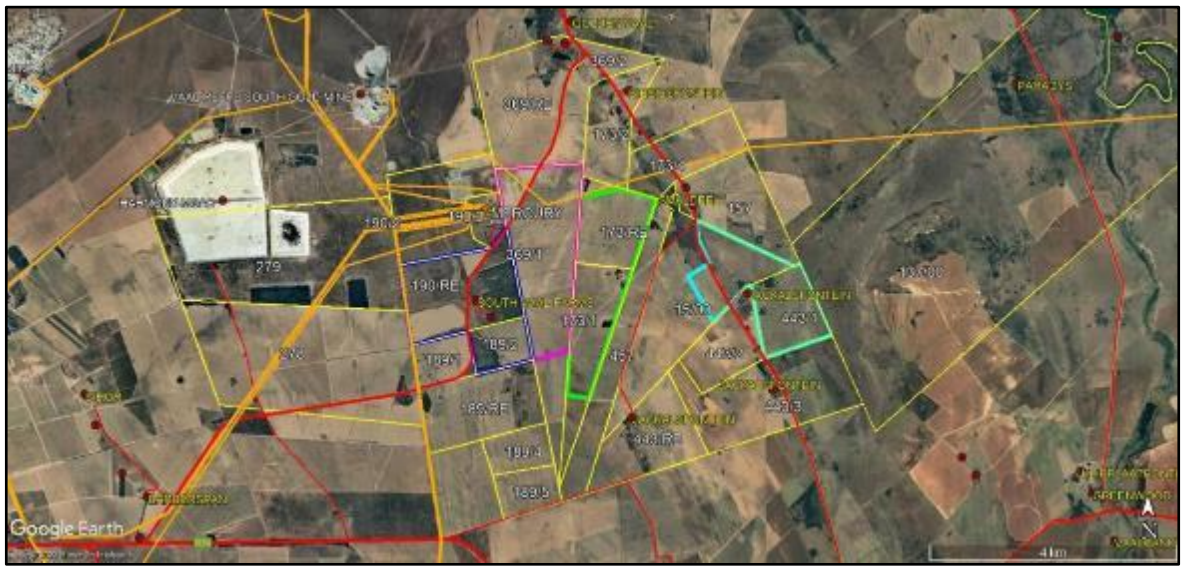


Figure 3.6: Proposed Zaaiplaats PV (dark blue outline), Kleinfontein PV (pink), Biesiefontein PV (green) and Vlakfontein PV (light blue) sites in relation to site- and adjacent properties, road network (red lines) and existing Eskom lines (orange)

The majority (14) of the adjacent properties are used for agricultural purposes, the balance accounted for by mining (Moab 279) and Portions 2 and 3 of Zaaiplaats 190 occupied by Mercury substation (Table 3.2).

Table 3.2: Overview of properties adjacent to Mercury PV North Cluster development properties (clockwise from north).

PROPERTY	OWNER	FARMED	LAND USES
Kleinfontein 369/RE	JS& AMP Muller	Mr Hansie Muller Sr	Residential (labourers) Dryland cropping, grazing
Kleinfontein 369/2	Hansie Muller Voerkraal Trust		Dryland cropping, grazing
Biesiefontein 173/2	JS& AMP Muller		Residential (farmstead and labourers) Dryland cropping, grazing
Biesiefontein 173/4			Dryland cropping, grazing
Uitval 457	Beverley Gossayn Trust	Mr John Gossayn	Dryland cropping, grazing
Smaldeel 157	Gerrit Botha Trust	Messers Arnold and Gerrit Botha	Residential (secondary) Dryland cropping, grazing

Paradys 137/RE	Botha's Shalom Boerdery Pty Ltd	Mr Peet Botha	Residential (base farm) Dryland & irrigated cropping, grazing
Jackalsfontein 443/3	Jackalsfontein CC	Mr Hansie Muller Jr	Dwelling uninhabited Dryland cropping, grazing
Jackalsfontein 443/2	Outback Trust		Residential (base farm) Dryland cropping, feedlot
Jackalsfontein 443/RE	Gregory Gossayn Trust	Mr John Gossayn	Structures uninhabited Dryland cropping, grazing
Fraai Uitzicht 189/5	Beverley Gossayn Trust		Dryland cropping, grazing
Fraai Uitzicht 189/4	Gossayns Beleggings		Dryland cropping, grazing
Fraai Uitzicht 189/RE	Alic Gossayn Pty Ltd		Dryland cropping, grazing
Gerar 278	Peet Botha Family Trust	Mr Peet Botha	Dryland cropping, grazing
Moab 279	Harmony Moab Khutsong		Gold and Uranium mining
Zaaiplaats 190/2	Eskom		Mercury substation
Zaaiplaats 190/3			

The 14 properties used for farming purposes are effectively farmed by five operations, viz. those of Mr Peet Botha (see above), Mr John Goussyn (see above), Messrs Arnold (father) and Gerrit (son) Botha, Mr Hansie Muller Snr, and Mr Hansie Muller Jr. Messrs Arnold and Gerrit Botha's operation is based on Vrede farm near Vierfontein further to the south-west of the site. Mr Muller Snr's operation is based on Biesiefontein 173/2 (adjacent to Biesiefontein PV site), and that of Mr Muller Jr's on Jackalsfontein 443/2 (adjacent to Vlakfontein PV site). All the farmed properties are primarily used for dryland cropping. The Vermaasdrift Road serves a rough demarcation line between high potential soils located to the west of the road, and lower potential ones to the east. Natural veld is therefore essentially limited to property portions located east of the road. All operations are mixed, i.e., include a livestock component, mainly beef cattle. A feedlot is located on Jackalsfontein 443/2 (Mr Muller Jr). Inhabited dwellings are located on only four properties, namely Biesiefontein 173/2, Jackalsfontein 443/2, Paradys 137/RE and Smaldeel 157.

3.8.4 Relationship to receptors

Potentially sensitive social receptors in significant proximity to the PV cluster site are limited. This is linked to the sparse settlement pattern in general, and the absence of dwellings on most properties. As indicated above, the land uses to the north of the study area have been affected by mining and the Mercury substation. The areas to the west, east and south consist of intensively cropped land largely associated with maize. The relatively flat landscape limits sighting distances. No tourism receptors are located in significant proximity to the site.

Table 3.3: Overview of North Cluster sites in relation to receptors on site- and adjacent properties

PROPERTY	ACCESS	DWELL	COMMENT
Zaaiplaats 190/RE	S729	Within	Zaaiplaats PV site; existing 1 x 132 kV
Fraai Uitzicht 189/02	S729	n.a.	Zaaiplaats site
Kleinfontein 369/1	S729	n.a.	Kleinfontein site; existing 1 x 400 kV
Biesiefontein 173/RE	S729	n.a.	Biesiefontein site; existing 1 x 400 kV
Biesiefontein 173/1	S729	n.a.	Biesiefontein site
Vlakfontein 15	Vermaasdrift Rd	n.a.	Vlakfontein site
Jackalsfontein 443/1	Vermaasdrift Rd	n.a.	Vlakfontein site
Kleinfontein 369/RE	Vermaasdrift Rd	2 km	Labourer's houses; existing 1 x 400 kV
Kleinfontein 369/2	Vermaasdrift Rd	n.a.	
Biesiefontein 173/2	Vermaasdrift Rd	1.4 km	Primary residence; Existing 1 x 400 kV
Biesiefontein 173/4	Vermaasdrift Rd	n.a.	Existing 1 x 400 kV
Uitval 457	Vermaasdrift Rd	n.a.	
Smaldeel 157	Vermaasdrift Rd	230 m	Dwelling occupied by guest
Paradys 137/RE	Vermaasdrift Rd	4.6 km	Owner of Zaaiplaats PV site Primary residence
Jackalsfontein 443/3	Vermaasdrift Rd	500 m	Dwelling/ structure not inhabited
Jackalsfontein 443/2	Vermaasdrift Rd	80 m	Primary residence; Feedlot
Jackalsfontein 443/RE	Vermaasdrift Rd	750 m	Dwelling/ structure not inhabited
Fraai Uitzicht 189/5	Viljoenskroon Rd	n.a.	
Fraai Uitzicht 189/4	Viljoenskroon Rd	n.a.	
Fraai Uitzicht 189/RE	S729	n.a.	Existing 1 x 132 kV
Gerar 278	S729	n.a.	Existing 3 x 132 kV
Moab 279	S729	n.a.	Harmony Moab Khotsong; Existing 5 x 132 kV
Zaaiplaats 190/2	S729	n.a.	Eskom Mercury substation; Existing 4 x 400 kV; 6 x 132 kV lines
Zaaiplaats 190/3	S729	n.a.	

Most of the relevant properties are unoccupied. The dwellings on Zaaiplaats 190/RE would need to be demolished to make way for the proposed Zaaiplaats PV. The owner has indicated that the dwellings are dispensable within his operation, the farmstead being occupied by a farm manager, and the labourers' dwellings leased out to Harmony Moab (Peet Botha – pers. comm). The owners of the balance of properties with dwellings located within 2 km of the site raised no issues with regard to the proposed layout. It should however be noted that the Vlakfontein site is located immediately adjacent to feedlots on Jackalsfontein 443/2, and that PV panels near the feedlots may be subjected to ongoing dust impacts (Muller, pers. comm).

The affected properties are primarily accessed off either the Viljoenskroon Rd (R76), Vermaasdrift Road, or the S729. The final access has not been finalised. Existing Eskom lines are concentrated to the west of Mercury substation, mainly affecting Gerar 278 and Moab 279. A single 132 kV line is located just inside the western boundary of Zaaiplaats 190/RE and Portion 1 and the Remainder of Fraai Uitzicht 189. A single 400 KV feeding in/ out of Mercury to the east traverses Kleinfontein 369/1 and Biesiefontein 173/4, and marginal portions of Kleinfontein 369/RE, Biesiefontein 173/RE and 173/2.

3.8.5 Other renewable energy projects

The Mercury PV North Cluster site falls within the Klerksdorp REDZ. In as far as could be established, no operational REFs are curretly located in significant proximity to the site. The nearest operational facility, the 68MW Bokamoso PV SEF, is located 42 km

SW of the site, near Leeudoringstad. Bokamoso achieved commercial production in 2020.[10] A total of 12 REF projects have historically been proposed or are currently being proposed within a 35 km radius of the site (Figure 3.7). These include three 'Cluster' developments currently being proposed (different applications), viz. Mercury South and North, and Red Rocket's Dominion Cluster located ~ 5km west of Klerksdorp. All of the projects involve PV SEFs.

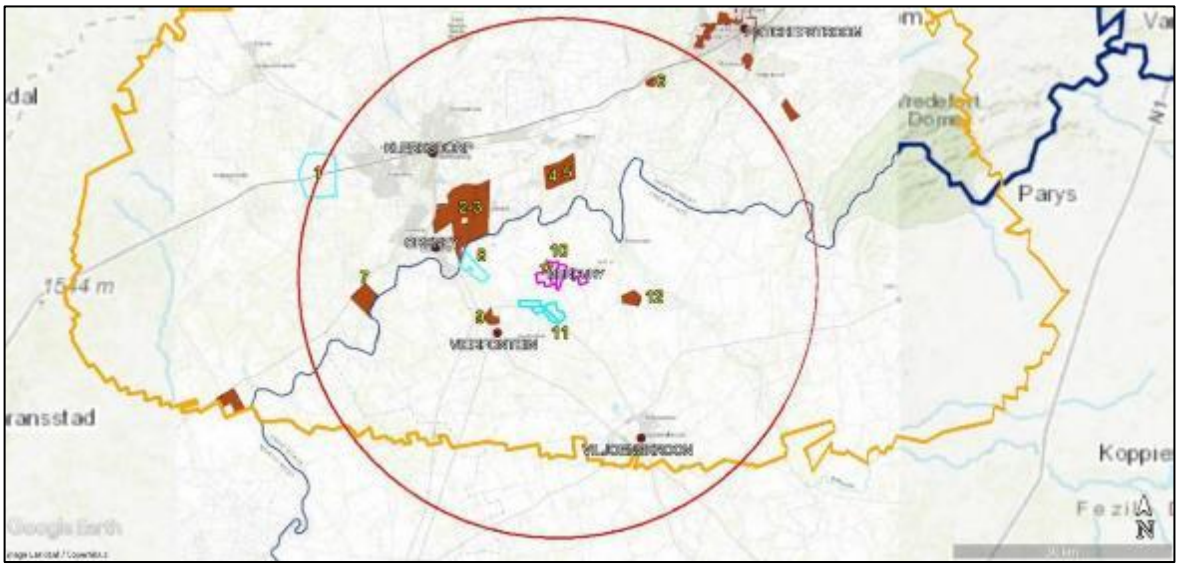


Figure 3.7: Proposed Mercury North Cluster site (pink) in relation to historic and current REF applications within 35 km radius of the site.[11] Parallel applications not yet reflected on the DFF&E's map above outlined in light blue; Klerksdorp REDZ outlined in orange.

The DFF&E's Renewable Energy website and other sources indicate that historic applications in the study area date back to 2010 (Table 3.4). Environmental application processes are currently being conducted concurrently for the two Mercury- and the Dominion Cluster projects. A BAR was approved for the proposed 150 MW Paleso PV SEF to the south of the Vaal River in 2021.

In conclusion, while this portion of the Klerksdorp REDZ had historically witnessed limited applications and no operational SEFs are currently located in significant proximity to the site, at least 3 'cluster'-type facilities (including Mercury North) are currently proposed within a 30 km of another (total of 1 075 MW).

[10] https://bokamososolar.co.za/
[11] https://egis.environment.gov.za/renewable_energy (Updated February 2022).

Table 3.4: Historic and current REF applications within 35 km of the Mercury North Cluster SEF site

	PROJECT	TYPE	MW	APPLICANT	STATUS
1	Dominion Cluster	PV SEF	300	Red Rocket	In process
2	Orkney PV	PV SEF	100	Genesis Orkney	EIA 2016
3	Kabi Vaalkop	PV SEF	???	Kabi Solar	Amendment 2017
4	Witkop Solar 2	PV SEF	61	???	EIA 2013
5	Buffels 1	PV SEF	75	???	EIA 2015
6	Buffels 2	PV SEF	100	Kabi Solar	EIA 2014
7	???	PV SEF	50	Omega Invest	EIA 2010
8	Paleso[12]	PV SEF	150	Paleso Solar	BAR 2021
9	Rietvlei	PV SEF	50	Keren properties	EIA 2012
10	Mercury North Cluster	PV SEF	400	Various	In process
11	Mercury South Cluster	PV SEF	275	Various	In process
12	???	PV SEF	50	Afropause 538	BAR 2011

12 https://sahris.sahra.org.za/sites/default/files/additionaldocs/Paleso%20Draft%20Basic%20Assessment%20Report.pdf

SECTION 4: ASSESSMENT OF KEY SOCIAL ISSUES

4.1 INTRODUCTION

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

- Review of project related information, including other specialist studies.
- Site visit and interviews with key interested and affected parties.
- 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 of key policy and planning documents indicates that renewable energy is 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, highlight the importance of renewable energy. The proposed project also supports a number of objectives contained in the Free State Province Provincial Growth and Development Strategy and Free State Green Economy Strategy. At a district and local level, the Moqhaka Local Municipality IDP and SDF support the development of renewable energy. The site is also located within the Klerksdorp REDZ. The area has therefore been identified as suitable for the establishment of renewable energy facilities.

4.3 CONSTRUCTION PHASE SOCIAL IMPACTS

The key social issues and associated significance ratings for the construction phase apply to each of the four 100 MW PV SEFs associated with the Northern PV SEF Cluster, namely the:

- Zaaiplaats 100 MW Solar PV1.
- Kleinfontein 100 MW Solar PV1.
- Biesiefontein 100 MW Solar PV1.
- Vlakfontein 100 MW Solar PV1.

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 for a 100 MW PV is expected to extend over a period of ~ 18 months and create approximately 250-300 employment opportunities during peak construction. Based on similar PV SEF projects the total wage bill for the construction phase is estimated to be in the region of R 30 million (2022 Rand value). Depending on the timing and phasing the proposed PV SEFs, the total number of employment opportunities associated with the Northern Cluster would be in the region of 800-1 000. The total wage bill for the Northern Cluster would be in the region of 100-120 million (2022 Rand value).

It is anticipated that approximately 60% of the employment opportunities will be available to low skilled workers (construction labourers, security staff etc.), 25% for semi-skilled workers (drivers, equipment operators etc.) and 15% for skilled personnel (engineers, land surveyors, project managers etc.). Members from the local communities in the area, specifically Klerksdorp and Orkney, would be in a position to qualify for the majority if low skilled and semi-skilled employment opportunities. There are also likely to be opportunities for skilled workers from Klerksdorp and Orkney. The majority of these employment opportunities are also likely to accrue to Historically Disadvantaged (HD) members from these towns.

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 contactors 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 capital expenditure associated with the construction of a 100 MW PV will be in the region of R 1.8-2 billion (2022 Rand value). The total capital expenditure for the Northern Cluster would be in the region of 7.2-8 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. Given the established mining sector in the area there are likely to be suitably qualified local contractors and engineering companies located in Klerksdorp and Orkney that could

benefit from the project. Implementing the enhancement measures listed below can enhance these opportunities. The local service industry will also benefit from the development. The potential opportunities for the local service sector would be linked to accommodation, catering, cleaning, transport, and security, etc. associated with the construction workers and contract staff. The hospitality industry in the area will also 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. A percentage of the wage bill (~R 30 million) will be spent in the local economy which will also create opportunities for local businesses in the area.

The implementation of the proposed enhancement measures listed below would also enable the establishment of the proposed SEF to support co-operation between the public and private sectors, which would support local economic development in the MLM.

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 years[13] 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

[13] The equivalent of a full-time employment opportunity for one person for one year.

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%.

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

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

Assessment of No Go option

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

Recommended enhancement measures

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

Employment

- Where reasonable and practical, the proponent should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. However, due to the low skills levels in the area, the majority of skilled posts are likely to be filled by people from outside the area.
- Where feasible, efforts should be made to employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria.
- Before the construction phase commences the proponent should meet with representatives from the MLM and CoMLM to establish the existence of a skills database for the area. If such as 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 MLM and CoMLM 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 MLM, 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.

Due to the location of the proposed site no workers will be accommodated on site. Based on experience with other renewable energy projects, local farmers are not in favour of a construction workers being accommodated on the site due to potential safety and security risks they pose.

The majority of non-local construction workers are likely to be accommodated in Klerksdorp and Orkney. As indicated above, the majority of low skilled and semi-skilled work opportunities can be taken up by members from the local community. Employing members from the local community to fill these job categories will reduce the risk and mitigate the potential impacts on the local communities. Where possible these workers should be sourced from the surrounding towns of Klerksdorp and Orkney. 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 area are high. The creation employment opportunities for low and semi-skilled workers from the area would therefore represent a positive socio-economic benefit. While the risks associated with construction workers at a community level will be low, at an individual and family level they may be significant, especially in the case of contracting a sexually transmitted disease or an unplanned pregnancy. This has been borne out from the experiences with other solar energy projects in the Northern Cape Province, for example projects located near Poffadder. However, given the nature of construction projects it is not possible to totally avoid these potential impacts at an individual or family level.

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

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

Assessment of No Go option

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

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:

- The proponent should prepare a Stakeholder Engagement Plan (SEP) and Community Health, Safety and Security Plan (CHSSP) prior to commencement of construction phase.
- 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 MLM Councillor, 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 contactor 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		
Cumulative impacts: Impacts on family and community relations that may, in some cases, persist for a long period of time. Also, in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.		
Residual impacts: See cumulative impacts.		

Assessment of No-Go option
There is no impact as it maintains the current status quo.

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

- The proponent, in consultation with the MLM and CoMLM, 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 famers 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 risk to farming operations and increased risk of crime was raised as a key issue by the local landowners. 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 safety and security risks of associated with construction phase would be higher if all of the PV SEFs associated with the Northern Cluster are constructed concurrently. This is directly linked to the increase in the number of construction workers in the area.

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 farmers and farm workers, livestock and damage to farm infrastructure associated with the presence of construction workers on site		
	Without Mitigation	**With Mitigation**
Extent	Local (3)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	Medium (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (33)	Low (24)
Status	Negative	Negative
Reversibility	Yes, compensation paid for stock losses and damage to farm infrastructure etc.	Yes, compensation paid for stock losses and damage to farm infrastructure etc.
Irreplaceable loss of resources?	No	No

Can impact be mitigated?	Yes
Mitigation: See below	
Cumulative impacts: No**,** provided losses are compensated for.	
Residual impacts: See cumulative impacts.	

Assessment of No-Go option
There is no impact as it maintains the current status quo.

Recommended mitigation measures
Key mitigation measures include:

- The proponent should prepare a Stakeholder Engagement Plan (SEP) and Community Health, Safety and Security Plan (CHSSP) prior to commencement of 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.
- 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 (CoC) 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 loses 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 risk of grass fires that could, in turn pose, a threat to livestock, crops, and farm infrastructure. Grass fires were identified aa a concern and pose a threat to livestock and farming operations. The potential risk of grass fires is heightened by the windy conditions in the area, specifically during the dry, windy winter months from May to October. The risk of grass fires would be higher if all of the PV SEFs associated with the Northern Cluster are constructed concurrently. This is directly linked to the increase in construction related activities and number of construction workers on site.

In terms of potential mitigation measures the option of constructing a firebreak around the perimeter of the site prior to the commencement of the construction phase should be investigated. In addition, a fire-fighting vehicle should be present on the site during the construction phase.

Table 4.5: Assessment of impact of increased risk of grass fires

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

Assessment of No-Go option
There is no impact as it maintains the current status quo.

Recommended mitigation measures
The mitigation measures include:

- The proponent should enter into an agreement with the local farmers in the area whereby damages to farm property etc., during the construction phase will be

compensated for. The agreement should be signed before the construction phase commences.

- The option of establishing a fire-break around the perimeter of the site prior to the commencement of the construction phase should be investigated.
- Contractor should ensure that open fires on the site for cooking or heating are not allowed except in designated areas.
- Smoking on site should be confined to designated areas.
- Contractor to ensure that construction related activities that pose a potential fire risk, such as welding, are 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, including the movement of heavy construction vehicles, have the potential to create noise, dust, and safety impacts and damage roads, specifically unsurfaced farm roads. Damage caused by movement of heavy construction vehicles along local roads, specifically the S729 and Vermaasdrift Road, and impact on access to the silos at Vierfontein and Viljoenskroon, specifically during harvesting period of May to July, were raised as key concerns. The roads are in a poor condition following the recent heavy rains. The risk of damage to roads and impacts associated with construction related activities would be higher if all of the PV SEFs associated with the Northern Cluster are constructed concurrently.

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.

Table 4.6: **Assessment of the impacts associated with construction vehicles**

Nature: Potential noise, dust and safety impacts associated with movement of construction related traffic to and from the site		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (1)
Duration	Short Term (2)	Short Term (2)
Magnitude	Medium (6)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Medium (30)	Low (15)
Status	Negative	Negative

Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Mitigation: See below		
Cumulative impacts: If damage to local farm roads is not repaired then this will affect the farming activities in the area and result in higher maintenance costs for vehicles of local farmers and other road users, and also impair access to silos. The costs will be borne by road users who were not responsible for the damage. Dust impacts to crops could also impact on quality.		
Residual impacts: See cumulative impacts		

Assessment of No-Go option
There is no impact as it maintains the current status quo.

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

- The movement of heavy vehicles associated with the construction phase should be timed to avoid times of the week, such as weekends, when the volume of traffic travelling along the local roads in the area may be higher.
- Damage to S729 and Vermaasdrift Road, and other local farm roads that may be impacted, should be repaired throughout the construction period.
- Construction related activities and movement of traffic should ensure that access to silos at Vierfontein and Viljoenskroon, specifically during harvesting period of May to July, is not impaired.
- Construction operations should be planned to minimise the total area cleared at any given time.
- Construction operations that have the potential to generate significant dust impacts, such as site clearance etc, should be timed to avoid harvesting times.
- Cleared areas should be rehabilitated once the construction phase has been completed.
- Dust suppression measures must be implemented on un-surfaced roads, such as wetting on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.
- All vehicles must be road-worthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.

4.3.7 Impacts associated with loss of farmland

The activities associated with the construction phase have the potential to result in the loss of land available for crop production and grazing. The comments from the affected landowners are summarised below:

- Zaaiplaats PV: The owner indicted that there were no concerns with the proposed layout. Only portions of the relevant properties are considered suitable for cropping. The loss of cropped areas can be accommodated within the larger operation. The farm house on Zaaiplaats 190/RE is occupied by a farm manager, who could be relocated. The farm labourer dwellings on the property are leased out

to Harmony Moab and are dispensable to the operation's needs (Peet Botha – pers. comm).

- Kleinfontein PV: The site would occupy higher potential cropped land on Kleinfontein 369/1. The loss of arable land is not ideal but could be absorbed by the larger Alic Gossayn farming operation (e.g., by leasing or buying additional land), provided the income from the SEF would compensate for the lost income generated by the current farming operations (John Gossayn, pers. comm).
- Biesiefontein PV: Biesiefontein 173/RE and 173/1 are currently used almost in their entirety for cropping purposes, i.e., located on higher potential soils. The loss of arable land is not ideal but could be absorbed by the larger farming operation (e.g., by leasing or buying additional land), provided the income from the SEF would compensate for the lost income generated by the current farming operations (John Gossayn, pers. comm).
- Vlakfontein PV: The Vlakfontein PV site would mostly affect areas that are not considered suitable for cropping on Vlakfontein 15 and Jackalsfontein 443/3. Only a relatively small cropping area located adjacent to the south of the Vermaasdrift Road would be affected. The loss of grazing and arable land associated with the site is not irreplaceable within the larger Alic Gossayn farming operation, provided the provided the income from the SEF would compensate for the lost income generated by the current farming operations (John Gossayn, pers. comm). The owners of the adjacent Jackalsfontein 443/2 farm indicated that potential for land use conflict may exist, as the feedlot on the property (Hansie Muller Voerkrale) generates significant localized dust, i.e., may impact on panels (Muller, pers. comm).

Good quality agricultural land is a scarce and finite resource. The loss of high-quality agricultural land should therefore be avoided and or minimised by careful planning in the final layout of the proposed PV SEF facilities. The final disturbance footprint can be reduced by careful site design and management of operation. The impact on farmland associated with the construction phase can also be mitigated by minimising the footprint of the construction related activities and ensuring that disturbed areas are fully rehabilitated on completion of the construction phase. Recommended mitigation measures are outlined below.

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

Nature: The activities associated with the construction phase, such as establishment of access roads and the construction camp, movement of heavy vehicles and preparation of foundations for the SEF and power lines will damage farmlands and result in a loss of farmlands for grazing.		
	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Long term-permanent if disturbed areas are not effectively rehabilitated (5)	Short term if damaged areas are rehabilitated (2)
Magnitude	Medium (6)	Minor (2)
Probability	Probable (3)	Highly Probable (4)
Significance	Medium (36)	Low (20)
Status	Negative	Negative

Reversibility	Yes, disturbed areas can be rehabilitated	Yes, disturbed areas can be rehabilitated
Irreplaceable loss of resources?	Yes, loss of farmland. However, disturbed areas can be rehabilitated	Yes, loss of farmland. However, disturbed areas can be rehabilitated
Can impact be mitigated?	Yes, however, loss of farmland cannot be avoided	
Mitigation: See below		
Cumulative impacts: Overall loss of farmland could affect the livelihoods of the affected farmers, their families, and the workers on the farms and their families. However, disturbed areas can be rehabilitated.		
Residual impacts: See cumulative impacts.		

Assessment of No-Go option
There is no impact as it maintains the current status quo.

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

- The loss of high-quality agricultural land should be avoided and or minimised by careful planning in the final layout of the proposed PV SEF facilities. The recommendations of the agricultural / soil assessment should be implemented.
- 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 key social issues and associated significance ratings for the operation phase apply to each of the four 100 MW PV SEFs associated with the Northern PV SEF Cluster, namely the:

- Zaaiplaats 100 MW Solar PV1.
- Kleinfontein 100 MW Solar PV1.
- Biesiefontein 100 MW Solar PV1.
- Vlakfontein 100 MW Solar PV1.

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.
- Create opportunity for improved security.

Potential negative impacts
- The visual impacts and associated impact on sense of place.
- Potential impact on property values.
- 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 CO_2 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 CO_2. 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 CO_2 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 years[14] 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 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.

[14] The equivalent of a full-time employment opportunity for one person for one year

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		
Cumulative impacts: Overall reduction in CO_2 emission, reduction in water consumption for energy generation, contribution to establishing an economically viable commercial renewables generation sector in the Northern Cape and South Africa.		
Residual impacts: See cumulative impacts		

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

Recommended mitigation measures
Should the project be approved the proponent should:

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

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

Based on information from other projects a single SEF would create ~ 20 permanent employment opportunities for over a 20 year period. The total number of employment opportunities created by the Northern Cluster would therefore be ~ 80. 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 llocal employment and skills development contained in the MLM IDP.

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 Klerksdorp and local towns in the area. 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		
Cumulative impacts: Creation of permanent employment and skills and development opportunities for members from the local community and creation of additional business and economic opportunities in the area		
Residual impacts: See cumulative impacts		

Assessment of No-Go option
There is no impact as it maintains the current status quo.

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 Socio-economic Development (SED) initiatives. These contributions are linked to Community Trusts and accrue over the 20-year project operation life and are used to invest in housing and infrastructure as well as healthcare, education, and skills development.

Community Trusts provide an opportunity to generate a steady revenue stream that is guaranteed for a 20-year period. This revenue can be used to fund development initiatives in the area and support the local community. The long-term duration of the revenue stream also allows local municipalities and communities to undertake long

term planning for the area. The revenue from the proposed SEF 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.

SED opportunities will be created by each of the PV SEFs associated with the proposed Northern Cluster.

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. However, Community Trusts can also be mismanaged. This is an issue that will need to be addressed when setting up the Trust.

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

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 Enhancement[15]**
Extent	Local and Regional (2)	Local and Regional (3)
Duration	Long term (4)	Long term (4)
Intensity	Low (4)	Moderate (6)
Likelihood	Probable (3)	Definite (5)
Significance	Medium (30)	High (65)
Status	Positive	Positive
Reversibility	Yes	Yes
Can impact be enhanced?	Yes	
Enhancement: See below		
Cumulative impacts: Promotion of social and economic development and improvement in the overall well-being of the community		
Residual impacts: See cumulative impacts		

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

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

- The MLM 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 MLM should be consulted as to the structure and identification of potential trustees to sit on the Trust. The key departments in the MLM that should be consulted include the Municipal Managers Office, IDP Manager and LED Manager.
- Clear criteria for identifying and funding community projects and initiatives in the area should be identified. The criteria should be aimed at maximising the benefits for the community as a whole and not individuals within the community.
- Strict financial management controls, including annual audits, should be instituted to manage the funds generated for the Community Trust from the SEF plant.

[15] Enhancement assumes effective management of the community trust

4.4.4 Generate income for affected landowners

The proponent will be required to enter into rental/lease agreements with the affected landowners for the use of the land for the establishment of the proposed SEFs. The additional income will assist to reduce the risk to farm livelihoods posed by droughts and fluctuating market prices for livestock, maize, and farming inputs, such as fuel, feed etc. The creation of a guaranteed income over a 20-year period significant benefit for the affected landowners. However, as indicated above, the income from the SEF must compensate for the lost income generated by the current farming operations

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		
Cumulative impacts: Support for local agricultural sector and farming		
Residual impacts: See cumulative impacts		

Assessment of No-Go option
There is no impact as it maintains the current status quo.

Recommended enhancement measures
Implement agreements with affected landowner.

4.4.5 Create opportunity to improve security

The establishment of the proposed PV SEFs will include the provision of security to protect the facilities. This will create an opportunity to improve security in the area which would benefit local landowners. The presence of maintenance personnel on the site and travelling in the area will also create opportunities to monitor local conditions and work with local farming associations to address security and safety issues.

Table 4.12: Create opportunity to improve security in the area

Nature: Provision of security for facilities will create opportunities to benefit local landowners		
	Without Enhancement	**With Enhancement**
Extent	Local (2)	Local (3)
Duration	Long Term (4)	Long Term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Definite (5)
Significance	Medium (30)	High (65)
Status	Positive	Positive
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Mitigation: See below		
Cumulative impacts: Improvement is security for local area.		
Residual impacts: See cumulative impacts.		

Assessment of No-Go option
There is no impact as it maintains the current status quo.

Recommended mitigation measures
Key mitigation measures include:

- The proponent should prepare a Community Health, Safety and Security Plan (CHSSP) prior to commencement of construction phase.
- The CHSSP should be prepared in consultation with local farmers in the area and discuss opportunities to coordinate security related activities.

4.4.6 Visual impact and impact on sense of place

Three mining areas, including the Vaal Reefs mine, and the associated mining infrastructure, slimes dams and overburden dumps are located within 6-10 km of the proposed SEFs. A large slimes dam associated with the mining operations is located 2 km and 3.5km to the west and north west of the Northern and Southern Cluster respectively. The visual character of the areas has also been affected by the Mercury Substation and associated transmission lines. The areas rural sense of place has therefore been impacted by the existing mining operations and transmission infrastructure. The potential impact of the proposed SEFs on the areas rural sense of place and adjacent land uses is therefore likely to be limited. This was confirmed by the feedback from the local landowners interviewed, none of whom raised concerns about potential visual impact on sense of place.

In addition, the site is located within the Klerksdorp REDZ. The area has therefore been identified as suitable for the establishment of renewable energy facilities.

Table 4.13: 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[16]**
Extent	Local (1)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Low (27)	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		
Cumulative impacts: Potential impact on current rural sense of place		
Residual impacts: See cumulative impacts		

Assessment of No-Go option
There is no impact as it maintains the current status quo.

Recommended mitigation measures
The recommendations contained in the VIA should also be implemented.

4.4.7 Potential impact on property values

As indicated above, the areas rural sense of place has been impacted by the existing mining operations and transmission infrastructure. The potential impact of the proposed SEFs on property values is therefore likely to be negligible. This was confirmed by the feedback from the local landowners interviewed, none of whom raised concerns about the potential impact on property values.

[16] Not possible to effectively mitigate visual impacts.

Table 4.14: Assessment of potential impact on property values and operations

Nature: Potential impact of the SEF on property values		
	Without Mitigation	**With Enhancement / Mitigation**
Extent	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Low (24)	Low (24)
Status	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	
Enhancement: See below		
Residual impacts: Linked to visual impact on 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 Agricultural Assessment and VIA should be implemented.

4.4.8 Potential impact on local tourism operations

As indicated above, the areas rural sense of place has been impacted by the existing mining operations and transmission infrastructure. The potential for the proposed SEFs to impact on tourism sector and the perception of visitors to the area is therefore likely to be negligible.

Table 4.15: Potential impact on tourism

Nature: Potential impact of the SEFs 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 of the Northern Cluster (~ 80), 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 4.16: Social impacts associated with decommissioning

Nature: Social impacts associated with retrenchment including loss of jobs, and source of income		
	Without Mitigation	**With Mitigation**
Extent	Local and regional (2)	Local and regional (1)
Duration	Medium Term (2)	Very Short Term (1)
Magnitude	Moderate (6)	Low (4)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	Medium (40)	Low (24)
Status	Negative	Negative

Reversibility	Yes, assumes retrenchment packages are paid to all affected employees	
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Mitigation: See below		
Cumulative impacts: Loss of jobs and associated loss of income etc. can impact on the local economy and other businesses. However, decommissioning can also create short term, temporary employment opportunities associated with dismantling etc.		
Residual impacts: See cumulative impacts		

Recommended mitigation measures

- The proponent should ensure that retrenchment packages are provided for all staff retrenched when the SEFs are decommissioned.
- All structures and infrastructure associated with the proposed facilities 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 concerns raised regarding wind farms and the impacts on landscapes may also apply to solar facilities. However, the components associated with SEFs are less intrusive than WEFs. The visual impacts are therefore likely to potentially be lower.

The relevant issues identified by Scottish Natural Heritage study include:

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

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

The Mercury PV North Cluster site falls within the Klerksdorp REDZ. Based on the available information, no operational REFs are curretly located in significant proximity to the site. The nearest operational facility, the 68MW Bokamoso PV SEF, is located 42 km south west of the site, near Leeudoringstad. A total of 12 REF projects have historically been proposed or are currently being proposed within a 35 km radius of the site (see Figure 3.7). These include three 'Cluster' developments currently being proposed (different applications), namely, Mercury South and North, and Red Rocket's Dominion Cluster located ~ 5km west of Klerksdorp. A BAR was approved for the proposed 150 MW Paleso PV SEF to the south of the Vaal River in 2021. All of the projects involve PV SEFs. There is therefore the potential for cumulative impacts (combined and sequential visibility).

However, as indicated ted above, the areas rural sense of place has been affected by mining activities and the Mercury Substation and associated transmission lines. The potential impact of the proposed SEFs on the areas rural sense of place and the associated potential cumulative impacts are therefore likely to be limited. In addition, the site is located within the Klerksdorp REDZ. The area has therefore been identified as suitable for the establishment of renewable energy facilities.

Table 4.17: 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 SEFs associated with the Northern Cluster and the other renewable energy facilities in the MLM and CoMLM has the potential to place pressure on local services in nearby towns, such as Klerksdorp and Orkney, specifically services such as medical, education and accommodation. This pressure will be associated with the influx of workers to the area associated with the construction 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 local towns such as Klerksdorp and Orkney.

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 MLM and CoMLM, including the opportunity to up-grade and expand existing services.

The Community Trusts associated with each project will generate revenue that can be used by the MLM and CoMLM, in consultation with the Free State Provincial Government, to invest in up-grading local services where required. In 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 MLM and CoMLM.

In addition, the site is located within the Klerksdorp REDZ. The area has therefore been identified as suitable for the establishment of renewable energy facilities.

Table 4.18: Cumulative impacts on local services

Nature: The establishment of a number of renewable energy facilities in the MLM and CoMLM has the potential to place pressure on local services, specifically medical, education and accommodation		
	Without Mitigation	**With Mitigation[17]**
Extent	Local and regional (3)	Local and regional (1)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	Medium (52)	Low (28)
Status	Negative	Negative
Reversibility	Yes. Solar energy plant components and other infrastructure can be removed.	
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Enhancement: See below		
Cumulative impacts: Negative impact on the local services		
Residual impacts: See cumulative impacts		

Comment on No-Go option
There is no impact as it maintains the current status quo.

Recommended mitigation measures
The Free State Provincial Government, in consultation with the MLM and CoMLM and the proponents involved in the development of renewable energy projects in the MLM and CoMLM, 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 MLM.

4.8 CUMULATIVE IMPACT ON LOCAL ECONOMY

In addition to the potential negative impacts, the proposed SEFs associated with the Northern Cluster 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

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

socio-economic opportunities for the MLM, 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 4.19: Cumulative impacts on local economy

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

Enhancement: See below
Cumulative impacts: Positive impact on the local and regional economy through the creation of downstream opportunities and wage spend in the local economy
Residual impacts: See cumulative impacts

Assessment of No-Go option

There is no impact as it maintains the current status quo. This would represent a lost socio-economic opportunity for the MLM and CoMLM.

Recommended mitigation measures

The proposed establishment of suitably sited renewable energy facilities within the MLM, CoMLM and Klerksdorp REDZ 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 is 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 Northern Cluster PV SEF development proposal is not unique. In that regard, a significant number of other renewable energy developments are currently proposed in the Free State 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 Free State and or South Africa. However, the socio-economic benefits for the MLM and CoMLM would be forfeited. In addition, the site is located within the Klerksdorp REDZ. The area has therefore been identified as suitable for the establishment of renewable energy facilities.

Table 4.20: Assessment of no-development option

Nature: The no-development option would result in the lost opportunity for South Africa to supplement is current energy needs with clean, renewable energy		
	Without Mitigation	**With Mitigation[18]**
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

[18] Assumes establishment of a Community Trust

Reversibility	Yes	
Irreplaceable loss of resources?	N/A	N/A
Can impact be mitigated?	Yes	
Enhancement: See below		
Cumulative impacts: Reduce carbon emissions via the use of renewable energy and associated benefits in terms of global warming and climate change.		
Residual impacts: See cumulative impacts		

Recommended enhancement measures

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

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.

The key social issues and associated significance ratings for the construction and operation phase apply to each of the four 100 MW PV SEFs associated with the Northern PV SEF Cluster, namely the:

- Zaaiplaats 100 MW Solar PV1.
- Kleinfontein 100 MW Solar PV1.
- Biesiefontein 100 MW Solar PV1.
- Vlakfontein 100 MW Solar PV1.

5.2.1 Policy and planning issues

The findings of the review of key policy and planning documents indicates that renewable energy is 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, highlight the importance of renewable energy. The proposed project also supports a number of objectives contained in the Free State Province Provincial Growth and Development Strategy and Free State Green Economy Strategy. At a district and local level, the Moqhaka Local Municipality IDP and SDF support the development of renewable energy. The site is also located within the Klerksdorp REDZ. The area has therefore been identified as suitable for the establishment of renewable energy facilities.

5.2.2 Construction phase impacts

The key social issues associated with the construction phase include:

Potential positive impacts

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

The construction phase for a 100 MW SEF is expected to extend over a period of ~18 months and create approximately 250-300 employment opportunities, depending on the final design. Of this total ~ 60% will be available to low-skilled workers (construction labourers, security staff etc.), 25% to semi-skilled workers (drivers, equipment operators etc.) and 15% 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 30 million (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 the area.

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 Klerksdorp and Orkney. 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 years[19] 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 for a single 100 MW PV SEF would be in the region of R 2 billion (2022 Rand value). The total capital expenditure associated with the Mercury PV SEF Northern Cluster would be ~ R 8 billion (2022 Rand value). The total number of employment opportunities associated with the Mercury PV SEF Northern Cluster would be ~ 1 000, with a total wage bill of ~ R 120 million (2022 Rand value).

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.

[19] The equivalent of a full-time employment opportunity for one person for one year

- 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 5.1 summarises the significance of the impacts associated with the construction phase for a single 100 MW PV SEF. Table 5.2 summarises the significance of the impacts associated with the construction phase for four (4) 100 MW PV SEFs associated with the Mercury Northern Cluster.

Table 5.1: Summary of social impacts during construction phase (single 100 MW PV SEF)

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 (-)

Table 5.2: Summary of social impacts during construction phase (Mercury PV Northern Cluster 4 x 100 MW PV SEFs)

Impact	Significance No Mitigation / Enhancement	Significance With Mitigation / Enhancement
Creation of employment and business opportunities	Medium (+)	High (+)
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.
- Create opportunities to improve security.

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. Since operation, the Independent Power Producers (IPPs) have generated 35 699 GWh, resulting in 36.2 Mton of CO_2 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.

Creation of employment and business opportunities

The total number of permanent employment opportunities associated with a single 100 MW SEF would be ~ 20, increasing to ~ 80 for four PV SEFs. 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 Klerksdorp and Orkney.

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.

SED opportunities will be created by each of the PV SEFs associated with the proposed Northern Cluster. 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 farming outputs and inputs, such as fuel, feed etc. The additional income from the SEF would therefore improve economic security of farming operations, which in turn would improve job security for farm workers and benefit the local economy. However, the income would need to compensate the losses associated with the current farming activities.

Opportunity to improve security
The provision of security for the proposed PV SEFs can create an opportunity to improve security for local landowners in the area.

Potential negative impacts
- The visual impacts and associated impact on sense of place.
- Impact on property values.
- 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 5.3 summarises the significance of the impacts associated with the operation phase for a single 100 MW PV SEF. Table 5.4 summarises the significance of the impacts associated with the operation phase for four (4) 100 MW PV SEF PV SEFs associated with the Mercury Southern Cluster.

Table 5.3: Summary of social impacts during operational phase (single 100 MW PV SEF)

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 (+)
Improve security	Medium (+)	High (+)
Visual impact and impact on sense of place	Low (-)	Low (-)
Impact on property values	Medium (-)	Low (-)

Impact on tourism	Low (-)	Low (-)

Table 5.4: Summary of social impacts during operational phase (Mercury PV Southern Cluster 4 x 100 MW PV SEFs)

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 (+)
Improve security	Medium (+)	High (+)
Visual impact and impact on sense of place	Low (-)	Low (-)
Impact on property values	Medium (-)	Low (-)
Impact on tourism	Low (-)	Low (-)

5.2.4 Assessment of cumulative impacts

Cumulative impact on sense of place
The site is located within the Klerksdorp REDZ. 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 area has been identified as suitable for the establishment of large scale renewable energy facilities. The cumulative impact on the areas sense of place associated with the Northern PV SEF Cluster is therefore rated as **Low Negative.**

Cumulative impact on services
The establishment of the proposed SEF and the other REFs in the MLM and CoMLM 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 associated with the Northern PV SEF Cluster can be mitigated by employing local community members. With effective mitigation the impact is rated as **Low 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 Northern PV SEF Cluster and other renewable energy projects in the area also has the potential to create a number of socio-economic opportunities for the MLM and CoMLM, 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 for a single 100 MW PV SEF and ~ 80 for four 100 MW PV SEFs), the potential negative social impact on the local economy associated with decommissioning of the Northern PV SEF Cluster 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 plants 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 is 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 proposed SEF development proposal is not unique. In that regard, a significant number of renewable energy development, including SEFs, are currently proposed in the Free State Province and South Africa. Foregoing the proposed development of the Northern PV SEF Cluster would therefore not necessarily compromise the development of renewable energy facilities in the Free State or South Africa. However, the socio-economic benefits for the MLM and CoMLM would be forfeited.

5.3 CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The findings of the SIA indicate that the development of the each of the four 100 PV SEFs associated with the Northern Cluster of the Mercury PV SEF Cluster will create employment and business opportunities for locals during both the construction and operational phase of the project. The enhancement measures listed in the report should be implemented in order to maximise the potential benefits The findings of the SIA also indicate that all of the potential negative impacts can also be effectively mitigated.

The establishment of Community Trusts associated with each of the four 100 MW PV SEFs will also benefit the local community in the area. 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 site is also located within the Klerksdorp REDZ. The area has therefore been identified as suitable for the establishment of renewable energy facilities. The establishment of the Zaaiplaats 100 MW Solar PV1, Kleinfontein 100 MW Solar PV1, Biesiefontein 100 MW Solar PV1 and Vlakfontein 100 MW Solar PV1 is therefore supported by the findings of the SIA. The enhancement measures listed in the report should be implemented in order to avoid and or minimise the potential negative impacts and maximise the potential benefits associated with development of each of the four proposed 100 MW PV SEFs.

Recommendations

The following recommendations are made to address the potential negative impacts:

- The final design and layout should ensure that the loss of productive farmland is avoided and or minimised.
- Damage to local farm roads caused by construction traffic must be repaired on an on-going basis throughout and on completion of the construction phase.
- The proponent should prepare a Stakeholder Engagement Plan (SEP) and Community Health, Safety and Security Plan (CHSSP) prior to commencement of construction phase.

ANNEXURE A

INTERVIEWS

- Botha, Mr Arnold (telephonic 2022-04-19). Farms Hormah 276/RE, Groenfontein 313/4.
- Botha, Mr Gerrit (telephonic 2022-04-19). Farm Smaldeel 157.
- Botha, Mr Peet (telephonic 2022-04-19). Farms Paradys 137/RE, Fraai Uitzicht 189/1, 189/2, Zaaiplaats 190/RE, Sihor 275/1, Hormah 276/1, Gerar 278, Kleinfontein 472.
- Du Toit, Mr Cobus (telephonic 2022-04-19; e-mailed comment 2022-04-22). Farm De Grendel 67/RE.
- Gossayn, Ms Beverley (telephonic 2022-04-19). Farms Biesiefontein 173/RE, 173/1, Fraai Uitzicht 189/4, 189/5, Kleinfontein 369/1, Uitval 457.
- Gossayn, Mr John (telephonic 2022-04-20). Farms Vlakfontein 15, Doreen 60/RE, De Grendel 67/1, 67/2, Fraai Uitzicht 189/RE, 189/3, Hormah 276/2, Jackalsfontein 443/RE, 443/1.
- Muller, Mr Hansie Sr (telephonic 2022-04-21). Farms Biesiefontein 173/2, 173/4, Kleinfontein 369/2.
- Naude, Mr Burgert (telephonic 2022-04-21). Farm Groenfontein 313/8.
- Pretorius, Mr Johannes (telephonic 2022-04-19; 2022-04-21, e-mailed comment 2022-04-22). Farm Ratpan 441.
- Van Biljon, Mr Deon (telephonic 2022-04-19). Farms Groenfontein 313/9, Barberspan 452/1, 452/2.
- Van Biljon, Mr Jaco (telephonic 2022-04-21). Farm Groenfontein 313/20.

INTERNET

- https://egis.environment.gov.za/renewable_energy.
- https://www.harmony.co.za/business/sa/moab-khotsong.
- https://municipalities.co.za/map/107/fezile-dabi-district-municipality.
- https://sahris.sahra.org.za/sites/default/files/additionaldocs/Paleso%20Draft%20Basic%20Assessment%20Report.pdf.

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- 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 Energy Plan for South Africa (2016).
- Integrated Resource Plan (2019).
- The National Development Plan (2011).
- New Growth Path Framework (2010).
- National Infrastructure Plan (2012).
- Free State Provincial Spatial Development Framework (PSDF).
- Free State Green Economy Strategy (2014).
- Free State Investment Prospectus (2019).
- Fezile Dabi District Municipality Integrated Development Plan (2022-21).
- Fezile Dabi District Municipality Climate Change Vulnerability Assessment and Response Plan (2016).

- Moqhaka Local Municipality Integrated Development Plan (2017-2022).
- Moqhaka Local Municipality Spatial Development Framework (2019-2020).
- City of Matlosana Local Municipality Integrated Development Plan (2019-20).
- City of Matlosana Local Municipality Spatial Development Framework (2009).
- Independent Power Producers Procurement Programme (IPPPP): An Overview (2017), Department of Energy, National Treasury and DBSA;
- Powering the Future: Renewable Energy Roll-out in South Africa (2013), Greenpeace South Africa.

ANNEXURE B

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 reso*urces.
- 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

Tony Barbour
ENVIRONMENTAL CONSULTING AND RESEARCH

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(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.

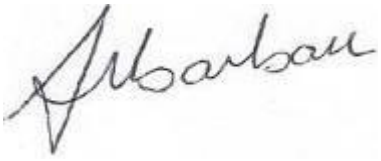
ANNEXURE D

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):

24 April 2022

Date: