SOCIAL IMPACT ASSESSMENT

SAN KRAAL WIND ENERGY FACILITY

NORTHERN AND EASTERN CAPE PROVINCE

DECEMBER 2017

Prepared for

ARCUS CONSULTANCY SERVICES SOUTH AFRICA (PTY) LTD

By

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EXECUTIVE SUMMARY

INTRODUCTION AND LOCATION

Arcus Consultancy Services South Africa (Pty) Ltd (hereafter referred to as Arcus) was appointed as the lead consultant to manage the Environmental Impact Assessment (EIA) process for the proposed 390 MW San Kraal Wind Energy Facility (WEF). The study area is located ~ 6 km south east of the town of Noupoort in the Umsobomvu Local Municipality (ULM), which falls within the Northern Cape Province. A small section of the site is also located in the Inxuba Yethemba Local Municipality (IYLM), which falls within the Eastern Cape Province. The IYLM falls within the Chris Hani District Municipality (CHDM).

Tony Barbour was appointed by Arcus to undertake a specialist Social Impact Assessment (SIA) as part of the EIA process. This report contains the findings of the SIA Report undertaken as part of the EIA process.

APPROACH TO THE STUDY

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

- Collection and review of baseline socio-economic data;
- Review of relevant planning and policy frameworks for the area;
- Site specific information collected during the site visit to the area and interviews with key stakeholders;
- Review of information from similar projects; and
- Identification of social issues associated with the proposed project.

SUMMARY OF KEY FINDINGS

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

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

FIT WITH POLICY AND PLANNING

The findings of the review indicated that renewable energy is strongly supported at a national, provincial and local level. The development of and investment in renewable energy is supported by the National Development Plan (NDP), New Growth Path Framework and National Infrastructure Plan, which all make reference to renewable energy. At a provincial level the development of renewable energy is supported by the Northern Cape Provincial Growth and Development Strategy and Northern Cape

Provincial Spatial Development Framework, as well as the Eastern Cape Provinccial Development Plan (2014) and the Eastern Cape Climate Change Response Strategy.

However, the provincial and local policy and planning documents also make reference to the importance of tourism and the region's natural resources. Care therefore needs to be taken to ensure that the siting of renewable energy facilities (including wind farms) does not impact negatively on the areas tourism potential[1].

CONSTRUCTION PHASE

The key social issues associated with the construction phase include:

Potential positive impacts

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

The construction phase for the proposed WEF is expected to extend over a period of 2 year period and create approximately ~ 350 employment opportunities. It is anticipated that approximately 55% (193) of the employment opportunities will be available to low skilled workers (construction labourers, security staff etc.), 30% (105) to semi-skilled workers (drivers, equipment operators etc.) and 15% (52) for skilled personnel (engineers, land surveyors, project managers etc.). The majority of the low and semi-skilled employment opportunities will be available to local residents in the area, specifically residents from Noupoort, Colesburg and Middelburg. 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. In order to maximise the potential benefits the developer should commit to employing local community members to fill the low and medium skilled jobs.

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

The capital expenditure associated with the construction phase for the proposed 390 MW WEF will be in the region of R 4 billion (2017 Rand value). The total wage bill will be in the region of R 104 million (2017 Rand value). A percentage of the wage bill will be spent in the local economy which will create opportunities for local businesses in the towns of Noupoort, Colesburg and Middelburg. The sector of the local economy that is most likely to benefit from the proposed development is the local service industry. The potential opportunities for the local service sector would be linked to

[1] The findings of the literature review indicate that the impact of wind farms impact on tourism is low to negligible

accommodation, catering, cleaning, transport and security, etc. associated with the construction workers on the site. The benefits to the local economy will be confined to the construction period (2 years).

Potential negative impacts

- Impacts associated with the presence of construction workers on site and in the area;
- Influx of job seekers to the area;
- Increased safety risk to farmers, risk of stock theft and damage to farm infrastructure associated with presence of construction workers on the site;
- Increased risk of grass fires;
- Impact of heavy vehicles, including damage to roads, safety and dust;
- Impact on farming activities.

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

Table 1: Summary of impacts associated with construction phase

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 (-)
Increased risks to livestock and farming infrastructure associated with the construction related activities and presence of construction workers on the site	Medium (-)	Low (-)
Increased fire risk	Medium (-)	Low (-)
Impact of heavy vehicles and construction activities	Medium (-)	Low (-)
Impact on farming activities	Medium (-)	Low (-)

OPERATIONAL PHASE

The key social issues affecting the operational phase include:

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;
- Benefits associated with the establishment of a Community Trust;
- Benefits for affected landowners.

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

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

The Green Jobs study (2011) identifies a number of advantages associated with wind power as a source of renewable energy, including zero carbon dioxide (CO_2) emissions during generation and low lifecycle emissions. Greenhouse gases (GHG) associated with the construction phase are offset within a very short period of time compared with the project's lifespan. Wind power therefore provides an ideal means for reaching emission reduction targets in a relatively easy manner. In addition, and of specific relevance to South Africa, wind as energy source is not dependent on water (as compared to the massive water requirements of conventional power stations), has a limited footprint and therefore does not impact on large tracts of land, poses limited pollution and health risks, specifically when compared to coal and nuclear energy plants.

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

The establishment of renewable energy facilities, such as the 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.

Creation of employment and business opportunities
The total number of permanent employment opportunities associated with a 390 MW WEF would be ~ 30. Of this total ~ 18 are low skilled workers, 9 semi-skilled and 3 skilled. The annual wage bill for the operational phase will be ~ R 3 million (2017

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

Rand value). The majority of the low and semi-skilled beneficiaries are likely to be historically disadvantaged (HD) members of the community. Given the location of the proposed facility the majority of permanent staff is likely to reside in the towns of Noupoort, Colebsurg and Middelburg.

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

Community Trust

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

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

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

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

Potential negative impacts

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

Visual impacts and impact on sense of place
The findings of the Visual Impact Assessment (VIA) (Sivest, September 2017) indicate that the visual impacts associated with the construction and operation phases of the proposed WEF can be mitigated to acceptable levels provided the recommended mitigation measures are implemented. The significance of the visual impact was rated at **Moderate Negative**.

The SIA found that only two of the local landowners initially raised concerns with regard to the proposed San Kraal WEF, specifically with regard to potential visual impacts associated with wind turbines. However, upon investigation it was found that the two landowners had confused the proposed WEF with another proposed WEF, namely the Umsobomvu WEF. This was confirmed by the relevant land owners in subsequent e-mails to the SIA study team. The relevant owners further indicated that the proposed San Kraal WEF turbines would be too distant from their properties to have any significant visual impact.

Impact on property values
The most comprehensive study appears to the study by Gibbons (2014), which found that "averaging over wind farms of all sizes" the price reduction was around 5-6% within 2km, falling to less than 2% between 2 and 4km, and less than 1% by 14km which is at the limit of likely visibility. The findings of the Urbis study (2016) indicate that appropriately located wind farms within rural areas, removed from higher density residential areas, are unlikely to have a measurable negative impact on surrounding land values. Based on this information the potential impact of the proposed WEF on the property values in the area is likely to be low.

Impact on tourism
Based on the findings of the literature review there is limited evidence to suggest that wind farms impact on the tourism. The findings also indicate that wind farms do not impact on tourist routes.

Table 5.2 summarises the significance of the impacts associated with the operational phase.

Table 5.2: Summary of impacts associated with operational phase

Impact	**Significance No Mitigation/ Enhancement**	**Significance With Mitigation/ Enhancement**
Promotion of renewable energy projects	High (-)	High (+)
Creation of employment and business opportunities	Medium (+)	Moderate (+)
Establishment of Community Trust	Medium (+)	High (+)
Benefits for local affected landowners	Low (+)	Medium (+)
Visual impact and impact on sense of place[3]	Medium-High (-) Low (-)	Medium (-) Low (-)
Impact on property values[4]	Low (-)	Low (-)
Impact on tourism[5]	Low (- and +)	Low (- and +)

[3] Ratings reflect findings of VIA (Medium-High Negative) and findings of stakeholders interviewed that do not regard wind farm as a having a negative visual impact (Low Negative).
[4] The rating applies to the impact on property prices in the broader area.
[5] The rating applies to the impact on tourism in the broader area.

CUMULATIVE IMPACTS

Cumulative impact on sense of place

Based on information provided by Arcus there are eleven approved renewable energy projects located within a 35 km radius of the site. These include 3 wind and 8 solar energy projects. One wind farm, the Mainstream Noupoort WEF, and two solar has been established to date. The remainder have been approved but not developed as yet. There is therefore the potential for cumulative visual impacts linked to combined visibility (whether two or more wind / solar farms will be visible from one location), and sequential visibility (e.g. the effect of seeing two or more wind / solar farms along a single journey, e.g. road or walking trail), and the potential loss of a characteristic element, namely a relatively undisturbed Karoo type landscape.

However, as indicated above, a number of stakeholders interviewed indicated that they were not concerned about the potential visual impacts associated with the proposed WEF and the associated impact on the areas sense of place. In this regard some stakeholders viewed the turbines associated with the existing Noupoort WEF in a positive manner. This will also have implications for the perceptions of different people towards to the nature and significance of the cumulative impacts associated with wind and solar farms on the areas sense of place.

The findings of the VIA (Sivest, September 2017) indicate that the cumulative impacts are not significant enough to prevent the WEF from being approved.

Based on the findings of the SIA and the VIA the overall cumulative impact of the areas sense of place does not represent a fatal flaw for the proposed WEF.

Cumulative impact on services

The establishment of the proposed WEF and the other renewable energy facilities in the ULM and IYLM 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 WEF. The potential impact on local services 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 WEF and other renewable energy projects in the area also has the potential to create a number of socio-economic opportunities for the ULM and IYLM, 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. This benefit is rated as **High Positive** with enhancement.

ASSESSMENT OF TRANSMISSION LINE ALTERNATIVES

Based on the findings of the SIA the social impacts associated with all three alternatives are likely to be low. However, the Preferred Alternative is supported given that it has the shortest distance.

POTENTIAL HEALTH IMPACTS

The potential health impacts typically associated with WEFs include, noise, shadow flicker and electromagnetic radiation. As indicated above, the findings of a literature review undertaken by the Australian Health and Medical Research Council published in July 2010 indicate that there is no evidence of wind farms posing a threat to human health. The research also found that wind energy is associated with fewer health effects than other forms of traditional energy generation and in fact will have positive health benefits (WHO, 2004). Based on these findings it is assumed that the significance of the potential health risks posed by the proposed WEF is of **Low Negative** significance.

NO-DEVELOPMENT OPTION

The No-Development option would represent a lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy. Given South Africa's position as one of the highest per capita producer of carbon emissions in the world, this would represent a High negative social cost. The no-development option also represents a lost opportunity in terms of the employment and business opportunities (construction and operational phase) associated with the proposed San Kraal WEF and the benefits associated with the ED and SED contributions as well as 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 WEF development is not unique. In this regard, a significant number of other renewable energy developments are currently proposed in the Northern and Eastern Cape and other parts of South Africa. Foregoing the proposed establishment of WEFs would therefore not necessarily compromise the development of renewable energy facilities in the Northern and Eastern Cape Province and or South Africa. However, the socio-economic benefits for local communities in the ULM and IYLM would be forfeited.

DECOMMISSIONING PHASE

In the case of decommissioning ~ 30 permanent jobs associated with the operational phase would be lost. The potential impacts associated with the decommissioning phase can however be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be **Low Negative.** The proponent should also investigate the option of establishing an Environmental Rehabilitation Fund to cover the costs of decommissioning and rehabilitation of disturbed areas. The Fund should be funded by a percentage of the revenue generated from the sale of energy to the national grid over the 20-25 year operational life of the facility. The rationale for the establishment of a Rehabilitation Trust Fund is linked to the experiences with the mining sector in South Africa and failure of many mining companies to allocate sufficient funds during the operational phase to cover the costs of rehabilitation and closure. Alternatively, the funds from the sale of the WEF as scrap metal should be allocated to the rehabilitation of the site.

CONCLUSION AND RECOMMENDATIONS

The findings of the SIA indicate that the development of the proposed San Kraal WEF will create employment and business opportunities for locals during both the construction and operational phase of the project. The establishment of a Community Trust will also benefit the local community. The potential negative social impacts can also be effectively mitigated.

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.

Based on the findings of the SIA the establishment of the proposed San Kraal WEF is supported. In this regard the project will create significant socio-economic opportunities for the area and have limited potential negative social impacts.

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 C
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Section 1.6 Annexure D
(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 1.4 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;	N/A for SIA
(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;	N/A
(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;	Figure 3.16
(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
(k) any mitigation measures for inclusion in the EMPr;	Section 4
(l) any conditions for inclusion in the environmental authorisation;	Section 4 Section 5.3
(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 summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Annexure A lists all key stakeholders interviewed
(p) any other information requested by the competent authority	N/A
Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	

ACRONYMS

DM	District Municipality
DEA&DP	Department of Environmental Affairs and Development Planning
ECPGDP	Eastern Cape Provincial Growth and Development Plan
EIA	Environmental Impact Assessment
IDP	Integrated development Plan
IPP	Independent Power Producer
IYLM	Inxuba Yethemba Local Municipality
kV	Kilovolts
LED	Local Economic Development
LM	Local Municipality
MW	Megawatt
SEA	Strategic Environmental Assessment
SIA	Social Impact Assessment
ULM	Umsobomvu Local Municipality
WEF	Wind Energy Facility

TABLE OF CONTENTS

SECTION 1: INTRODUCTION

1.1 INTRODUCTION

Arcus Consultancy Services South Africa (Pty) Ltd (hereafter referred to as Arcus) was appointed as the lead consultant to manage the Environmental Impact Assessment (EIA) process for the proposed 390 MW San Kraal Wind Energy Facility (WEF). The study area is located ~ 6 km south east of the town of Noupoort in the Umsobomvu Local Municipality (ULM), which falls within the Northern Cape Province. A small section of the site is also located in the Inxuba Yethemba Local Municipality (IYLM), which falls within the Eastern Cape Province. The IYLM falls within the Chris Hani District Municipality (CHDM).

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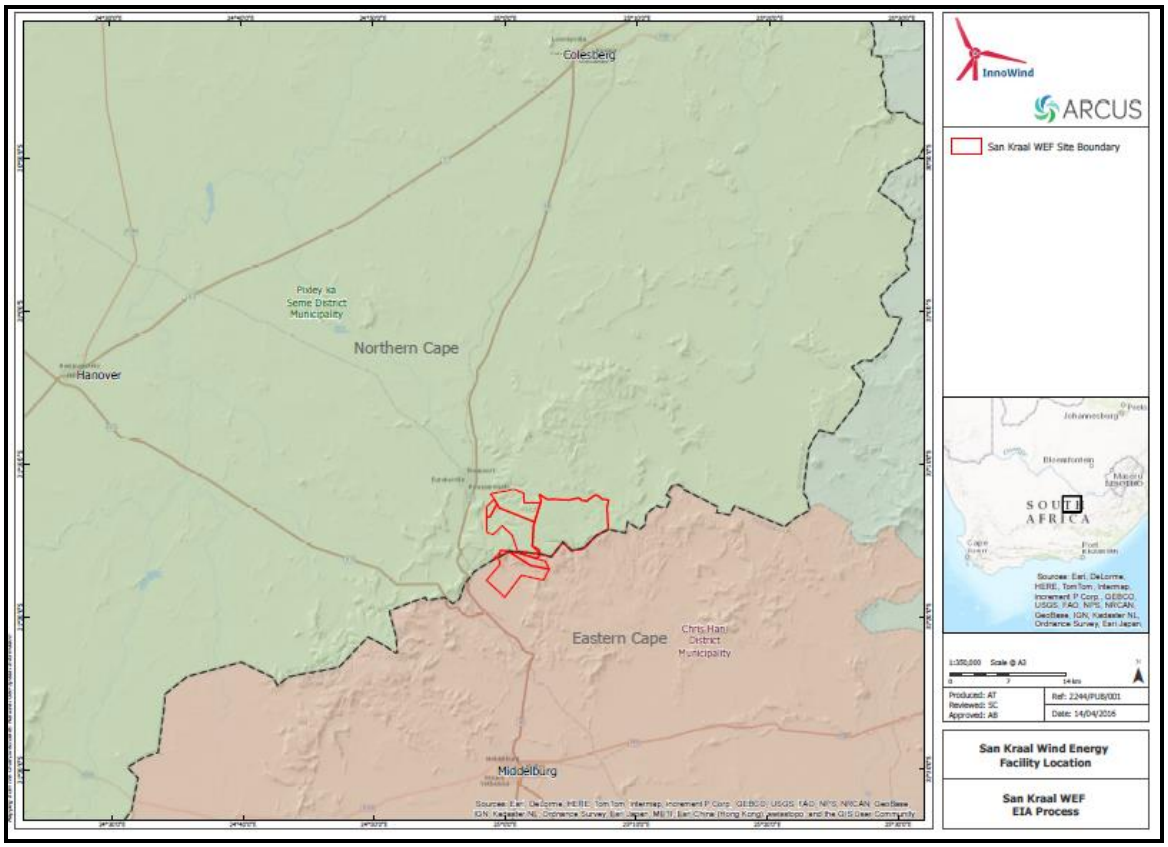


Figure 1.1: Location of San Kraal Wind Energy Facility

1.2 TERMS OF REFERENCE AND APPROACH TO STUDY

The terms of reference for the SIA require:

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

In the absence of a similar Guideline for the Eastern Cape and Northern Cape Provinces, the approach to the SIA study is based on the Western Cape Department of Environmental Affairs and Development Planning Guidelines for Social Impact Assessment (DEADP, 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 and 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.
- Identification of enhancement and mitigation measures aimed at maximizing opportunities and avoiding and or reducing negative impacts; and

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

One of the key challenges facing SIA does not necessarily involve the physical disruption of human populations, but understanding the meanings, perceptions and/or social significance of these changes. In order to understand the role of social assessment in the EIA process one needs to define what social impacts are. This issue is complicated by the way in which different people from different cultural, ethic, religious, gender, and educational backgrounds etc., view the world. This is referred to as the "social construct of reality". The social construct of reality informs people's worldview and the way in which they react to changes. However, in many instances these constructs are frequently treated as perceptions or emotions, to be distinguished from "reality."

The social construct of reality is a characteristic of all social groups, including the agencies that attempt to implement changes, as well as the communities that are

affected (Guidelines and Principles for Social Impact Assessment, 1994). The tendency of development agencies and proponents to dismiss the concerns of others as being merely imagined and perceived is therefore a key issue that needs to be addressed by social impact assessments.

In this regard the findings of the SIA indicate that while certain stakeholders are opposed to the proposed WEF, others either support the development and or do not have an objection to the establishment of a WEF on the proposed site.

1.3 PROJECT DESCRIPTION AND AFFECTED PROPERTIES

A wind energy facility (WEF) consists of multiple wind turbines which are used to capture the kinetic energy of the wind and generate electricity. This captured kinetic energy is used to drive a generator located within the wind turbine and the energy is subsequently converted into electrical energy. A typical wind turbine consists of four primary components (Figure 1.2).

- The **foundation unit** upon which the turbine is anchored to the ground;
- The **tower** which is a hollow structure allowing access to the nacelle. The height of the tower is a key factor in determining the amount of electricity a turbine can generate. The tower houses the transformer which converts the electricity to the correct voltage for transmission into the grid. The transformer can also be placed in a small housing outside the tower depending on the design;
- The **nacelle** (generator/turbine housing). The nacelle houses the gearbox and generator as well as a wind sensor to identify wind direction. The nacelle turns automatically ensuring the blades always face into the wind to maximise the amount of electricity generated;
- The **rotor** which is comprised of three rotor blades. The rotor blades use the latest advances in aeronautical engineering materials science to maximise efficiency. The greater the number of turns of the rotor the more electricity is produced.

The amount of energy a turbine can harness is dependent on the wind velocity and the length of the rotor blades. Wind turbines typically start generating power at wind speeds of between 10 - 15 km/hour, with speeds between 35 - 60 km/hour required for full power operation. In a situation where wind speeds are excessive (beyond 90km/hour), the turbine automatically shuts down to prevent damage. A turbine is designed to operate continuously, unattended and with low maintenance for more than 20 years or >120 000 hours of operation. Once operating, a WEF can be monitored and controlled remotely, with a mobile team used for maintenance, when required.

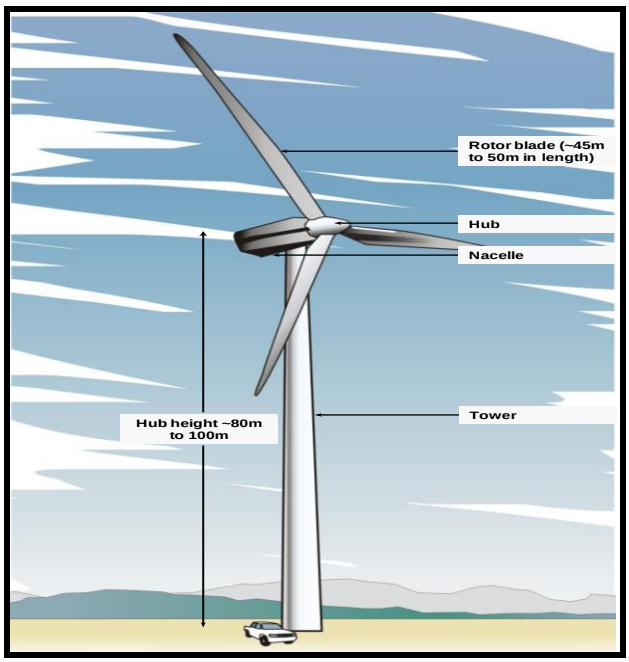


Figure 1.2: Typical example of wind turbine structure and components

The proposed 390 MW San Kraal WEF would consist of the following infrastructural components:

- Up to 78 turbines with a generation capacity between 3 – 5 MW and a rotor diameter of up to 150 m, a hub height of up to 150 m and blade length of up to 75 m;
- Foundations (up to 25 x 25 m) and hardstands associated with the wind turbines;
- Internal access roads of between 8 m (during operation) and 14 m (during construction) wide to each turbine;
- Medium voltage underground electrical cables will be laid to transmit electricity generated by wind turbines to the onsite switching station or substation;
- Overhead medium voltage cables between turbine rows where necessary;
- An on-site switching station (10 000m^2);
- A 4 km medium voltage overhead line connecting the onsite switching station with the onsite medium voltage 132kV substation;
- An onsite substation and OMS complex (180 000 m^2) to facilitate stepping up the voltage from medium to high voltage 132 kV to enable the connection of the WEF to the proposed Umsobomvu WEF 132/ 400 kV Substation and the generated power will be fed into the national grid;
- A 23 km 132 kV high voltage overhead power line from the onsite substation to the proposed 4oo kV Umsobomvu substation to the national grid;
- A 100 m corridor surrounding the Umsobomvu substation so that the grid connection can turn into the substation from any direction;
- Two 90 000 m^2 , alternative areas of batching plants, temporary laydown area and construction compound;
- Temporary infrastructure including site camp; and
- A laydown are approximately 7500 m^2 in extent, per turbine.

The total size of the land portions within which the proposed development will be located is 10 511.51 hectares. The footprint of the proposed development is estimated to be less than 1% of this area

The turbine infrastructure is anticipated to have a lifespan of approximately 20 years. If the developer manages to renew it PPA with Eskom or find another off taker, it is likely that the wind turbines will be re-powered (i.e. all equipment to be replaced except the turbine's foundation and towers). Disassembling and replacement activities would again require the transport of abnormal loads (cranes, new turbine components, removal of decommissioned components) to and within the WEF site. Decommissioned components would be removed from the sites, and reused, recycled or disposed of in accordance with regulatory requirements. With the exception of the turbine blades, all turbine components can currently be reused or recycled. According to current legislation, infrastructure will have to be removed and the site rehabilitated (e.g. by planting natural vegetation or feedstock) once final decommissioning has occurred. According to current legislation, infrastructure would have to be removed and the sites rehabilitated once final decommissioning has occurred.

Based on the information from other WEF projects the construction phase for a 390 MW WEF is expected to extend over a period of approximately two years and create approximately 350 (full-time equivalent) employment opportunities. The capital expenditure will be in the region of R 4 billion (2017 rand values). The operational phase will employ approximately 20 people full time for a period of up to 20 years.

1.3.1 Transmission line alternatives

The energy generated by the San Kraal WEF will be evacuated from the site via a proposed 132 kV overhead transmission into Eskom's new (not yet constructed) Umsobomvu substation located ~16 km south-west of the site. Three Transmission line (Tx line) Alternatives are proposed. A lateral corridor of 500 m on either side of the line (1 km total) is associated with all three Alternatives.

Six land owners in total would be affected. A core set of four landowners would be affected by all three Alternatives. One of the owners affected by the other two Alternatives would not be affected by Alternative 2 (Mr Erasmus), while Alternative 2 would affect an owner not affected by the two other Alternatives (Mr de Villiers). In addition, Alternative 2 affects two of Mr Gillmer's properties, Edendale and De Rust, while the other two only affect De Rust. Each of the Alternatives is described below.

Preferred Alternative
The Preferred Alternative is the shortest (~23 km), most centrally located, and most direct of the three Alternatives. It also has the least amount of line turns. This Alternative affects properties which belong to five land owners, namely:

- Farms 15/182; 47/ 182 (Hartebeeshoek), which belong to the Umsobomvu LM, and would be affected over a distance of 2.4 km
- Farm RE/ 13 (Beskuitfontein), which belongs to Mr Pieter Erasmus, over a distance of 450 m;
- Farms 2; 3/1; 11/1; 18/1 (De Rust), which belong to Mr Jean Gillmer, over a distance of ~5 km;
- Farm RE/1/1 (Vrede), which belongs to Mr Tollie Jordaan, over a distance of ~4.1 km; and
- Farms RE/118 (Winterhoek) RE/ 135 and RE/ 136 (Bergplaas), which both belong to Ms Vivian van der Merwe, over a distance of 11.1 km.

The Preferred Alternative would feed out from the south-west of the on-site substation on Hartebeeshoek (15/182), and continue south-west for ~1.3 km before

changing direction west-south west ~300m north of Hartebeeshoek's (47/182) southern boundary (with Beskuitfontein RE/13). Hartebeeshoek 15/182 forms part of the San Kraal site, while 47/182 forms part of the Phezukomoya WEF site. The west-south-west line segment continues for ~1 km across Hartebeeshoek before crossing over into the Beskuitfontein. The entire alignment on Hartebeeshoek is located in a relatively inaccessible portion of Hartebeeshoek, not currently affected by proximate Tx lines or other service industrial infrastructure.

Only the extreme northern portion of Beskuitfontein RE/13 is affected, and only over a relatively short distance, namely ~450 m. The relevant area forms part of the San Kraal WEF site, and is located in broken terrain.

West of Beskuitfontein, the line continues straight west-south-west across portions of De Rust farm, located to the east of the N9. Roughly the eastern half of the alignment (across 2 and 3/1) would affect broken terrain on De Rust. The western portion (11/1 and 18/1) would be located across flatter, lower lying terrain located to the south of the old De Rust railway siding. The line would pass ~300 m to the south of the unoccupied cottages associated with the old siding, effectively the 'farm yard' on De Rust. This portion of De Rust is affected by the old Port Elizabeth railway line and the underground portion (and associated above ground structures) of the operational line. The N9 ~500 m east of the railway cottages, demarcates De Rust's western boundary. An existing Tx line is located ~100 m parallel to the southern boundary of 18/1 (with Vrede), ~700 m south-west of the old De Rust rail siding.

The Preferred Alternative crosses the N9 ~170m south of an existing Tx line crossing. Another existing Tx line is located ~360 m to the east of this point. The proposed crossing is located ~1.1 km north-east of the uninhabited farmstead on Vrede. The initial ~1.9 km portion of the alignment across Vrede continues its straight west-north-west alignment, up to a point ~1.2 km north-west of the Vrede farmstead. Here the alignment turns south-west, and continues in a straight line for the remainder of its course (~2.2 km) across Vrede. Apart from the extreme terminal portion across Vrede which would traverse a koppie, the remainder of the alignment is located on relatively flat, low-lying terrain. The eastern portion of Vrede around the farmstead is already transformed by the N9 and existing Tx lines, but the area to the west thereof is not.

From the western boundary of Vrede, the alignment continues in an unbroken line due south-west across Winterhoek to the boundary with Bergplaas, across a succession of hills and lower lying areas. The extreme south-eastern portion of RE/ 118 north of the N10 is affected. The alignment traverses the N10 across a broad low-lying area 2.2 km north-east of the farmstead on Winterhoek, along a straight ~3.8 km stretch of the N10. This portion of the N10 is not currently affected by infrastructure. Most of the alignment of the line portion across the portion of RE/ 118 south of the N10 would affect broken terrain in the central portion of Winterhoek. The alignment would pass ~1.2 km to the south-east of the inhabited farm house on Winterhoek. An intervening koppie would screen the line from Winterhoek farmstead.

The terminal portion of the alignment across Bergplaas to the south of Winterhoek affects very broken terrain in the central portion of the property, just to the west of the farm access road from Winterhoek. The Alternative is located ~260 m to the west of the uninhabited farm yard (essentially stock pens and a shed) on Bergplaas. The line would feed into the Umsobomvu substation located immediately across the south-western boundary point of RE/ 135.

Alternative 1
Alternative 1 is the southernmost of the Alternatives. It is somewhat longer (~25.4 km) than the Preferred Alternative. The portion to the west of Winterhoek is characterized by numerous line bends. Alternative 1 would affect the same set of land owners as the Preferred Alternative, but a slightly different set of cadastral parcels:

- Farms 15/182; 47/ 182 (Hartebeeshoek), which belong to the Umsobomvu LM, and would be affected over a distance of 1.8 km;
- Farms 1/11 and RE/ 13 (Beskuitfontein), which belong to Mr Pieter Erasmus, over a distance of 3.2 km;
- Farms 2/11; 3/1; 11/1; 18/1 (De Rust), which belong to Mr Jean Gillmer, over a distance of ~4.3 km;
- Farm RE/1/1 (Vrede), which belongs to Mr Tollie Jordaan, over a distance of ~5 km; and
- Farms RE/118 (Winterhoek) RE/ 135 and RE/ 136 (Bergplaas), which both belong to Ms Vivian van der Merwe, over a distance of 11.1 km.

Alternative 1 would affect the same portions (15/182 and 47/182) as the Preferred Alternative. Essentially the same area on Hartebeeshoek would be affected, namely broken terrain to the south-west of the proposed on-site substation. The initial ~1.5 km across Hartebeeshoek is roughly parallel in general direction to the Preferred Alternative. At a point ~240m north of the boundary with Beskuitfontein RE/13, Alternative 1 turns south-south-west before crossing the boundary.

The alignment across Beskuitfontein affects broken terrain located to the north and north-west of the inhabited farmstead on Beskuitfontein. In addition to RE/13 affected by the Preferred Alternative, 1/11 would also be affected. The alignment changes course from east-south-east to west-north-west across Beskuitfontein as it gradually loops back in the direction of the Preferred Alternative. The line would be located ~850 m to the north-west of the farmstead on Beskuifontein and associated access road. Buskuitfontein is not currently affected by any service industrial infrastructure such as Tx lines.

The line enters De Rust from the hilly terrain north-west of Beskuitfontein farmstead, but is largely located across lower lying, even terrain across De Rust. The alignment across De Rust initially runs west-north-west, gradually turning north-west, and again west-north-west. The initial ~2.7 km line portion from the Beskuitfontein boundary across 2/11 and 3/11 would be located a portion of De Rust not currently affected by any service industrial infrastructure. No houses or other structures are located in this portion of De Rust. The line portion across 11/1 and 18/1 however traverses a portion of De Rust affected by an existing Tx line corridor, the small above-ground portion of the active Port Elizabeth railway line on De Rust, and the old railway line just to its west. The terminal 500 m across De Rust is located just inside the property's south-western boundary (with Vrede RE/1/1), and ~50m parallel and to the west of an existing Tx line across Vrede. Alternative. Approximately 540 m of De Rust's boundary with the N9, the alignment changes direction, more or less directly west, and crosses onto Vrede. This is the nearest point to the uninhabited railway cottages on De Rust, which are located ~800 m to the north-east.

The initial ~1 km line portion across Vrede maintains a roughly westward course. This portion is essentially located less than 300m parallel to the south of the Preferred Alternative. It consequently crosses the N9 closer to the currently uninhabited Vrede farmstead (760m), and its alignment across Vrede is in closer

proximity to the farmstead (360 m) than the Preferred Alternative. The relevant portion of Vrede is however already affected by two existing Tx lines, the nearest of which located 600 m north-east of the farmstead.

Approximately 400 m north-west of the Vrede farmstead, the alignment changes direction, roughly towards the south-south-west, before swinging south-west along its terminal ~560 m across Vrede. The entire alignment across Vrede is located within approximately 300 m to 2 km to the south of the Preferred Alternative. The alignment is less direct, but roughly parallel in direction to the Preferred Alternative. The alignment skirts to the north of two koppies along Vrede's boundaries with De Rust and Winterhoek, but essentially traverses lower-lying, flatter terrain on the property.

The line traverses the N10 in the extreme south-western portion of Vrede. The road crossing is located at the eastern end of the same straight ~3.8 km stretches of the N10 west of Winterhoek farmstead.

Unlike the Preferred Alternative and Alternative 2, Alternative 1 only affects the portion of Winterhoek located to the south of the N10. The initial 4.3 km of the alignment traverses hilly terrain located in the eastern portion of the property, just to the south of the N10. Approximately 1 km south-east of the Winterhoek farmstead, the alignment turns south-east.

The remainder of the alignment across Winterhoek and Bergplaas is essentially located within 300 m (east and then south) of the Preferred Alternative. Again, the same intervening koppie screens the alignment from the Winterhoek farmstead, located ~970 m to the north-west of the nearest line portion. Essentially the same portion of Bergplaas to the Umsobomvu substation as the Preferred Alternative would be affected. The line would however be located marginally closer (~220 m to the west) to the uninhabited farm yard on Bergplaas.

Alternative 2
Alternative 2 is the northernmost of the Alternatives, and the longest of the three Alternatives (~26.9 km) than Alternative 1. Alternative 2 would affect four of the same set of five land owners as the Preferred Alternative and Alternative 1 (Mr Erasmus of Beskuitfontein would not be affected), although a slightly different site of associated cadastral portions of these 4 would be affected. In addition, the Alternative 2 corridor would affect a land owner not affected by the other two Alternatives (Mr de Villiers of Kleinfontein).

Alternative 2 would affect the following owners and properties:

- Farms 15/182; 47/ 182; 46/182 and RE/182 (Hartebeeshoek), which belong to the Umsobomvu LM, and would be affected over a distance of 6.4 km;
- Farms 11/1; RE/11/1 (De Rust) and RE/11/1; 12/1 and 21/1 (Edendale), which belong to Mr Jean Gillmer, over distances of ~4.3 km and ~1.2 km, respectively (total 5.5km);
- Farm 1/117 (Kleinfontein), which belongs to Mr Jim de Villiers, over a distance of ~1.4 km (corridor only);
- Farm RE/1/1 (Vrede), which belongs to Mr Tollie Jordaan, over a distance of ~3.5 km; and
- Farms RE/118 (Winterhoek) RE/ 135 and RE/ 136 (Bergplaas), which both belong to Ms Vivian van der Merwe, over a distance of 11.7 km.

Unlike the Preferred Alternative and Alternative 1, Alternative 2 would feed out of the on-site substation on Hartebeeshoek towards the north-west. The bulk of the alignment (~4.7 km) would be located on site portions of Hartebeeshoek, namely 15/182 and 46/182. The terminal (western) portion across Hartebeeshoek is located across RE/182 which forms part of the proposed Phezukomoya WEF site.

The alignment across Hartebeeshoek affects a succession of hills and narrow valleys in the southern and central portions of the farm over a broad arc. The alignment runs ~620 m to the south of one of the nearest of a number of uninhabited farmsteads on Hartbeeshoek. Portions 15/182 and 46/182 are not currently affected by any service industrial infrastructure. The westernmost portion of RE/182 is affected by the existing 132 kV feeder line from the operational Noupoort WEF to the north of the San Kraal site. The relevant line is however located to the north of a koppie to the south of which Alternative 2 is located.

West of Hartebeeshoek, the alignment crosses over onto De Rust from north-east to south east, affecting lower lying terrain in its extreme northern portion over a distance of ~1.1 km. Alternative 2 crosses De Rust's western boundary and the N9 ~230 m north-east of the Barredeel railway siding along the Port Elizabeth railway line.

An existing Tx line across Edendale farm is located ~970 m west of, and roughly parallel to the N9. West of the Barredeel siding and railway line, Alternative 2 enters onto land which also belongs to Mr Gillmer (De Rust owner), namely the north-eastern corner of Edendale farm. The alignment across Edendale is essentially from the property's north-eastern to south-western corners. The entire alignment is across lower-lying, flat terrain to the south of Afrikaberg. The terminal ~350 m across Edendale is located just within the boundary of 21/11. Alternative 2 would be located ~1.2 km north-west from the Edendale farmstead, partially screened by a low koppie. The eastern half of of Edendale is currently affected by proximity to the rail and N9 corridors, and the Tx line referred to above. The western half of Edendale is not currently affected by service industrial infrastructure.

The alignment across Vrede would affect the extreme north-western portion of the property. The relevant portion consists of hilly terrain, and is not located in proximity to the farmstead on Vrede (3.4 km). The alignment be located within 500 m of the property's boundary with Kleinfontien to the west. The 500-m corridor of a 1.4 km portion of this line portion across Vrede would also affect the south-easternmost portion of Kleinfontein. The relevant portion of Kleinfontein consists of broken terrain ~6 km south-east of the Kleinfontein farmstead. The relevant portions of Vrede and Kleinfontein are currently not affected by Tx line corridors.

The bulk of the alignment across the portion of Winterhoek north of the N10 is located ~1km parallel to the north of the Preferred Alternative. The initial and terminal portions of the alignment would affect broken terrain, while the bulk of the alignment would traverse the same large low-lying area as the Preferred Alternative. Approximately 300 m north of the N10, the line changes direction to south-south east across a distance of ~1.6 km to a point located ~1.2 km south-east of the Winterhoek farmstead.

The line crosses the N10 ~1.2 km of the west of the Preferred Alternative crossing, and ~1 km north-east of the farmstead along the same straight stretch of the N10 as traversed by the other two Alternatives. From the point ~1.2 km south-east of the farmstead to its terminus, Alternative 2 is located within 300 m of both the Preferred

Alternative and Alternative 1. Again, the same intervening koppie screens the alignment from the Winterhoek farmstead, located ~750 m north-west of the nearest line portion. The portion across Bergplaas is almost identical to that of Alternative 1, and also passes ~220 m to the west of the uninhabited Bergplaas farm yard.

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 wind energy facility.

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

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

1.4.2 Limitations

Demographic data
The information contained in some key policy and land use planning documents, such as Integrated Development Plans etc., may not contain data from the 2011 Census. However, where required this data has been up-dated with the relevant 2011 Census data.

1.5 SPECIALIST DETAILS

Tony Barbour, the lead author of this report is an independent specialist with 25 years' experience in the field of environmental management. In terms of SIA experience Tony Barbour has undertaken in the region of 220 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. Annexure C contains a copy of Tony Barbour's CV.

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

1.6 DECLARATION OF INDEPENDENCE

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

1.7 REPORT STUCTURE

The report is divided into five sections, namely:

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

SECTION 2: DESCRIPTION OF POLICY AND PLANNNIG CONTEXT

2.1 INTRODUCTION

Legislation and policy embody and reflect key societal norms, values and developmental goals. The legislative and policy context therefore plays an important role in identifying, assessing and evaluating the significance of potential social impacts associated with any given proposed development. An assessment of the "policy and planning fit[6]" of the proposed development therefore constitutes a key aspect of the Social Impact Assessment (SIA). In this regard, assessment of "planning fit" conforms to international best practice for conducting SIAs. Furthermore, it also constitutes a key reporting requirement in terms of the Western Cape Department of Environmental Affairs and Development Planning's *Guidelines for Social Impact Assessment* (2007).

For the purposes of the meeting the objectives of the SIA the following national, provincial and local level 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 Resource Plan (IRP) for South Africa (2010-2030);
- The National Development Plan (2011);
- New Growth Path Framework (2010);
- National Infrastructure Plan (2012).

Provincial
- Northern Cape Provincial Growth and Development Strategy (2004-2014);
- Northern Cape Climate Change Response Strategy;
- Northern Cape Spatial Development Framework;
- Eastern Cape Vision 2030 Provincial Development Plan (2014);
- Eastern Cape Climate Change Response Strategy (2011); and
- Eastern Cape Provincial Growth and Development Programme (2004-2014).

District and local
- Pixley ka Seme District Municipality Integrated Development Plan (Review 2014/15);
- Umsobomvu Municipality Integrated Development Plan (Review 2014/15);
- Chris Hani District Municipality Climate Change Vulnerability Assessment and Response Plan (2017);
- Inxuba Yethemba Municipality Integrated Development Plan (2014/15); and

[6] 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.

- Inxuba Yethemba Local Municipality Draft Spatial Development Framework (2014).

Section 2 also provides a review of the Renewable Energy Programme in South Africa and a summary of some of the key social issues associated with wind farms based on international experience. A summary of a review of international studies on the potential impacts on property values and tourism is also provided.

2.2 NATIONAL POLICY ENVIRONMENT

2.2.1 National Energy Act (Act No 34 of 2008)

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

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

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

Investment in renewable energy initiatives, such as the proposed WEF, is supported by the White Paper on Energy Policy for South Africa (December1998). In this regard the document notes:

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

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

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

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

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

The White Paper also acknowledges that South Africa has neglected the development and implementation of renewable energy applications, despite the fact that the

country's renewable energy resource base is extensive and many appropriate applications exist.

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

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

Disadvantages include:

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

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

2.2.3 White Paper on Renewable Energy

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

The White Paper notes that while South Africa is well endowed with renewable energy resources that have the potential to become sustainable alternatives to fossil fuels, these have thus far remained largely untapped. As signatory to the Kyoto Protocol[7], 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.

[7] 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)

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. The medium-term (10-year) target set in the White Paper is:

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

The current iteration of the Integrated Resource Plan (IRP) for South Africa, initiated by the Department of Energy (DoE) after a first round of public participation in June 2010, led to the Revised Balanced Scenario (RBS) that was published in October 2010 and later up-dated in November 2013. The document outlines the proposed generation new build fleet for South Africa for the period 2010 to 2030. This scenario was derived based on the cost-optimal solution for new build options (considering the direct costs of new build power plants), which was then "balanced" in accordance with qualitative measures such as local job creation. In addition to all existing and committed power plants, the RBS included a nuclear fleet of 9,6 GW; 6,3 GW of coal; 11,4 GW of renewables; and 11,0 GW of other generation sources.

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

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

- The installation of renewables (solar PV, CSP and wind) were brought forward in order to accelerate a local industry;
- To account for the uncertainties associated with the costs of renewables and fuels, a nuclear fleet of 9,6 GW was included in the IRP;
- The emission constraint of the RBS (2140 million tons of carbon dioxide per year after 2024) was maintained; and
- Energy efficiency demand-side management (EEDSM) measures were maintained at the level of the RBS.

Figure 2.1 indicates the new capacities of the Policy commitment. The dates shown in Table 2.1 indicate the capacity is required in order to avoid security of supply concerns. The document notes that projects could be concluded earlier than indicated. In terms of allocation, wind was allocated between 600 and 800MW per year and solar between 500 and 700MW. With Round 4 announcement in April 2015 the allocation for wind and solar was doubled in the so called Round 4b and even an expedited Round 4c with an additional 1 800MW was introduced for bidding in October 2015. Furthermore the department announced that the current REIPPPP will be extended with an additional 63 00MW for the upcoming years. To date, there have been four (4) volumes or bidding windows under the REIPPPP. In April 2015,

the DoE announced additional preferred bidders for the REIPPPP Bid Window 4 contributing 1 121MW to the national grid contributing to a total of 5 243MW procured since the implementation of the programme to date (DoE, 2015).

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

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

2011 Determinations 2012 Determinations Eskom commitments (pre IRP)

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

Source: IRP 2010-2030 Update Report November 2013

Figure 2.1: IRP2010 Policy Adjusted Plan with Ministerial Determinations

2.2.5 National Development Plan

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

2.2.6 The New Growth Path Framework

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

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

2.2.7 National Infrastructure Plan

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

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

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

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

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

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

- Support bio-fuel production facilities.

SIP 9: Electricity generation to support socio-economic development
- Accelerate the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy and address historical imbalances;
- Monitor implementation of major projects such as new power stations: Medupi, Kusile and Ingula.

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

2.3 PROVINCIAL POLICY AND PLANNING ENVIRONMENT

2.3.1 Northern Cape Province Provincial Growth and Development Strategy

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

- Agriculture and Agro-processing;
- Fishing and Mariculture;
- Mining and mineral processing;
- Transport;
- Manufacturing;
- Tourism.

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

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

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

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

Of specific relevance to the SIA the NCPGDS make reference to the need to ensure the availability of inexpensive energy. The section notes that in order to promote

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

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

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

2.3.2 Northern Cape Provincial Spatial Development Framework

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

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

Under Section B 14.4, Energy Sector, the NCSDF (2012), notes the total area of high radiation in South Africa amounts to approximately 194 000 km^2 of which the majority falls within the Northern Cape. It is estimated that, if the electricity production per km^2 of mirror surface in a solar thermal power station were 30.2 MW

and only 1% of the area of high radiation were available for solar power generation, then generation potential would equate to approximately 64 GW. A mere 1.25% of the area of high radiation could thus meet projected South African electricity demand in 2025 (80 GW) (NCPSDF, 2012). However the SDF does indicate that this would require large investments in transmission lines from the areas of high radiation to the main electricity consumer centres. The SDF also notes that the implementation of large concentrating solar power (CSP) plants has been proposed as one of the main contributors to greenhouse gas emission reductions in South Africa. In this regard various solar parks and CSP plants have been proposed in the province with Upington being the hub of such developments (NCPSDF, 2012).

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

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

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

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

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

2.3.3 Northern Cape Climate Change Response Strategy

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

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

2.3.4 Eastern Cape Vision 2030 Provincial Development Plan (2014)

Vision is "in 2030 we will see the fruits of careful and collective hard work towards this commitment in":

- An Eastern Cape with a proliferation of innovation and industry, and citizens who can feed themselves
- All children and youth manifesting our shared belief that they are the cornerstone of the future
- Participatory local development action driven by committed, capable citizens and conscientious institutional agents

The plan notes that given the spatial imbalance in the province and the persistent underdevelopment of its rural regions where the majority of citizens live, the provinces long-term plan prioritises rural development as key to sustainable development. The PDP seeks to achieve a flourishing and thriving province by strengthening positive interactions between human, economic and institutional development:

- Economic development contributes to human development through increased household incomes and greater fiscal resources for public services;
- Economic development contributes to institutional development through increased fiscal resources for public institutions, parastatals, non-government organisations, private-sector partners and service providers to development programmes and projects;
- Human development is a prerequisite for institutional development by providing well-educated and ethical institutional leadership and employees;
- Human development contributes to economic development through a well-educated, creative, healthy and productive workforce;
- Institutional development and the creation of a capable and developmental state are crucial for driving rapid and equitable economic development;
- Institutional development contributes to human development through better use of public resources, for example, better health and education.

The PDP is based on a principled approach. The following key principles and assumptions underpin the PDP's implementation:

- Understanding of context;
- Social justice;
- Spatial equity and justice;
- Intergenerational equity;
- People-centred development;
- Keeping the public good public;
- Distributed agency and shared agenda-setting;
- Integrated coordination and efficiencies.

The PDP lists five key goals, namely:

Goal 1: A growing, inclusive and equitable economy
The objectives and strategic actions for achieving goal 1 are:

- Improved economic infrastructure that promotes new economic activity across all regions of the Eastern Cape. Of relevance the PDP identifies positioning the

Eastern Cape as a key investment hub in the energy sector and ensuring reliable energy supplies to high potential sectors
- Accelerated economic development of rural areas and all regions;
- Stronger industry and enterprise support. The PDP notes that this will be achieved by encouraging and creating partnerships to drive economic development, supporting enterprise development, R&D and innovation;
- An accelerated and completed land-reform process;
- Rapid development of high-potential economic sectors. Of relevance to the study, the high-level sector strategies in include mining and energy and tourism:

Renewable energy is specifically discussed in the context of the first objective (Improved economic infrastructure that promotes new economic activity). In this regard, 'Positioning the province as a key investment hub in the energy sector and ensuring reliable energy supply to high-potential sectors' is identified as one of seven key strategic actions for meeting this objective.

The PDP notes that by positioning the province as an energy investment hub, opportunities would be created to develop the capital goods sector and heavy industries. This new investment could become a major catalyst for provincial economic development, particularly if the benefits and costs are well managed. Regional and local benefits accruing from new investment in the energy sector could include:

- Cheaper energy (fuel and electricity), leading to cheaper food and transport, and more competitive labour markets;
- Employment in the construction, operation and maintenance of new energy facilities;
- Employment in the supply of manufactured components for the new energy facilities;
- Downstream linkages; and
- New rental collection systems to capture a portion of the surplus from these new investments.

The PDP notes that approved wind energy projects already account for 63 percent of the average provincial energy demand (1 700 MW). However, at present there are serious institutional hindrances to wind-farm developments (a reported 35 permits are required), particularly in the former homelands where there are land-tenure issues. Pre-authorisation arrangements in "renewable energy zones" (to be located in Cacadu and Chris Hani districts) would allow this industry to expand to its full potential (5000 MW).

Goal 2: An educated, empowered and innovative citizenry
The objectives and strategic actions for achieving goal 2 are:

- Access to quality early childhood development opportunities;
- Quality basic education;
- Teacher development;
- Improved leadership, management and governance;
- Infrastructure;
- Quality and relevant post-schooling with expanded access.

Goal 3: A healthy population
The objectives and strategic actions for achieving goal 3 are:

- Health system stability through primary healthcare re-engineering;
- Leadership and social partnering;
- Social determinants of health and disease.

Goal 4: Vibrant, equitably enabled communities
The objectives and strategic actions for achieving goal 4 are:

- Spatial planning and land-use management;
- Integrated, quality human settlements;
- Universal access to social infrastructure. To achieve universal access to water and sanitation, the province will upgrade and rehabilitate existing, and develop new, bulk-water supply and waste-water infrastructure; manage, monitor, protect and use water resources; review institutional arrangements for water resource management and water services management; and expand water services and sanitation to cover under-serviced rural areas and informal settlements. The province will review and resource the integrated public transport plan to ensure an improved public transport network;
- Promote safer communities.

Goal 5: Capable, conscientious and accountable institutions

The PDP reflects on the nine key challenges identified in the NDP with reference to the status quo in the Eastern Cape, namely:

High levels of unemployment: Unemployment statistics for the Eastern Cape – at 27.8 % (narrow rate) and 43.5 % (expanded rate including discouraged work-seekers) are higher than the national averages of 24.1 % and 34 % respectively. The situation is worse still in the economically depressed rural regions where the majority of the province's population resides.

Poor standard of education for most black learners: The Eastern Cape has fared worse than other provinces, despite its early history of educational leadership. Over the period 2000 to 2011, about 22 % of learners who entered Grade 1 progressed to Grade 12 within the 12-year period, with only 14 % successfully completing the National Senior Certificate examination.

Poorly located and maintained infrastructure that is insufficient to foster higher growth and spatial transformation: Despite efforts to address backlogs, infrastructure needs remain high, especially in rural regions, the road network is severely stressed and deteriorating, there is inadequate bulk infrastructure for services due to persistent underinvestment and poor maintenance and energy transmission and distribution networks are under-maintained and undercapitalised.

Spatial patterns exclude the poor from development. The province's two metropolitan areas together account for 65.5 % of gross value added (GVA) to the provincial economy (42.5 % in Nelson Mandela Bay Municipality and 23.0 % in Buffalo City Municipality). In addition, development patterns still reflect the inherited structure of the colonial, apartheid and Bantustan economies. In this regard, the freehold white-owned farms in the western part of the province still make up the bulk of the province's agricultural output.

The economy is overly and unsustainably resource intensive. The province has the smallest primary sector in the country, a relatively small agricultural sector, and the

largest tertiary services sector of all the provinces. The contribution of government services to the provincial economy is significantly higher than the national average.

The widespread disease burden is compounded by a failing public health system: The low life expectancy and high infant and maternal mortality rates in the province are clear indications of a dysfunctional health system, as well as a symptom of poverty and other adverse socioeconomic conditions. The rural nature of the Eastern Cape, with dispersed settlements, poor infrastructure and inaccessibility in some areas, also contributes to the complexities of providing healthcare services.

Public services are uneven and often of poor quality. The province's civil service is unprofessional and underperforms across all spheres. It is characterised by poor administration, a poor work ethic and weak consequence management.

Corruption is widespread. Corruption in the public service continues, including fruitless and wasteful expenditure and unaccounted-for funds. Systemic corruption in the private sector is also a key concern.

The province, like much of South Africa, remains a divided society. The slow pace of land reform and other forms of redress, and the stresses of continued exclusion from the economy still pose significant hurdles to social stability and cohesion.

The PDP identifies a number of opportunities including:

- Rich and diverse natural resources, including renewable energy and agriculture potential;
- Rich cultural history;
- Well established education systems and history. In this regard the Eastern Cape is also home to four universities and a number of further education and training (FET) colleges (which in future will be known as technical vocational education and training [TVET] colleges).

The PDP notes that the Chris Hani District has significant agricultural potential, with good water resources and some irrigation infrastructure. This presents the province with an opportunity to develop a large agro-industrial hub and significantly re-order spatial patterns of economic activity and growth by promoting value-adding agro-processing industry, related industries and services, and develop new settlements of a technical and professional employees in this region. The PDP further notes that the CHDM is also establishing itself as a model district by piloting new forms of collective enterprise – mainly cooperatives to help grow poor black citizens' participation in the economy. Cradock is identified a growth node for agriculture and the emerging biofuel industry in the province, with its proximity to the port city of Nelson Mandela Metro giving it a distinct advantage.

2.3.5 Eastern Cape Climate Change Response Strategy (2011)

In keeping with national policy initiatives, the Eastern Cape Climate Change Response Strategy (ECCCRS) was developed by Provincial Government from 2010-2011. The ECCCRS gives expression to the realization that the Eastern Cape is contributing to climate change, while at the same time being vulnerable to its effects. The ECCCRS is intended to facilitate planned and coordinated policy approaches to both climate change mitigation and adaptation.

The ECCCRS was developed in four phases, each resulting in a stand-alone report which compliments those of the other three phases. The relevant Phases/ Reports are:

- Phase I: Climate Change Scenario. This report focused on an understanding of the issues and context of climate change in the Province;
- Phase II: Provincial Needs and Technology Assessment. This report investigated technical options for climate change mitigation most appropriate to the Province's identified circumstances and needs;
- Phase III: Guideline Document on Sectoral Climate Change Action Plans. This report identified and developed cross-sectoral priority response programmes aimed at adaptation as well as mitigation responses; and
- Phase IV: Climate Communications, Education and Public Awareness Strategy. This report focused on disseminating the key information contained in the other reports to all relevant stakeholders.

Each of the four Phases are briefly discussed below.

Phase 1: Climate Change Scenarios and Impacts
The ECCCRS notes that manifestations of climate change are likely to include:

- Higher temperatures;
- Altered rainfall patterns;
- More frequent or intense extreme weather events including heat-waves, droughts, storms and floods; and
- Rising sea levels (which, associated with more intense storm surges and floods, may result in local inundation and coastal erosion).

The Eastern Cape is expected to experience the highest temperature increases towards the northwest interior (i.e. the Middelburg study area), while lowest increases are likely along the coast. Associated with the higher temperature will be increases in evaporation rates and increased intensity of droughts.

With regard to rainfall, it is anticipated that the Province will have generally stable or slightly higher rainfall than present, but with increasing intensity. Increased precipitation is more likely in the eastern parts of the Province.

The Strategy notes that the effects of climate change may have significant knock-on effects which could combine to threaten the environmental, economic and social systems of the province.

More hot days and heat waves would result in increased evaporation of water resources and in increased wildfire frequency. This would have significant negative impacts on the Province's commercial -, subsistence agriculture and forestry sectors, while also posing a risk to human and livestock health. With regard to human health, the elderly and infirm are the most vulnerable.

Increased storm severity/ Extreme weather events would result in increased risks of flooding and storm damage. Longer dry spells and increased likelihood/ severity of droughts pose an increased risk to primary production and subsistence farming, and thus to food security and sustainable human settlements.

The ECCCRS notes that all these manifestations of climate change would all have profound implications for the Province's social and economic development plans and

programmes. The assessment outlines the relevance of climate change to these plans and programmes, including:

- Initiatives and programmes reflected in provincial plans and programmes need to take into consideration risks and impacts and limitations imposed by climate change, such as increased temperatures; changes in precipitation levels; increased storm events; tidal surges and sea-level rise; and consider adaptation measures.
- Infrastructure development needs to take into account the impact of changing variables such as higher return periods for flooding and droughts, more extreme weather events, and sea level rise. Infrastructure development should pay close attention to geographic areas at highest risk such as flood–prone areas and areas close to sea-level;
- Development plans and programmes need to take into consideration the growing need for climate change mitigation and clean energy projects as development direction and economic opportunity. Such a development direction is underscored by the growing green economy; and
- Development plans and programmes need to consider co-funding opportunities through mechanisms such as trading of Carbon Credits and Climate Change Adaptation Funds.

The ECCCRS emphasizes that the successful outcomes of development plans and programmes, particularly in regard to poverty alleviation and food security, will increase the resilience of vulnerable communities to climate change.

A preliminary Greenhouse Gas Inventory for the Eastern Cape was undertaken as part of the ECCCRS. Four categories of emission sources were considered, namely Energy; Industrial Processes and Product Use; Solid Waste Management; and Agriculture, Forestry and other Land Use. The results of the preliminary provincial inventory indicated that the energy sector (electricity and fuels) was the key source of emissions, accounting for 67% of the ECP's greenhouse gas emissions.

Phase 2: Technology Assessment

The ECCCRS notes that opportunities for mitigation of climate change impacts by means of technical interventions and programmes are generally well understood and are described in the international literature. An analysis of the literature indicates that - apart from some contributions from forestation, livestock and soils - the predominant opportunities for mitigation are in the energy sector.

The highest priority opportunities are in terms of energy efficiency – both on the demand and the supply side. This would entail no-cost or relatively low-cost interventions which realise savings in resource consumption, and also hence costs, and which have attractive paybacks or returns on investment. The ECCCRS notes that according to the IEA's World Energy Outlook, energy efficiency has the potential to account for two-thirds of abatement targets set for 2020. Increased use of renewable energy would contribute approximately a fifth.

With regard to the ECP context, the ECCCRS assessed the most important and promising technologies and the appropriateness of technology opportunities in terms of the maturity of the technology; opportunities for cooperation with other organizations; and options for promotion within ECP Policies and Sector Plans.

Based on the assessment, priority technologies for an ECP mitigation response were identified. These represent technologies where the most significant gains in

mitigation can be achieved for the time, effort and finances invested. Ten such technologies were identified, namely:

- Energy efficiency in buildings and appliances;
- Heat pump technologies;
- Solar space and water heating;
- Energy efficiency in transport;
- Industrial energy efficiency;
- Smart grids and metering systems;
- Biomass energy systems;
- Wind energy systems;
- Hydro energy systems; and
- Solar PV systems,

With regard to **wind energy**, the ECCCRS notes that applications would include utility-scale WEFs, as well as small-scale mini-grid and stand-alone systems. Wind energy has the benefit of quicker development turnaround times relative to many other of the identified technologies. The Strategy further notes that the Province has some of the most suitable wind regimes in South Africa for the development of utility-scale WEFs. Within the ECP, the northern (including the Middelburg study area) and south-western portions have the highest average annual wind speeds (Figure 2.2)

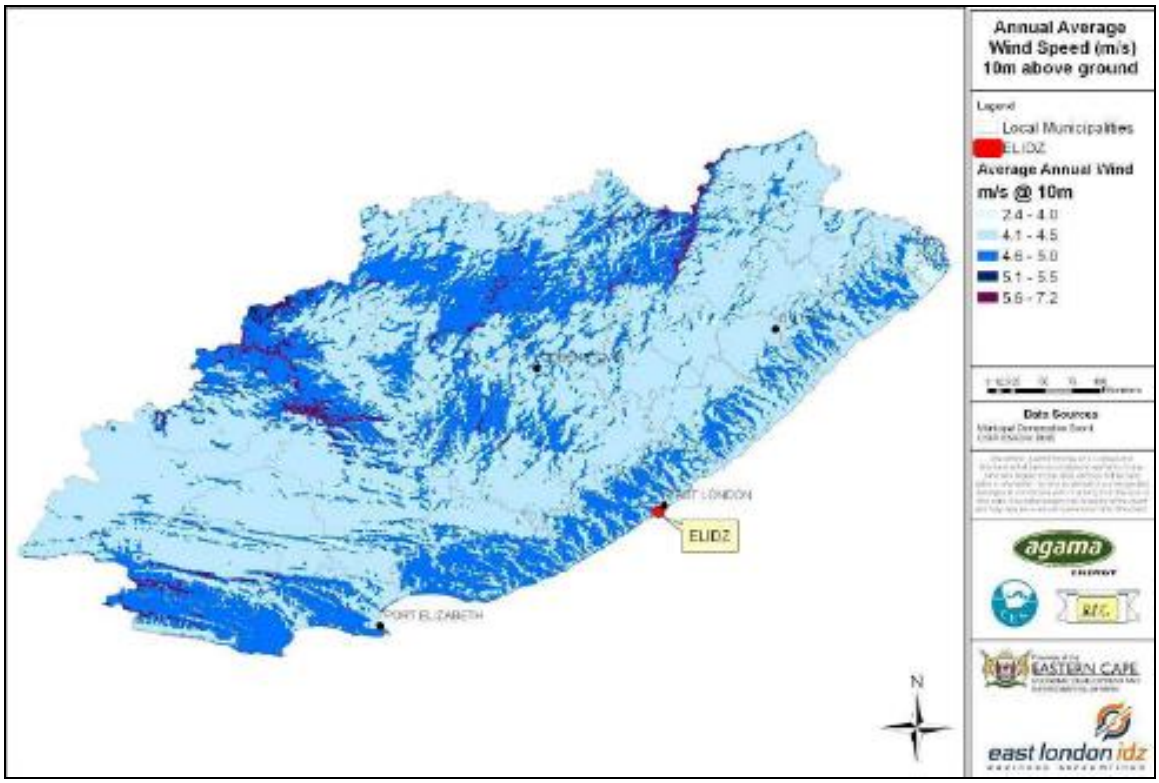


Figure 2.2: Average Annual wind speed (Source: ECCCRS, Phase 2 Report, p. 14)

The ECCCRS notes that although climate change has many negative social and economic implications, the necessary adjustment of global modes of production to a more sustainable, low carbon economy is likely to result in many opportunities for

the generation of "green" jobs. Renewable energy technologies typically result in more jobs per unit energy generated than conventional technologies such as coal, gas and nuclear.

Policies and measures that can be introduced by the Eastern Cape Provincial Government to promote technical options for mitigation include requirements for market creation and
development, Research and Development efforts, investments in new technologies, standard setting and the development of an enabling regulatory environment.

Phase 3: Sectoral Climate Change Action Plans
As indicated, Phase 3 deals with the development of provincial response programmes and plans. These are divided into two main categories, namely ones dealing with adaptation, and ones dealing with mitigation.

Measures and policy objectives identified in terms of Adaptation responses include water resources management; flood and storm prevention; and improved wildfire prevention and suppression.

Measures and policy objectives identified in terms of Mitigation responses are the following:

- Mainstreaming greenhouse gas Mitigation in Provincial and Local Government and in Industry;
- Promotion of Renewable Energy in the EC. Here the key mitigation objective should be to create an enabling environment for investment implementation and use of clean energy in the Eastern Cape;
- Mitigation and opportunities for sustainable livelihoods;
- Mitigation in Solid Waste and Wastewater Treatment; and
- Greenhouse Gas Mitigation in Transport.

Key potential opportunities are mainly associated with Mitigation responses. These include:

- Creating new streams of revenue from greenhouse gases reduction projects;
- Technology transfer and development;
- Access to foreign investment;
- Cost saving from increased energy efficiency and conservation;
- Poverty alleviation through income and employment generation associated with mitigation and development programmes;
- The Clean Development Mechanism (CDM) and the carbon market and involvement in emissions trading (buying or selling carbon credit);
- Opportunities to develop new products, services or technologies;
- Carbon neutral activities or projects to offset emissions from parts of its operations by buying or acquiring carbon credits; and
- Development of strategic partnerships with national and international partners.

Phase 4: Communication, Education and Public Awareness Strategy
The ECCCRS notes that, as climate change is a global problem with wide-ranging impacts, it is essential that the climate change message is communicated successfully to as many different and affected groups as possible.

With regard to the ECP, a targeted approach relevant to the types of audience, together with specific communication approaches, is recommended. Recommended target audiences include:

- Provincial legislature and local government councillors;
- Provincial and local government departments;
- Affected industry and service sectors;
- The general public.

The key message to be communicated to all groups is that "Everyone has a role to play in reducing emissions (mitigation) and everyone will be affected by climate change (adaptation)".

2.3.6 Eastern Cape Provincial Growth and Development Programme (2004-2014)

The Eastern Cape Provincial Growth and Development Programme (PGDP)(2004-2014) sets out the vision and plan for development for the Eastern Cape up until 2014[8]. It highlights, in particular, strategies to fight poverty, promote economic and social development, and create jobs.

The strategy document does not highlight any specific measures to promote the development of renewable energy sources. However, an analysis of energy sources within the province reveals that 23% of the population of the province still rely on paraffin for their energy needs while 25% rely on candles for lighting.

Section 5 of the PGDP identifies six strategic objective areas or programs aimed at addressing the challenges facing the province. The PGDP indicates that the programmes have been selected for their potential in leveraging significant resources, creating a large multiplier effect, and providing a foundation for accelerated economic growth. Of specific relevance to the proposed development is the Strategic Infrastructure Programme. This programme indicates that enabling economic and logistics infrastructure – energy, roads, rail, ports, and air transport among others – is a necessary condition for economic growth and development. Specific reference is therefore made to energy infrastructure.

The report notes that development of infrastructure, especially in the former homelands, is a necessary condition to eradicate poverty through:

- The elimination of social backlogs in access roads, schools and clinics and water and sanitation;
- To leverage economic growth through access roads and improving the road, rail and air networks of the Province.

Energy demands and electricity infrastructure rollout forms part of the Strategic Infrastructure Programme of the PGDP. The PGDP states that the, "…economic and logistics infrastructure – energy, roads, rail, ports, and air transport among others – is a necessary condition for economic growth and development."

Infrastructure development, in turn, will have strong growth promotion effects on the agriculture, manufacturing and tourism sectors by improving market access and by

[8] An up-dated PGDP had not been prepared at the time of undertaking this study.

"crowding in" private investment. Poverty alleviation should also be promoted through labour-intensive and community based construction methods.

The Strategic Infrastructure Programme also seeks to consolidate and build on this coastal advantage through the provision of world-class infrastructure and logistics capability at the Coega and East London IDZs, and improving connectivity and linkages with major industrial centers such as Johannesburg.

The high-level objectives of the Strategic Infrastructure Programme include consolidating and building upon the strengths of the Province's globally-competitive industrial sector through the development of world-class infrastructure and logistics capability in the East London and Coega IDZs. A reliable energy supply will be critical to achieving these objectives.

2.4 DISTRICT AND LOCAL POLICY AND PLANNING ENVIRONMENT

2.4.1 Pixley ka Seme District Municipality Integrated Development Plan

The vision for the Pixley ka Seme District Municipality (PKSDM) as set out in the IDP is "Pixley Ka Seme DM, pioneers of development, a home and future for all". In terms of the mission statement, the PKSDM sets out to achieve the vision by:

- Using the integrated development planning process to create a home for all in our towns, settlements and rural areas through rendering efficient and effective, excellent and dedicated services;
- Providing political and administrative leadership in the development planning process;
- Promoting economic growth that is shared across and within communities;
- Assisting local municipalities to provide a sustainable delivery of services to local communities;
- Mainstream integrated planning in the operations of our municipalities;
- Ensuring that all development initiatives in the district are aligned to the National Development Plan.

The IDP lists a number of developmental challenges facing the area including poverty, economic stagnation, unemployment and geographically imbalanced settlement structure. However, the IDP indicates that the most critical challenge facing the district is the reduction of poverty. Other key challenges identified that are relevant to the proposed development include:

- Lack of diversification of the district economy;
- Lack of investment in the region;
- Lack of employment opportunities;
- Lack of skills;
- Lack of entrepreneurship;
- Small number of SMME's active in the region;
- Underutilization of the regions natural resources and economic opportunities;
- Lack of water for irrigation farming.

The IDP also lists a number of strengths, weaknesses, opportunities and threats. The following opportunities and threats are relevant to the proposed development.

Opportunities
- Participation in green economic activities-solar power;
- Revitalization of the rail network- cargo hub;
- Tourism opportunities – N1, N9, N10 and N12 and Vanderkloof resort;
- Revamped Railway line;

Threats
- Diminishing income that inhibits service delivery;
- Low levels of graduates in the district;
- Impact of HIV/ Aids;
- Unemployment;
- Poverty;
- Climatic conditions e.g. drought;
- Alcohol/Drug abuse;
- Teenage pregnancy.

The Key Performance Areas (KPAs) listed in the IDP relevant to the proposed development includes Key Performance Area 3: Local Economic Development. The promotion of a green economy linked to renewable energy is identified as a key opportunity. In this regard the IDP notes that the PKSDM is actively promoting a green that seeks to promote economic activities that preserve and enhance environmental quality while using natural resources more efficiently.

In this regard the IDP makes specific reference to the Pixley Renewable Energy Hub. The establishment of the hub was initiated at the Pixley ka Seme District 2010 Investment and Renewable Energy Conference. A key objective of the hub is to diversify the economy by attracting foreign direct investments into solar, wind, hydro and Biomass projects. To date a number of renewable energy projects have been awarded in the PKSDM.

In addition to renewable energy the IDP also identifies shale gas exploration and possible production, together with the Square Kilometre Array (SKA) and the Meerkat Radio Telescope, as potential opportunities to diversify the economy which is largely agriculturally based.

Tourism is also identified as a key sector. The potential projects / areas identified include:

- Corridor development on the Orange and Vaal rivers;
- Adding value and local incomes from game hunting;
- Enhanced promotion and site development of the district's Anglo Boer war battlefields;
- Development of water sports facilities at Xhariep dam.

The proposed WEF supports a number of development objectives listed in the IDP, including:

- Promotion of economic development and the creation of sustainable job opportunities;
- Poverty reduction;
- Development of human and social capital;
- Provision of adequate infrastructure for economic and social development.

Key interventions would include promoting SMMEs; attracting and retaining investors in the region; development of identified development corridors; value-adding to/ beneficiation of local produce; and the promotion of tourism development. Local Economic Development (LED) Policies/ targets aimed at addressing these challenges include:

- LED 1: Promote Local Economic Development in the region;
- LED 2: Increase SMME promotion;
- LED 4: Increased tourism promotion;
- LED 6: Poverty Reduction.

2.4.2 Umsobomvu Local Municipality Integrated Development Plan

The vision for the Umsobomvu Municipality as set out in the IDP is "to be the Fastest Economically Developing Municipality in South Africa". The mission statement linked to the vision is "to serve our community by delivering quality services and customer care through dedicated staff for the upliftment of our community socially and economically".

The IDP notes that the ULM's economic activities are largely dominated by agriculture, followed by financial services, trade, hospitality industry, tourism and transport. The main agricultural activities are linked to merino sheep and horses, with irrigation along the Orange River. The status of the municipality's economy reflects the legacy of apartheid through its skewed development among former white areas and townships. Upliftment of the local economy is therefore a key focus area for the Municipality. Of relevance to the proposed development the IDP notes that the local economy is characterised by:

- High levels of poverty and unemployment, and low levels of education;
- A declining economy that is largely based on sheep farming;
- An economy that was too dependent on Spoornet in Noupoort, which has since declined because of the withdrawal of Spoornet;
- Promising growth in tourism in Colesberg Area;
- Rapid population growth in Colesberg because of the migration from other parts of the municipal area, which puts a heavy burden on the infrastructure. This has resulted in housing shortages and increase in number of informal dwellings;
- Increase of HIV infections amongst the youth;
- Alcohol and substance abuse;
- Increase in teenage pregnancies;
- Abuse of social grants.

The level of income for the majority of households in the ULM is also below the Minimum Living Level (MLL) or Poverty Datum Line (PDL). A large percentage of the local population are therefore unable to pay for their municipal services, which in turn places pressure on the local municipality. The current land ownership and land development patterns strongly reflect the political and economic conditions of the past era. Land reform programmes that are to be implemented within the IDP framework must therefore deal with the inequitable distribution of land. However, there is limited or no land available to for small and medium sized farming related activities. In this regard very little of the land is owned by provincial and national governments, local authorities and parastatal organizations.

The IDP identifies a number of challenges and opportunities facing the UM. The key challenge identified is poverty. Other challenges of relevance to the proposed development include:

- Ensuring all citizens have access to basic services such as water, sanitation, electricity and housing;
- Increasing access to services in education, health and social services;
- Stabilizing and decreasing the rate of HIV and AIDS infection and TB;
- Economic empowerment;
- Shortage of critical skills;
- Targeting special groups e.g. women, disabled and youth; and
- Sustainable job creation.

A Strengths, Weakness, Opportunities and Threats (SWOT) analysis was undertaken during as part of the IDP review process. The strengths and opportunities of potential relevance to the proposed development include:

- Tourism potential;
- Infrastructure – conducive to development;
- Low crime rates;
- Existing physical infrastructure.
- Good infrastructure;
- Industrial and economic potential;
- Tourism development

Potential weaknesses and threats include:

- Lack of capacity to environment service;
- Inadequate social and economic conditions;
- Scarce skills backlog;
- Depopulation of district;
- Sustainable Income for Municipality;
- Alcohol and drug abuse;
- Illiteracy;
- Migration to urban centres;
- TB and impact of HIV/Aids;
- Unemployment;
- High levels of poverty;
- Disinvestment;
- Lack of training in technology.

The IDP also identifies a number of opportunities for growth and development, including agriculture and agro-processing, manufacturing and tourism. The development of renewable energy is not specifically identified as an opportunity. A number of development nodes aimed at stimulating economic growth and attracting investment to the area are listed in the IDP, namely:

- Colesberg, which is located along the N1 national road that links Gauteng and Western Cape, and the N9 that links the district with Port Elizabeth and the Eastern Cape;
- The Orange River, which not only plays an important role in agriculture but also in tourism;
- The Gariep Dam, which is located on the Orange River on the border of the Free State and Eastern Cape Provinces. The dam is one of the main tourist attractions

of the region and forms part of the development corridor that runs in a north-south direction and links Bloemfontein, Trompsburg, Gariep Dam and Colesberg with one another along the N1 route.

In terms of key services, the IDP lists a number of key issues. These are listed below:

- Low population growth in rural areas;
- Demand for services, such as education, shelter, recreational facilities;
- Limited employment opportunities;
- Crime as a result of unemployment;
- Shortage of skilled workers;
- High poverty levels, with majority of the households in the municipality living below the Minimum Living Level (MLL) of Poverty Datum Line (PDL);

The priorities identified in the IDP that are of relevance to the proposed development include:

- Local economic development (LED), tourism and poverty alleviation
- Social upliftment
- Education and development
- Youth development
- Sport and recreation

At a local ward level, the proposed development is located in Ward 1 and 2, Noupoort. The needs identified in the IDP based on an extensive consultation process that could benefit from the establishment of a Community Trust associated with the proposed WEF include:

- Building of houses;
- Street lights;
- Library in Kwazamuxolo; and
- Public toilets in Nouport.

In terms of social and community facilities the IDP notes that there is a lack schools especially in the rural areas, which results in many young people having to travel long distances to areas where the schools exist. The majority of schools do not have libraries and resources at those schools that do have libraries are limited. In addition, there is tertiary institution in the LM. School leavers therefore leave the area and seldom return. The health centres in urban areas are poorly equipped and under-staffed; while there is a general lack health centres are available in the rural areas. There is also lack of aftercare facilities and support services for out-patients. In terms of recreational facilities, there is a dire shortage of such facilities in the historically disadvantaged communities. In addition, the existing recreational facilities in the townships do not have basic services and infrastructure.

2.4.3 Chris Hani District Municipality Climate Change Vulnerability Assessment and Response Plan (2017)

The Chris Hani DM recognises climate change as a threat to the environment, its residents, and to future development. Responding to climate change has therefore been identified as a key issue for the Chris Hani District Municipality. With the aid of Local Government Climate Change Support (LGCCS) program and the German Federal Government, a Climate Change Vulnerability Assessment and Response Plan (CCVARP) was developed for the DM in 2017.

The CCVARP focuses specifically on Adaptation strategies. Mitigation strategies such as renewable energy generation are not addressed in the Plan.

Five key vulnerable sectors were identified for the DM, namely:

- Agriculture;
- Biodiversity and the Environment;
- Human Health;
- Disaster Management, Infrastructure and Human Settlements; and
- Water resources.

Cross-cutting risks were identified for these sectors. Key risks include:

- Increased risk of agricultural pests and diseases;
- Changes in cropping conditions for subsistence staples like sorghum;
- Crops and livestock affected by frequency of droughts and storm events;
- Heat stress (human and animal health);
- Increased isolation of rural communities;
- Increased migration into urban areas;
- Increased risk of wildfires;
- Increased risk of flooding; and
- Water scarcity and impacts on water quality as a result of reduced runoff and increased evaporation

In the Chris Hani District Municipal Area, it is predicted that climate change will increase average temperatures, increase the variability of rainfall, and also exacerbate the risk and frequency of severe weather events such as floods, droughts and damaging storms.

The Plan notes that while the Agricultural sector is a modest contributor to the DM's Gross Value Added (GVA), it is one of the largest providers of employment opportunities. Approximately 44.34% of the DM's households are engaged in agricultural activity. While climate change may result in higher rainfall favourable to the DM's agricultural sector, it is also predicted to increase rainfall variability and decrease water security.

A reduction in biodiversity and/ or the impairment of ecosystem services could have direct negative consequences for the economy and social structures in the DM. These consequences could have a detrimental effect on efforts to reduce poverty, inequity and unemployment in the DM.

Climate change is expected to have an significant negative impacts on socio-economic development as well as the water and sanitation, food security, health, and energy sectors.

Climate change impacts are also likely to impact negatively on human health in the DM, affecting clean air, secure shelter, safe drinking water, and sufficient food. Potential impacts would include more frequent natural disasters, changes in behaviour of vector-borne diseases, decreased food security and nutrition, increased heat stresses, and increased air pollution. Human health and economic factors would also have impacts on sustainable human settlements and communities.

Climate change induced deterioration in the quantity and quality of the fresh water resource would profoundly affect environmental health, agriculture as well as human health and wellbeing.

Nine Desired Adaptation Outcomes have been identified for the Chris Hani DM, namely:

- Robust/integrated plans, policies and actions for effective delivery of climate change adaptation, together with monitoring, evaluation and review over the short, medium and longer-term;
- Appropriate resources (including current and past financial investments), capacity and processes (human, legal and regulatory) and support mechanisms (institutional and governance structures) to facilitate climate change adaptation;
- Accurate climate information (e.g. historical trend data, seasonal predictions, future projections, and early warning of extreme weather and other climate-related events) provided by existing and new monitoring and forecasting facilities/networks (including their maintenance and enhancement) to inform adaptation planning and disaster risk reduction;
- Capacity development, education and awareness programmes (formal and informal) for climate change adaptation (e.g. informed by adaptation research and with tools to utilise data/outputs);
- New and adapted technologies/knowledge and other cost-effective measures (e.g. nature-based solutions) used in climate change adaptation;
- Climate change risks, impacts and vulnerabilities identified and addressed;
- Systems, infrastructure, communities and sectors less vulnerable to climate change impacts (e.g. through effectiveness of adaptation interventions/response measures);
- Non-climate pressures and threats to human and natural systems reduced (particularly where these compound climate change impacts); and
- Secure food, water and energy supplies for all citizens (within the context of sustainable development).

As indicated, the Plan only addresses Adaptation measures, and therefore does not address renewable energy. The DM is however currently in the process of drafting a Climate Change Adaptation and Mitigation Strategy. This Strategy would also address renewable energy generation.

2.4.4 Inxuba Yethemba Local Municipality IDP

The vision for the Inxuba Yethemba LM (IYLM) as set out in its most recent (2014/ 2015) IDP is "A Coherent Developmental Municipality putting people first and providing a better life for all its citizens". In terms of the mission statement, the IYLM sets out to achieve this vision by:

- Promoting social and economic development;
- Ensuring effective community participation;
- Providing and maintaining affordable services; and
- Effectively and efficiently utilising all available resources.

Key municipal needs
Key basic infrastructure and services needs affecting the whole IYLM, as identified in the IDP, include the following:

- Roads and Storm water;

- Bulk water supply and infrastructure rehabilitation;
- Rehabilitation of bulk sewer pumps and sewer stations;
- Land for housing; and
- Waste management facilities.

Key social infrastructure needs affecting the whole IYLM include the following:

- More mobile health care facilities;
- An HIV/ Aids programme;
- Disaster management centre and associated equipment;
- Increased safety and security; and
- Increased traffic control enforcement.

Key economic developmental needs affecting the whole IYLM include the following:

- Employment creation;
- Support for emerging farmers;
- Support to existing projects and Community Based Enterprises;
- Support to cooperatives and SMME's;
- Tourism Development and Transformation;
- Development and Growing the Local Economy; and
- Land for land redistribution.

Key development strategies
The IYLM's development strategies are informed by the Local Government 5 year strategic agenda, and its turnaround strategy which involves:

- Service delivery and basic infrastructure;
- Local economic development;
- Financial Viability;
- Institutional Development and Municipal transformation; and
- Good governance and Public Participation.

Social needs strategies
Based on the needs analysis above, Council's key developmental objectives/ strategies include:

- Providing 5 000 low and medium cost serviced housing opportunities by 2020;
- Ensuring that all communities receive an uninterrupted power supply;
- Providing a safe and secure environment, amongst others by close co-operation between Council and the SAPS, and by petitioning the SAPS for more satellite stations;
- Facilitating the process of providing adequate educational facilities, in particular for pre-school and crèches, amongst others by lobbying with the Departments of Public Works and Social Development, as well as donor agents for the funding of structures; and
- Reducing the HIV infection rate and its impact on individuals, families and the community, by amongst others improving access to facilities for sufferers, increasing community awareness and testing, promoting safe sex and the use of condoms, and ensuring compliance by circumcision officials.

Economic development strategies
The IYLM's key economic development priorities and strategies include:

- Developing the Local Economy by stimulating it and strengthening part partnerships with the business and labour sectors. Key strategies include the promotion of local businesses and local spending; offering incentives for business retention, expansion and attraction; and promoting SMMEs;
- Poverty alleviation and employment creation. Key strategies include encouraging capacity building, development and training; and promoting projects which will create sustainable jobs;
- Growing the local underdeveloped tourism sector. Key strategies include general beautification; increased promotion of the region; and diversification of tourism assets and facilities; and
- Improving agricultural productivity as well as access to land. Key strategies include promoting existing enterprises while facilitating support for emerging farmers.

Sector Plans
The IDP also contains an overview of a number of existing and envisaged municipal sector plans. Of these, the following are of relevance here:

Spatial Development Framework
The IYLM SDF was in the process of revision when the IDP was compiled in 2014, and does not seem to have been finalized yet. Key principles which would underpin the SDF include ones dealing with sustainability, efficiency, integration; densification and land reform. Sustainability principles are of specific relevance to the WEF project, and include:

- Protecting the environmental resources such as vegetation and environmentally sensitive areas, during future development;
- Ensuring that sufficient natural resources such as water and land are available for future expansion;
- Ensuring economical, affordable services; and
- Creating and investor friendly environment.

Local Economic Development Framework
Key objectives identified for the revision of the IYLM's LED Framework include the following:

- Plugging Leaks in Local Economy by promoting local spending;
- Infrastructure Development for SMME development. Building and construction contracts should be labour intensive, thus creating jobs for economic growth;
- Attracting Business to Inxuba Yethemba by means of a business incentive scheme;
- Retention of Existing Business by ensuring flexibility of regulating by-laws to favour local business;
- SMME Development; and
- Maximising the region's tourism potential.

2.4.5 Inxuba Yethemba Local Municipality Draft Spatial Development Framework (2014)

The most recent version of the IYLM Spatial Development Framework (SDF) appears to be a December 2014 revision draft.

The key spatial development principles underpinning the SDF are identified as Sustainability (environmental, social and economic), Efficiency, Urban Integration, Urban Densification, and Land Reform.

The SDF notes that Middleburg is an important urban centre, serving as the centre of urbanization for surrounding rural populations thus putting Council under significant pressure to provide new housing. The majority of the households moving to Middleburg are poor and without adequate income opportunities. Sufficient land for low cost housing is available in Middelburg.

Most of the spatial proposals in the SDF pertain to urban areas, and are not applicable to the study area. Renewable resources are discussed in the context of climate change.

The SDF notes that Council does not currently have any climate change mitigation policies in place. The SDF notes that the IYLM is likely to suffer from higher, but more unpredictable rainfall, increased evaporation, and hotter summers and winters. All of these would significantly impact on existing land use, specifically agriculture. Increased energy efficiency and the support of renewable sources of energy are identified as key mitigation responses.

The SDF notes the suitability of the IYLM for wind and other renewables proposals, and recommends that Council takes the appropriate measures to prepare itself for dealing with specific applications. The SDF notes that physical impacts should be restricted to suitable areas, but does not provide any spatial suitability guidance in this regard.

2.5 OVERVIEW RENEWABLE ENERGY SECTOR IN SOUTH AFRICA

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

The following documents were reviewed:

- Independent Power Producers Procurement Programme (IPPPP): An Overview (30 September 2016), Department of Energy, National Treasury and DBSA;
- Green Jobs Study (2011), IDC, DBSA Ltd and TIPS;
- Powering the Future: Renewable Energy Roll-out in South Africa (2013), Greenpeace South Africa;
- WWF SA, Renewable Energy Vision 2030, South Africa, 2014
- Jacqueline M. Borel-Saladin, Ivan N. Turok, (2013). The impact of the green economy on jobs in South Africa,), South African Journal of Science, *Volume 109 |Number 9/10, September/October 2013;*

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

2.5.1 Independent Power Producers Procurement Programme (IPPPP): An Overview

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

Energy supply
In terms of renewable energy 6 376 MW1 of electricity had been procured from 102 RE Independent Power Producers (IPPs) in three finalized bid rounds to date. Of this 2 738 MW of electricity generation capacity from 51 IPP projects has been connected to the national grid. To date 11 064 GWh of energy has been generated by renewable energy sources procured under the REIPPPP since the first project became operational (making a 15% contribution to morning and evening system peak periods).

Investment
The document notes that the REIPPPP has attracted significant investment in the development of the REIPPs into the country. The total investment (total project costs1), including interest during construction, of projects under construction and projects in the process of closure is R194.1 billion (this includes total debt and equity of R192.9 billion, as well as early revenue and VAT facility of R1.3 billion).

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

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

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

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

target for shareholding by black people in top management has been set at 40%, with an average 61% achieved to date.

Community shareholding and community trusts

The REIPP Procurement program of the Department of Energy require a minimum ownership of 2.5% by local communities in IPP projects. This is to ensure that a substantial portion of the investments has been structured and secured as local community equity. An individual community's dividends earned will depend on the terms of each transaction corresponding with the relevant equity share. To date all shareholding for local communities have been structured through the establishment of community trusts. For projects in BW1 to BW4 and 1S2, qualifying communities will receive R29.2 billion net income over the life of the projects (20 years). The report notes that the bulk of the money will however only start flowing into the communities from 2028 due to repayment obligations in the preceding years (repayment obligations are mostly to development funding institutions). However, despite the delay this represents a significant injection of capital into mainly rural areas of South Africa.

Procurement spend

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

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

Local Content[9]

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

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

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

Leveraging employment opportunities

To date, a total of 28 4842 job years[10] have been created for South African citizens, of which 26 207 were in construction and 2 276 in operations. These job years should rise further past the planned target as more projects enter the construction phase. The report also notes that by end September 2016, 51 projects had successfully completed construction and moved into operation. The projects had planned to deliver 13 069 job years during the construction phase, but had achieved 20 987. This was 61% more than planned.

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

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

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

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

Socio-economic development (SED) contributions

An important focus of the REIPPPP is to ensure that the build programme secures sustainable value for the country and enables local communities to benefit directly from the investments attracted into the area. In this regard IPPs are required to contribute a percentage of projected revenues accrued over the 20 year project operational life toward SED initiatives. These contributions accrue over the 20 year project operation life and are used to invest in housing and infrastructure as well as healthcare, education and skills development. The minimum compliance threshold for SED contributions is 1% of revenue with 1.5% the targeted level over the 20 year

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

project operational life. The 51 projects that are currently operational have contributed R256 to SED to date, which represents approximately 1.2% of total revenue generated to date. The 51 IPP projects have also committed 1.5% over the 20 year project operational life. Therefore, based on current projects average commitment level is 2.2% or 120% more than the minimum compliance threshold.
To date (across 6 bid windows) a total contribution of R19.3 billion has been committed to SED initiatives. Assuming an even, annual revenue spread, the average contribution per year would be R964 million. Of the total commitment, R15.2 billion is specifically allocated for local communities where the IPPs operate. With every new IPP on the grid, revenues and the respective SED contributions will increase.

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

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

2.5.2 Green Jobs Study

The study notes that South Africa has one of the most carbon-intensive economies in the world, thus making the greening of the electricity mix a national imperative. Within this context the study notes that the green economy could be an extremely important trigger and lever for enhancing a country's growth potential and redirecting its development trajectory in the 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 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 operations and maintenance (O&M) activities, particularly those involved in the various natural resource management initiatives. In this regard, operations and maintenance employment linked to renewable energy generation plants will also be substantial in the longer term. The employment growth momentum related to building, construction and installation activities peaks in the medium term, largely propelled by mass transportation infrastructure, stabilising thereafter as green building methods become progressively entrenched.

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

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

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

Table 2.2: Potential contribution capacity of local industries

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

The study also identifies a number of advantages associated with wind power as a source of renewable energy with a large 'technical' generation potential. In this regard wind energy does not emit carbon dioxide (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 greenhouse gases (GHG) associated with the construction phase are offset within a very short period of time compared with the project's lifespan. Wind power therefore provides an ideal means for reaching emission reduction targets in a relatively easy manner. In addition, and of specific relevance to South Africa, wind as energy source is not dependent on water (as compared to the massive water requirements of conventional power stations), has a limited footprint and therefore does not impact on large tracts of land, poses limited pollution and health risks, specifically when compared to coal and nuclear energy plants.

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

2.5.3 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 (Letete, T et al). Energy accounts for 83% of the total GHG emissions (excluding land use, land use change and forestry) with fuel combustion in the energy industry accounting for 65% of the energy emissions of South Africa (DEA, 2011).

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

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

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

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

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

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

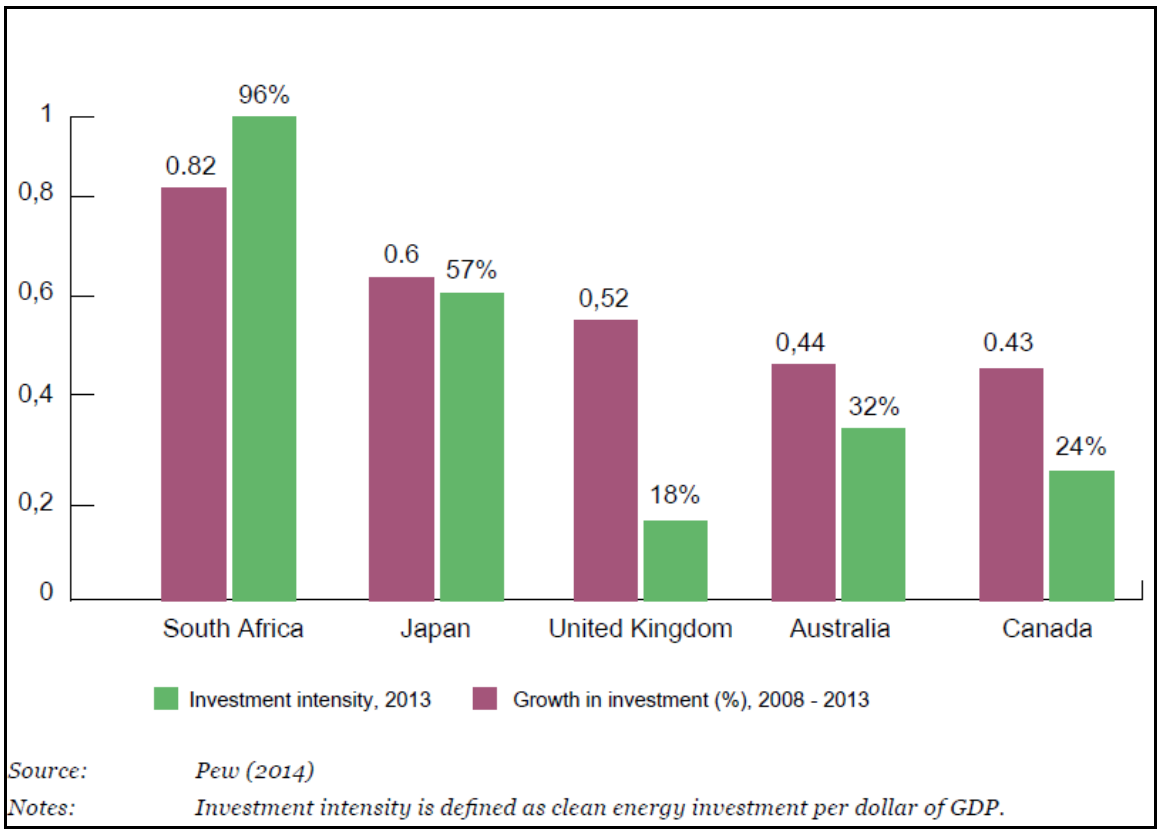
2.5.4 WWF SA, Renewable Energy Vision 2030

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

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

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

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



Source: *Pew (2014)*

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

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

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

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

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

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

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

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

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

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

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

2.5.5 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 Development Bank of South Africa, and Trade and Industrial Policy Strategies. Many role players from other organisations were also consulted, including the World Wide Fund for Nature, the Green Building Council, the Economic Development Department and private companies involved in green industries.

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

2.5.6 The potential for local community benefits from wind farms in South Africa

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

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

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

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

2.5.7 Market Intelligence Report: Renewable Energy

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

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

2.6 INTERNATIONAL EXPERIENCE WITH WIND FARMS

Three documents were reviewed, namely:

- National Wind Farm Development Guidelines produced by the Environment Protection and Heritage Council (EPHC) of Australia (Draft, July, 2010). The guidelines highlight the potential social and biophysical impacts associated with WEFs. Given the similarities between South Africa and Australia, such as large, unobstructed landscapes and climates, these guidelines are regarded as relevant to the South Africa situation;
- Research on wind energy development in Scotland undertaken by Warren and Birnie in 2009 (Warren, Charles R. and Birnie, Richard V. (2009) 'Re-powering Scotland: Wind Farms and the 'Energy or Environment?' Debate'). The Scottish experience is also regarded as relevant to the South Africa context for a number of reasons. Firstly, installed wind power capacity has expanded rapidly in Scotland over the past decade. Before 1995 no wind farms existed. By late 2008,

there were 59 operational onshore wind farms, 65 consented to or under construction and a further 103 in the planning process (BWEA, 2008). South Africa faces a similar situation, with a rush of applicants seeking approval for WEFs. Secondly, the impact on the landscape, specifically the Scottish Highlands, was one of the key concerns raised in Scotland. The impact on undeveloped, natural landscapes is also likely to become an issue of growing concern in South Africa;

- Review of the potential health impacts associated with wind farms undertaken by the Australian Health and Medical Research Council (July, 2010)[11].

It should be noted that the section is not specific to the site but merely a review of international literature.

Health related impacts

The potential health impacts typically associated with WEFs include, noise, dust, shadow flicker and electromagnetic radiation. The findings of a literature review undertaken by the Australian Health and Medical Research Council published in July 2010 indicate that there is no evidence of wind farms posing a threat to human health. The research also found that wind energy is associated with fewer health effects than other forms of traditional energy generation, and may therefore in fact result in the minimization of adverse health impacts for the population as a whole (WHO, 2004).

The overall conclusion of the review undertaken by the Australian Health and Medical Research Council (July, 2010) is that, based on current evidence, wind turbines do not pose a threat to health if planning guidelines are followed.

Landscape impacts

The guidelines also note that landscapes change over time, both naturally and through human intervention. In addition, landscape values, being subjective, change not only with time, but also from person to person. As a result, there are a wide variety of opinions of what is valued and what is not. The perceptions by which we value landscapes are influenced by a range of factors such as visual, cultural, spiritual, environmental, and based on memories or different aesthetics (National Wind Farm Development Guidelines, DRAFT - July 2010).

The guidelines 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 at a time, but if each successive stretch of the road is dominated by views of a wind farm, then that can be argued to be a cumulative visual impact (National Wind Farm Development Guidelines, DRAFT - July 2010).

Cumulative impacts may be visual and aesthetic, but they can also occur in relation to non-visual values about landscape. Non-visual values include sounds/noise, associations, memories, knowledge and experiences or other cultural or natural values. As an example, the Guidelines indicate that locating four wind farms in a valley previously best known for its historic wineries might change the balance of perception about the valley's associational character, irrespective of whether all four

[11] Annexure D contains a more detailed review of the documents.

wind farms were sited in a single view shed (National Wind Farm Development Guidelines, DRAFT - July 2010).

In the Scottish case, the primary argument employed to oppose wind farms related to the impact on valued landscapes. As in the South African case, the visual impacts are exacerbated by the fact that the locations with the greatest wind resources are often precisely those exposed upland areas which are most valued for their scenic qualities, and which are often ecologically sensitive. The establishment of wind farms together with the associated service roads and infrastructure, transforms landscapes which are perceived to be natural into 'landscapes of power' (Pasqualetti et al., 2002, p. 3).

2.7 IMPACT OF WIND FARMS ON TOURISM

A review of international literature in the impact of wind farms was undertaken as part of the SIA. Three articles were reviewed, namely:

- Atchison, (April, 2012). Tourism Impact of Wind Farms: Submitted to Renewables Inquiry Scottish Government. University of Edinburgh
- Glasgow Caledonian University (2008). The economic impacts of wind farms on Scottish tourism. A report prepared for the Scottish Government
- Regeneris Consulting (2014). Study into the Potential Economic Impact of Wind Farms and Associated Grid Infrastructure on the Welsh Tourism Sector

The most comprehensive appears to be a review undertaken by Professor Cara Aitchison from the University of Edinburgh in 2012 which formed part Renewable Energy Inquiry by Scottish Government. The research by Aitchison found that that previous research from other areas of the UK has demonstrated that wind farms are very unlikely to have any adverse impact on tourist numbers (volume), tourist expenditure (value) or tourism experience (satisfaction) (Glasgow Caledonian University, 2008; University of the West of England, 2004). In addition, to date, there is no evidence to demonstrate that any wind farm development in the UK or overseas has resulted in any adverse impact on tourism. In conclusion, the findings from both primary and secondary research relating to the actual and potential tourism impact of wind farms indicate that there will be neither an overall decline in the number of tourists visiting an area nor any overall financial loss in tourism-related earnings as a result of a wind farm development. The study by the Glasgow Caledonian University (2008) found that only a negligible fraction of tourists will change their decision whether to return to Scotland as a whole because they have seen a wind farm during their visit.

The study also found that 51.0% of respondents indicated that they thought wind farms could be tourist attractions. In this regard, the visitor centre at the Whitelee Wind Farm in east Ayrshire Scotland run by ScottishPower Renewables has become one of the most popular 'eco-attractions' in Scotland, receiving 200 000 visitors since it opened in 2009.

2.8 IMPACT ON WIND FARMS ON PROPERTY VALUES

The literature review undertaken as part of the SIA does not constitute a property evaluation study and merely seeks to comment on the potential impact of wind farms

on property values based on the findings of studies undertaken overseas. The literature reviewed was based on an attempt by the authors of the SIA to identify what appear to be "scientifically" based studies that have been undertaken by reputable institutions. In this regard, it is apparent that there are a number of articles available on the internet relating to the impact of wind farms on property values that lack scientific vigour. The literature review also sought to identify research undertaken since 2010. The literature review does not represent an exhaustive review.

In total five articles were identified and reviewed namely:

- Stephen Gibbons (April, 2014): Gone with the wind: Valuing the Visual Impacts of Wind turbines through house prices. London School of Economics and Political Sciences & Spatial Economics Research Centre, SERC Discussion Paper 159;
- Review of the Impact of Wind Farms on Property Values, Urbis Pty Ltd (2016): Commissioned by the Office of Environment and Heritage, NSW, Australia;
- Yasin Sunak and Reinhard Madlener (May 2012): The Impact of Wind Farms on Property Values: A Geographically Weighted Hedonic Pricing. School of Business and Economics / E.ON Energy Research Center, RWTH Aachen University. Model Working Paper No. 3/2012;
- Martin D. Heintzelman and Carrie M. Tuttle (March 3, 2011): Values in the Wind: A Hedonic Analysis of Wind Power Facilities. Economics and Financial Studies School of Business, Clarkson University;
- Ben Hoen, Jason P. Brown, Thomas Jackson, Ryan Wiser, Mark Thayer and Peter Cappers (August 2013): A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States. Ernest Orlando Lawrence Berkeley National Laboratory.

Three of the articles indicate that wind farms have the potential to impact on property values, while two indicate that the impacts are negligible and or non-existent.

In terms of the proposed project the most relevant study is the Urbis study (2016). The authors of the study found that appropriately located wind farms within rural areas, removed from higher density residential areas, are unlikely to have a measurable negative impact on surrounding land values.

SECTION 3: OVERVIEW OF THE STUDY AREA

3.1 INTRODUCTION

Section 3 provides an overview of the study area with regard to:

- The administrative context;
- The demographic and socio-economic context.

The majority of the study area is located within the Umsobomvu Local Municipality (ULM, which is located in the Northern Cape Province. A small section of the site is located in the Inxuba Yethemba Local Municipality (IYLM), which falls within the Eastern Cape Province. The IYLM falls within the Chris Hani District Municipality.

3.2 ADMINISTRATIVE CONTEXT

The IYLM is one of six B-Municipalities that constitute the Chris Hani District Municipality (CHDM) (DC13) (Figure 3.1). Cradock is the administrative seat of the IYLM, and together with Middelburg, one of the two major towns in the LM. The main land uses in the area are linked to stock farming and agriculture.

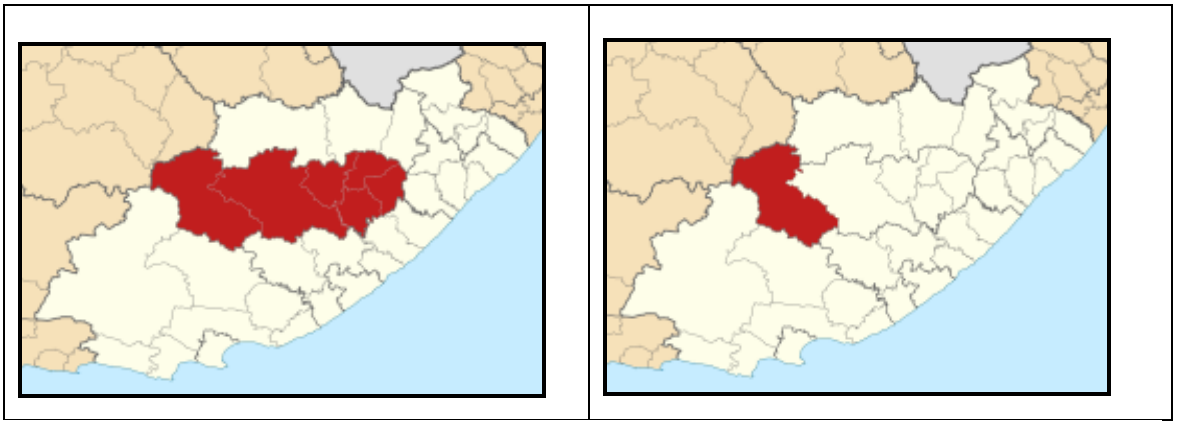
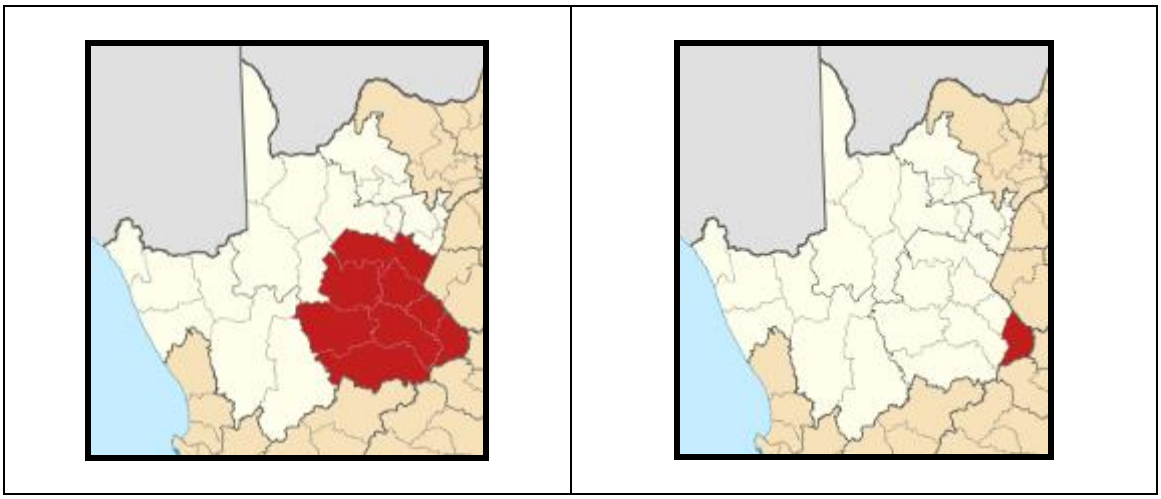


Figure 3.1: Location of Chris Hani District Municipality (left) and Inxuba Yethemba Local Municipality (right) within the Eastern Cape Province

The ULM is one of the eight B-Municipalities that constitute the Pixley ka Seme District Municipality (PKSDM) (NC7) (Figure 3.2). Colesberg is the administrative centre of the ULM. The town of Colesberg is located on the N1 in the Great Karoo, approximately halfway between Johannesburg and Cape Town. Colesberg is also located on the N9, which provides a link to Port Elizabeth to the south. The other two urban centres in the UM are Noupoort and Norvalspont, a small settlement located near the Gariep Dam.



Source: Wikipedia

Figure 3.2: Location of Pixley ka Seme District Municipality (left) and Umsobomvu Local Municipality (right) and within the Northern Cape Province (white).

3.1 NORTHERN CAPE PROVINCIAL CONTEXT[12]

The Northern Cape Province is the largest province in South Africa, covers an area of 361,830 km^2, and constitutes approximately 30% of South Africa. The province is divided into five district municipalities (DM), namely, Pixley ka Seme, Frances Baard, Namakwa, ZF Mgcawu[13], and John Taola Gaetsewe[14], twenty-six Category B municipalities and five district management areas. The site itself is located in the Umsobomvu Local Municipality.

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

Education
Based on the information contained in the NCPSDF the average adult education attainment levels in the Northern Cape are lower than the adult education attainment levels of South Africa as a whole. Approximately 19.7% of the Northern Cape adults have no schooling in comparison to South Africa's 18.1%. The Northern Cape has the

[12] The information in this section is based on the Northern Cape Provincial Growth and Development Strategy 2004-2014. This document does not include 2011 Census Data. Where possible data from the 2011 Census and the NCSDF 2012 has been used to update the information.
[13] The ZF Mgcawu DM was previously referred to as the Siyanda DM.
[14] The John Taola Gaetsewe DM was previously referred to as the Kgalagadi DM

second lowest percentage of adult individuals (5.5%) that obtained a tertiary education in South Africa. The LED Strategy for the Northern Cape indicates that Pixley ka Seme has the lowest adult education attainment levels in the Northern Cape with 27.3% of the adult population having no form of schooling, whilst John Taolo Gaetsewe is second with 25.4% having no schooling. The highest number of the adult population with tertiary education (6.4%) is located in Frances Baard.

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

Economic development

Over the past 8 years there has been little to no variance in the Human Development Index (HDI) figures for the Northern Cape, indicating no increase or decrease in the overall standard of living[15]. This trend is unlikely to change in the foreseeable future, mainly due to the marginal economic base of the poorer areas, and the consolidation of the economic base in the relatively better-off areas. It is important to note that the HDI for the Northern Cape (0.55) is substantially below the South African figure of 0.72. The HDI of 0.55 displays a pattern of semi-development, and there is a definite inequality between the different population groups, with the Whites having a higher development lifestyle than the African or Coloured groups.

The percentage of Northern Cape people living below the poverty line has decreased from 40% in 1995 to 27% in 2011, while the poverty gap has decreased from 11% in 1995 to 8% in 2011 (Figure 3.3). The goal set by the province is to decrease the percentage of people living below the poverty line to 20% by 2015 NCSDF, 2012). The alleviation of poverty is one of the key challenges for economic development. Higher levels of economic growth are a key challenge for poverty eradication. Investment in people is pivotal to the eradication of poverty and inequality. Investment in people is also, to a large extent, about delivering social and economic infrastructure for education, welfare, health, housing, as well as transport and bulk infrastructure.

[15] The Human Development Index (HDI) was developed by the United Nations Development Programme (UNDP) based on the philosophy that the goal of development was to ensure that individuals live long, informed and comfortable lives. The HDI consists of three components: Longevity, which is measured by life expectancy at birth; Educational attainment, which is measured by two education variables, namely adult literacy and combined gross primary, secondary and tertiary enrolment ratio, and; Income, which is measured by gross domestic product (GDP) per capita. Performance in each dimension is expressed as a value between 0 and 1, and the HDI index gives an internationally accepted measure of the wellness (quality of life) of the population of the area under consideration. The closer the HDI is to 1.0, the higher the level of "living condition". For example, Sweden has an index of 0.91 defined as high, South Africa at 0.72 is defined as middle and Lesotho at 0.47 is defined as low.

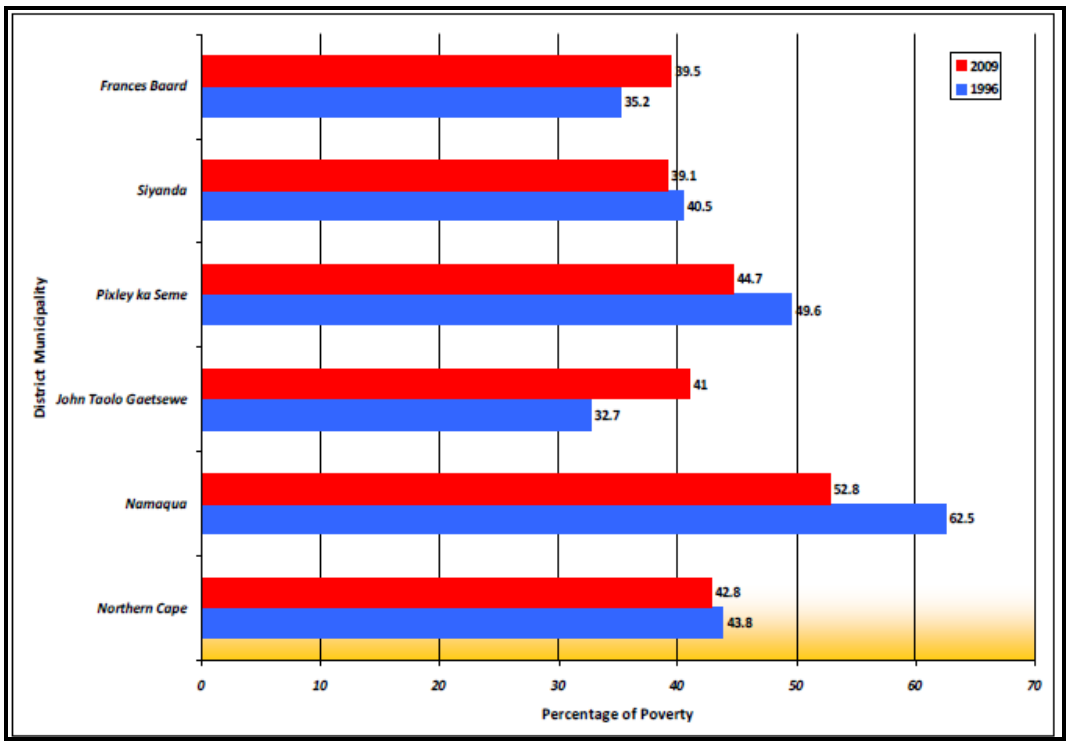


Figure 3.3: Percentage of people living in poverty in the Northern Cape (Source: Global Insight, 2009 as cited in the PGDS, July 2011)[16].

In terms of per capita income, the Northern Cape Province has the third highest per capita income of all nine Provinces. However, income distribution is extremely skewed, with a high percentage of the population living in extreme poverty. The measure used in the PGDS document to measure poverty is the percentage of people living below the poverty line or breadline is used[17]. The poverty line indicates a lack of economic resources to meet basic food needs. Figure 3.4 indicates the percentage of household income below the poverty breadline of R800 in the Northern Cape Province, the highest being Karoo at 48% and the lowest being Namakwa at 36%.

[16] The name of the Siyanda DM has been changed to the ZF Mgcawu DM

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

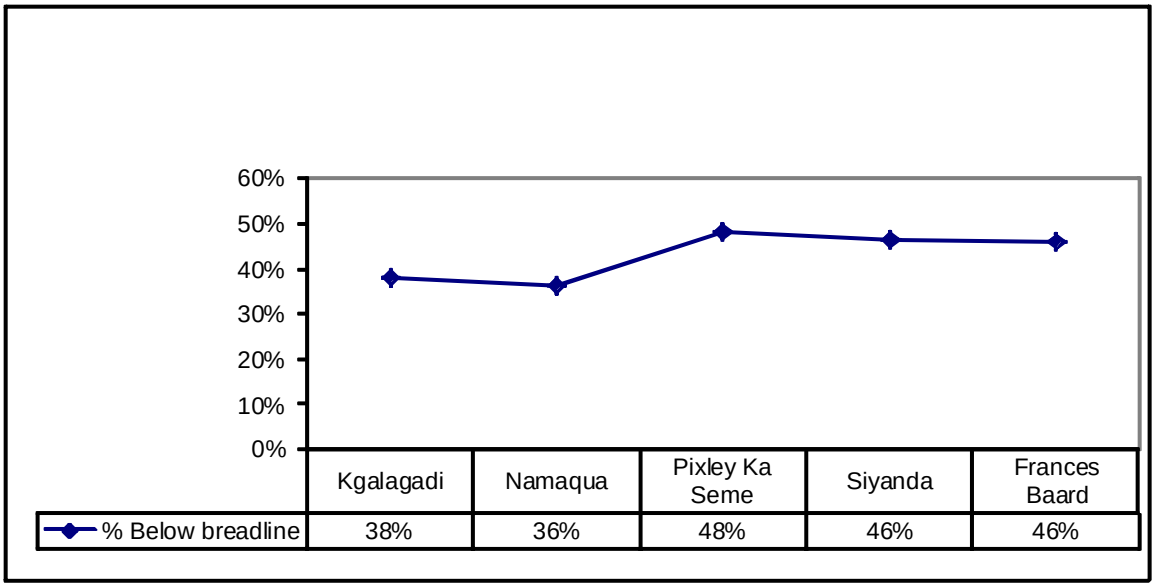


Figure 3.4: Percentage of household income below the poverty breadline by district[18] (*Source: Northern Cape PGDS).*

Economic sectors

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

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

Agriculture and agri-processing sector is also a key economic sector. Approximately 2% of the province is used for crop farming, mainly under irrigation in the Orange River Valley and Vaalharts Irrigation Scheme. Approximately 96% of the land is used for stock farming, including beef cattle and sheep or goats, as well as game farming. The agricultural sector contributed 5.8% to the Northern Cape GDP per region in 2007 which was approximately R1.3 billion, and it employs approximately 19.5% of the total formally employed individuals (NCSDF, 2012). The sector is experiencing significant growth in value-added activities, including game-farming. Food production and processing for the local and export market is also growing significantly.

The main agricultural produce of the Northern Cape include:

- High-value horticultural products such as table grapes, sultanas and wine grapes, dates, nuts, cotton, fodder, and cereal crops are grown along the Orange River.

[18] The name of the Kgalagadi DA has been changed to the John Taola Gaetsewe DM. The name of the Siyanda DM has been changed to the ZF Mgcawu DM.

- Wheat, fruit, groundnuts, maize and cotton in the Vaalharts irrigation scheme in the vicinity of Hartswater and Jan Kempdorp.
- Vegetables and cereal crops at the confluence of the Vaal River and the Orange Rivers in the vicinity of Douglas.
- Wool, mohair, karakul, Karoo lamb, ostrich meat and leather, and venison throughout most of the province.

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

Employment
According to Statistics South Africa Labour (2012) the community and social services sector is the largest employer in the province at 29%, followed by the agricultural sector (16%), wholesale and retail trade (14%), finance (8%) manufacturing (6%) and mining (6%), etc. (Figure 3.5).

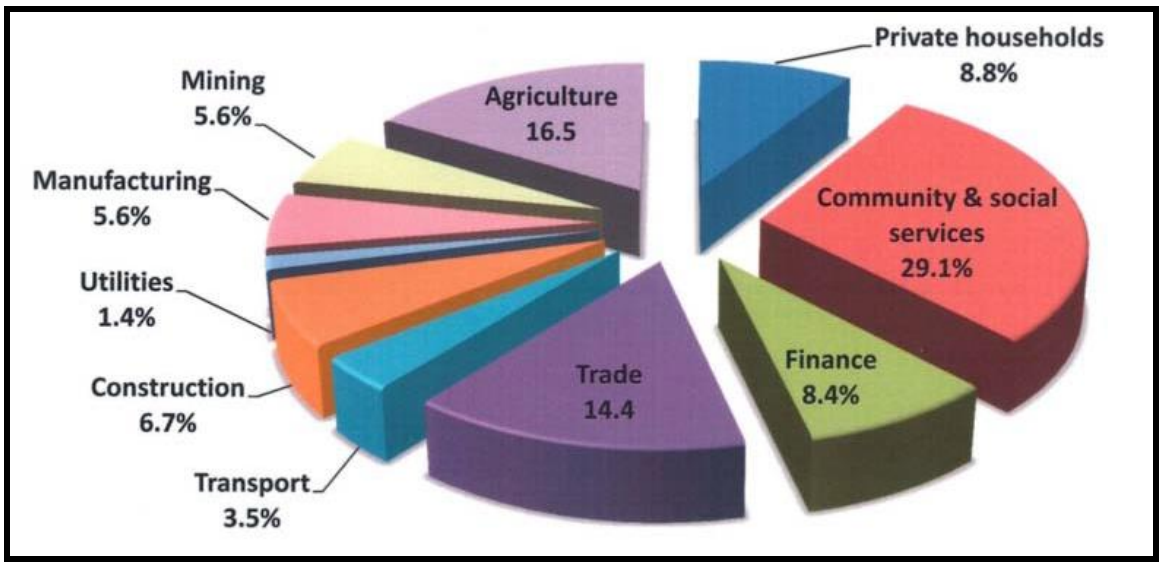


Figure 3.5: Employment by Economic Sector and Industry (Source: Statistics South Africa 2012).

3.3 PIXLEY KA SEME AND UBUNTU MUNICIPALITY

3.3.1 Demographic Overview

As indicated in Table 3.1, the population of the PKSDM increased by from 166 547 in 2001 to 186 351 in 2011, which represents an increase of ~ 12%. The population of the ULM increased from 23 641 in 2001 to 28 376 in 2011 (~ 20%) over the same period. This represents an average annual increase of ~ 1.12% and 1.83% for the PKSDM and ULM respectively. The increase in the population in the PKSDM and ULM was linked to an increase in the 15-64 and 65 and older age groups. This is likely to reflect a situation where the majority of job seekers in the 15-64 age group are single males who have not settled down and started a family and increase in retirees settling in the area. In terms numbers, 87% of the ULM population is urbanised. The

relatively higher increase in the population in the towns was due to farm workers moving to the towns. As expected, the number of households in both the PKSDM and ULM increased between 2001 and 2011. The size of the household sizes in both areas decreased marginally, namely from ~ 3.8-9 to 3.7-3.5.

The majority of the population is in the ULM was Black African (62.6%), followed by Coloured (30.6%) and Whites (5.7%) (Census, 2011). The dominant language within the Municipality is isiXhosa (~54.2%), followed by Afrikaans (~37.9%), Sesotho (1.9%) and English (~1.8%) (Census 2011). The ULM accounts for ~ 14% of the total population of the PKSDM. Colesburg, the largest town in the ULM, has a population of ~ 13 000. A negative growth rate is forecasted for the rural population due to emigration. Therefore the statistics reveal the rapid migration to towns within the Municipality.

Table 3.1: Overview of key demographic indicators for the PKSDM and ULM

	PKSDM		ULM	
ASPECT	**2001**	**2011**	**2001**	**2011**
Population	166 547	186 351	23 641	28 376
% Population <15 years	32.6	31.6	33.7	31.4
% Population 15-64	61.5	62.4	61.0	62.8
% Population 65+	5.9	6.1	5.3	5.8
Households	41 707	49 193	5 848	7 841
Household size (average)	3.8	3.7	3.9	3.5
Formal Dwellings %	84.7%	86.3%	81.8%	88.2%
Dependency ratio per 100 (15-64)	62.7	60.4	63.8	59.3
Unemployment rate (official) - % of economically active population	36.4%	28.3%	51.9%	33.0%
Youth unemployment rate (official) - % of economically active population 15-34	44.1%	35.4%	60.8%	40.4%
No schooling - % of population 20+	27.1%	14.6%	27.9%	16.3%
Higher Education - % of population 20+	5.7%	6.1%	5.5%	6.3%
Matric - % of population 20+	12.9%	20.5%	13.1%	23.1%

Source: Compiled from StatsSA Census 2011 Municipal Fact Sheet.

The dependency ratio in both the PKSDM and ULM decreased from 62.7 to 60.4 and 63.8 to 59.3 respectively. The decrease represents a positive socio-economic improvement by indicating that there are a decreasing number of people dependent the economically active 15-64 age group. The age dependency ratio is the ratio of dependents, people younger than 15 or older than 64, to the working, age population, those ages 15-64. However, the dependency ratios for the PKSDM and ULM were higher than the ratio for the Northern Cape as whole, which was 55.7 in 2011.

In terms of percentage of formal dwellings, the number of formal dwellings in the PKSDM increased from 84.7% in 2001 to 86.3% in 2011. In the ULM the number of formal dwellings increased from 81.8 to 88.2% for the same period. This represents a positive socio-economic benefit for both the PKSDM and ULM. However, despite the increase in formal dwelling the ULM IDP indicate that there is housing backlog of ~ 2 000 houses in the ULM, with the majority (1 200) of the backlog located in Noupoort.

Employment
The official unemployment rate in both the PKSDM and ULM decreased for the ten year period between 2001 and 2011. In the PKSDM the rate fell from 36.4% to 28.2%, a decrease of 8.2%. In the ULM the unemployment rate decreased from a significantly high level of 51.9% in 2001 to 33.0% in 2011, a decrease of nearly 19%. Despite the decreases the unemployment levels in the PKSDM and ULM are still higher than the Northern Cape average of 27.4%. This highlights the limited employment opportunities in the area, specifically in the ULM. Youth unemployment in both the PKSDM and ULM also dropped over the same period. Youth unemployment in the both the PKSDM and ULM is still high however (35.4% and 40.4% respectively).

Household income
Based on the data from the 2011 Census, 13.5 % of the population of the ULM have no formal income, 4.5% earn between 1 and R 4 800, 6.3% earn between R 4 801 and R 9 600 per annum, 21.1% between R 9 601 and 19 600 per annum and 21.7% between R 19 600 and R 38 200 per annum (Census 2011). The poverty gap indicator produced by the World Bank Development Research Group measures poverty using information from household per capita income/consumption. This indicator illustrates the average shortfall of the total population from the poverty line. This measurement is used to reflect the intensity of poverty, which is based on living on less than R3 200 per month for an average sized household. Based on this measure 67.1% of the ULMs population live below the poverty line. The low-income levels reflect the reliance on the agricultural sector and limited formal employment opportunities in the ULM. The low income levels are a major concern given that an increasing number of individuals and households are likely to be dependent on social grants. The low income levels also result in reduced spending in the local economy and less tax and rates revenue for the district and local municipality.

Education
The education levels at both the district and local municipal level also improved, with the percentage of the population over 20 years of age with no schooling in the PKSDM decreasing from 27.1% to 14.6%. For the ULM there was a significant decrease from 27.9% to 16.3%. The percentage of the population over the age of 20 with matric also increased in both the PKSDM and ULM, from 12.9% to 20.5% in the PKSDM and 13.1% to 23.1% in the ULM. However, despite this increase the figure for the PKSDM and ULM are still below the national (28.4%) level in 2011.

3.3.2 Municipal Services

As indicated in Table 3.2, the municipal service levels, with the exception of weekly access to refuse removal in the ULM, in the PKSDM and ULM all improved over the period 2001 to 2011. This represents a socio-economic improvement. The service levels in the PKSDM and ULM are, with the exception of households in the ULM that have piped water inside the dwelling and households that use electricity in the PKSDM, all higher than the provincial averages for the Northern Cape Province.

Table 3.2: Overview of access to basic services in the PKSDM and ULM

Municipal Services	PKSDM		ULM	
	2001	2011	2001	2011
% households with access to flush toilet	45.4	65.7	48.3	68.7
% households with weekly municipal refuse removal	67.8	72.6	76.6	76.3
% households with piped water inside dwelling	32.8	47.0	21.3	45.1
% households which uses electricity for lighting	75.1	85.1	80.6	86.7

Source: Compiled from StatsSA Census 2011 Municipal Fact Sheet

3.3.3 Social Services

Education

There are 8 primary schools and 6 secondary schools in the ULM (Table 3.3). The IDP notes that while the actual number of schools is generally satisfactory there is an acute shortage in the remote rural areas of the Municipality. As a result children often have to walk long walking distances to access the available schools.

The key issues listed in the IDP include:

- Insufficient and accessibility to education facilities;
- Availability of qualified staff and quality of education facilities.

Table 3.3: Education Facilities Umsobomvu Municipality (2013)

Town	Crèche	Pre-primary	Primary	Secondary	Tertiary	Grand Total
Colesberg	1	1	1	1	0	3
Kuyasa	1	0	2	2	0	4
Lowryville	1	1	1	1	0	3
Norvalspont	0	0	1	0	0	1
Noupoort	1	1	1	1	0	3
Eurekaville	0	0	1	0	0	1
Kwazamuxolo	1	1	1	1	0	3
Umsobomvu LM	**5**	**4**	**8**	**6**	**0**	**18**

Health

The IDP indicates that there are 7 health facilities in the ULM (Table 3.4). This total includes a hospital and clinic in Noupoort. The key issues identified include:

- Insufficient health facilities;
- Lack of public transport services for patients;
- Availability of medical staff;
- Lack of aftercare facilitates and support services to patients;
- Lack of 24 hour health services and emergency services;
- Lack of hospice for aged and terminal ill;
- Support of AIDs/HIV patients.

Table 3.4: Health Facilities Umsobomvu Municipality (2014).

Town	Hospital	Clinic	Grand Total
Colesberg	1	0	2
Kuyasa	0	1	1
Lowryville	0	1	1
Norvalspont	0	1	1
Noupoort	1	1	2
Umsobomvu LM	**2**	**4**	**7**

Safety and security
The IDP indicates that there are 4 police stations in the ULM, one of which is located in Noupoort (Table 3.5). There is also a Magistrates Court in Noupoort. Even though the crime rate in the region is low if compared to other areas in South Africa, some issues were raised regarding the safety and securities. These include:

- Police need to be more visible;
- Police stations are not accessible to greater community- Lowryville, Eurekaville, Kwazamuxolo;
- Shortage of police resources;
- Not enough police stations;
- Shortage of human resources;
- High level of unemployment;
- Youth delinquency.

Table 3.5: Safety and Security Facilities Umsobomvu municipality (2014)

Town	Police stations	Magisterial court	District court
Colesberg	1	1	1
Kuyasa	1	0	0
Lowryville	0	0	0
Norvalspont	1	0	0
Noupoort	1	1	0
Eurekaville	0	0	0
Kwazamuxolo	0	0	0
Umsobomvu LM	**4**	**2**	**1**

3.4 EASTERN CAPE PROVINCIAL CONTEXT[19]

As indicated, a small portion of the proposed WEF falls within the Inxuba Yethemba LM of the Chris Hani DM in the Eastern Cape Province (ECP). The ECP faces significant social challenges: addressing poverty, income inequality, food insecurity, and unemployment.

Population
According to the 2011 census, the province was home to 6.7 million people, which constituted 12.7% of the national population. This makes the Eastern Cape the third most populated province after Gauteng (12.2 million) and KwaZulu-Natal (10.2 million). The ECP's population grew by 4.5% between 2001 and 2011. The demographics for the Province also indicate that 57% of the total population were

[19] The majority of the information in this section is based on a study undertaken by the University of Pretoria in 2013, titled Eastern Cape Socio-economic Review and Outlook, 2013.

under the age of 30, while the median age was 22.4, the second lowest after the Limpopo Province. The national average in 2011 was 24.4.

In terms of population distribution, the OR Tambo DM (21%), NMBM (17%), Amotole (14%), and Buffalo City Metropolitan Area (12%), account for 64 % of the Provinces' population. The Chris Hani DM makes up 12% of the province's total population. It is also important to note that youth constitute the largest share of the population in all DMs. The proposed project is located in the OR Tambo DM.

The average life expectancy for males in the Eastern Cape Province was 50.2 years in 2011. Only KwaZulu-Natal and the Free State Province had life expectancy estimates lower than the ECP, at 48.4 and 44.9 years respectively. Average life expectancy for the South African male population between the years 2006 and 2011 was only 52.1 years. Males in the Western Cape Province had the highest life expectancy rate of 59.9 years followed by Limpopo at 55.8 and Gauteng at 54.4. Female expectancy in the Eastern Cape was 54 years for the period 2006 to 2011, also lower than the national average of 56 years. The figures for the Western Cape and Limpopo were 65.8 years and 61.4 years respectively (Eastern Cape, Socio-economic Review and Outlook, 2013).

Poverty and inequality

As study undertaken by the University of Pretoria in 2013 (Eastern Cape, Socio-economic Review and Outlook, 2013) which used the Fuzzy Index of Poverty (FIP) to measure poverty[20] found that the Eastern Cape Province had the highest poverty levels in South Africa in 2011 (Figure 3.6).

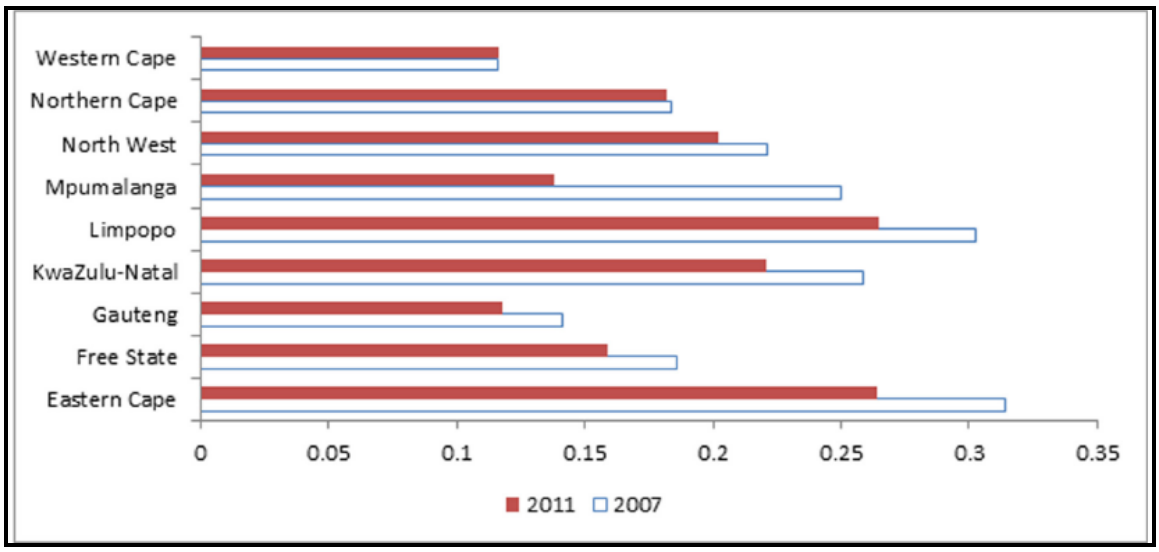


Figure 3.6: Provincial poverty levels in SA
Source: Eastern Cape, Socio-economic Review and Outlook, 2013

[20] The FIP approach does not rely on a monetary poverty line, but used a the FIP uses a set of 12 indicators of well-being to measure poverty levels, namely, employment, municipal services (such as refuse collection, access to water, access to toilet, and access to electricity for lighting, cooking, and heating), type of dwelling, education, income, household size, and access to means of communication such as cell phones.

Within the province itself the poorest districts in 2011 were the Alfred Nzo followed by the O.R. Tambo and Amatole DMs. The Chris Hani DM was ranked the fifth poorest of the ECP's seven District Municipalities (Figure 3.7).

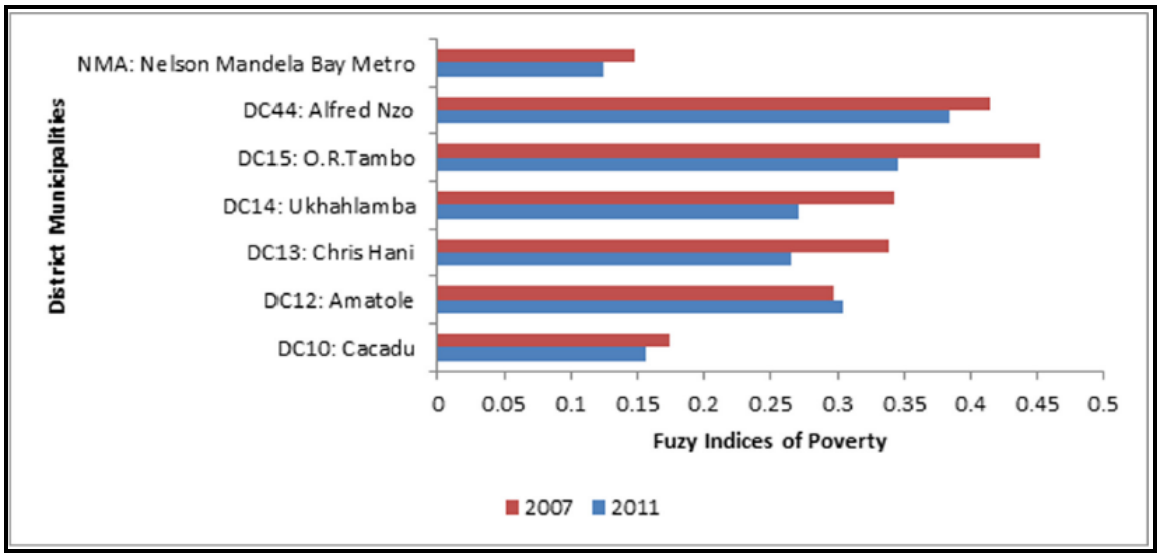


Figure 3.7: Poverty levels with the Eastern Cape Province
Source: Eastern Cape, Socio-economic Review and Outlook, 2013

In terms of inequality, South Africa is one of the most unequal societies in the world. According to data from IHS Global Insight, income national inequality, measured in terms of Gini Coefficient, was 0.68 in 2002 and fell marginally to 0.63 in 2011. The data from the Eastern Cape indicates that income inequality has fallen marginally in all DMs in the province. Income equality however, remains major challenge facing the Eastern Cape Province.

Food security
The Eastern Cape has one of the highest levels of food insecurity in South Africa. According to estimates, about 78% of the households in the province may be classified as food insecure. This is significantly higher than national average of 64% (Eastern Cape, Socio-economic Review and Outlook, 2013).

Vulnerability to food insecurity is widespread, particularly among households in Alfred Nzo, Chris Hani and O.R Tambo DMs (81-86%). (Figure 3.8). The majority of households in the province that are affected by food insecurity are located in the rural areas. A number of these are also headed by females, have larger family sizes, and have higher dependency ratios.

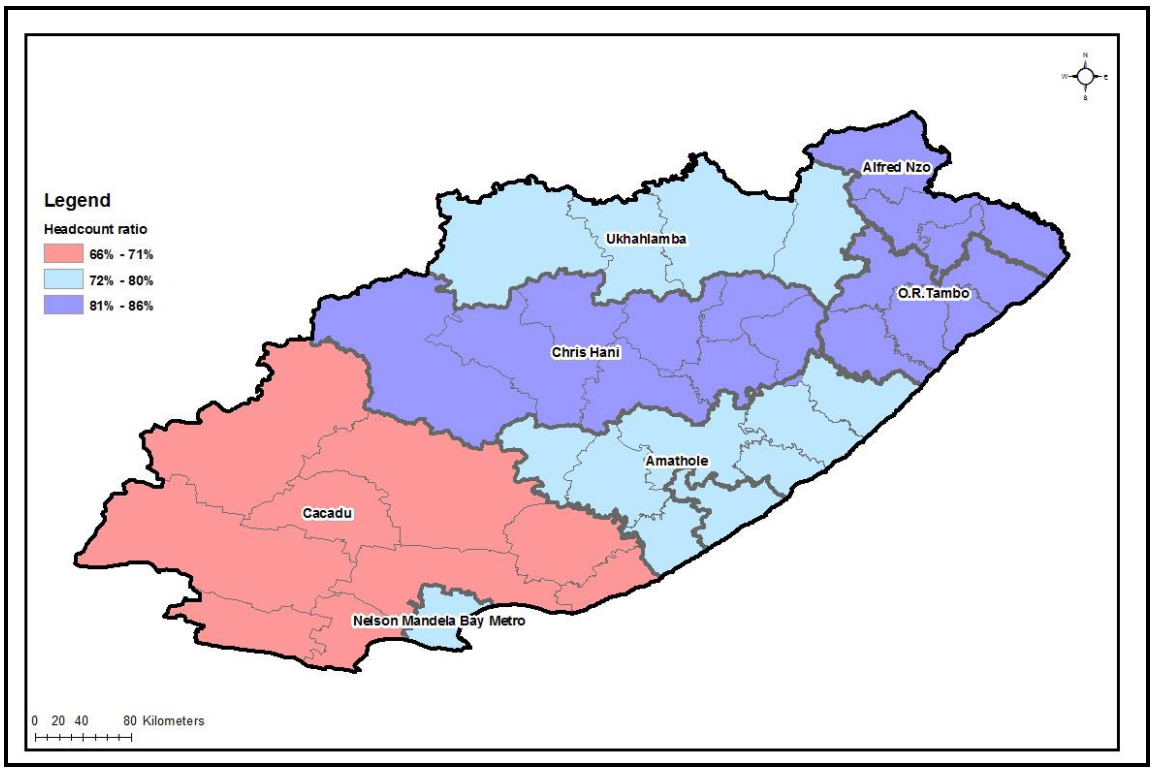


Figure 3.8: Food Insecurity in the Eastern Cape
Source: Eastern Cape, Socio-economic Review and Outlook, 2013

Economic Performance

The Eastern Cape Province accounted for 7.8% of the national GDP in 2011 making it the fourth largest economy in South Africa, although only marginally ahead of the North West, Mpumalanga and Limpopo. Gauteng (35%) is the biggest contributor to the national economy, followed by KwaZulu-Natal (16.4%) and the Western Cape (14.8%). It is also worth noting that the contribution of the Eastern Cape Province to national GDP has fallen marginally since 2002 (Figure 3.9).

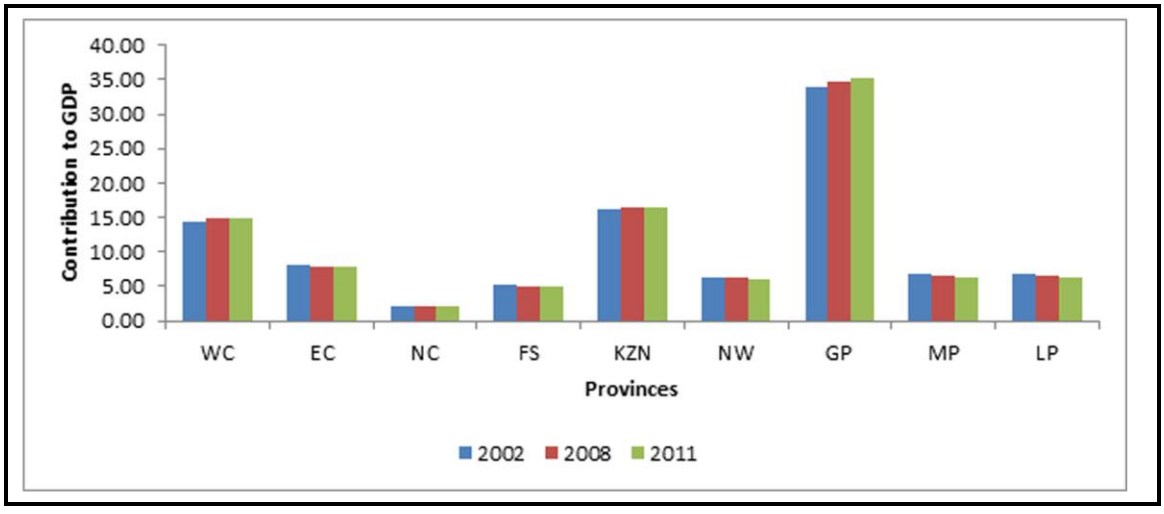


Figure 3.9: The Easter Cape Provinces' Contribution to GDP

In terms of sectors the most important sector in the Eastern Cape economy is the tertiary sector, which contributed 76.7% of the regional GDP, followed by the secondary sector (21.2%), and the primary sector (2.2%). Within the tertiary sector the most important sub-sectors were finance, real estate and business services (22.4%), general government services (21.2%) and wholesale and retail trade (13.8%). Within the Secondary Sector the most important sub-sectors were manufacturing (17.5%), followed by construction (2.6%). The most important sub-sector in the Primary Sector was agriculture, forestry and fishing (2.1%) followed by mining and quarrying (0.1%) (Table 3.6).

Table 3.6: Sectoral contribution to Provincial economy

Sectors	2002	2011	% Point Change
Primary Sector	2.7	2.2	-0.5
Agriculture, forestry and fishing	2.5	2.1	-0.5
Mining and quarrying	0.2	0.1	-0.1
Secondary Sector	22.3	21.2	-1.2
Manufacturing	19.6	17.5	-2.2
Electricity, gas and water	1.1	1.1	0.0
Construction	1.6	2.6	1.1
Tertiary Sector	75.0	76.7	1.7
Wholesale & retail trade	14.5	13.8	-0.7
Transport, storage and communication	8.8	8.9	0.1
Finance, real estate and business services	20.1	22.4	2.4
Personal services	10.2	10.3	0.1
General government services	21.5	21.2	-0.2
All industries at basic prices	100	100	

Source: Eastern Cape, Socio-economic Review and Outlook, 2013

In terms of contribution of the provincial GDP, the NMBM (43%) and Buffalo City Metropolitan Area (23%) are the two most important areas, followed by the Amotole DM (9%) and the SBDM and OR Thambo DM with 7% each in 2011 (Figure 3.10). The contribution of the Chris Hani DM to the Province's GDP has remained constant since 2002 at around 6%.

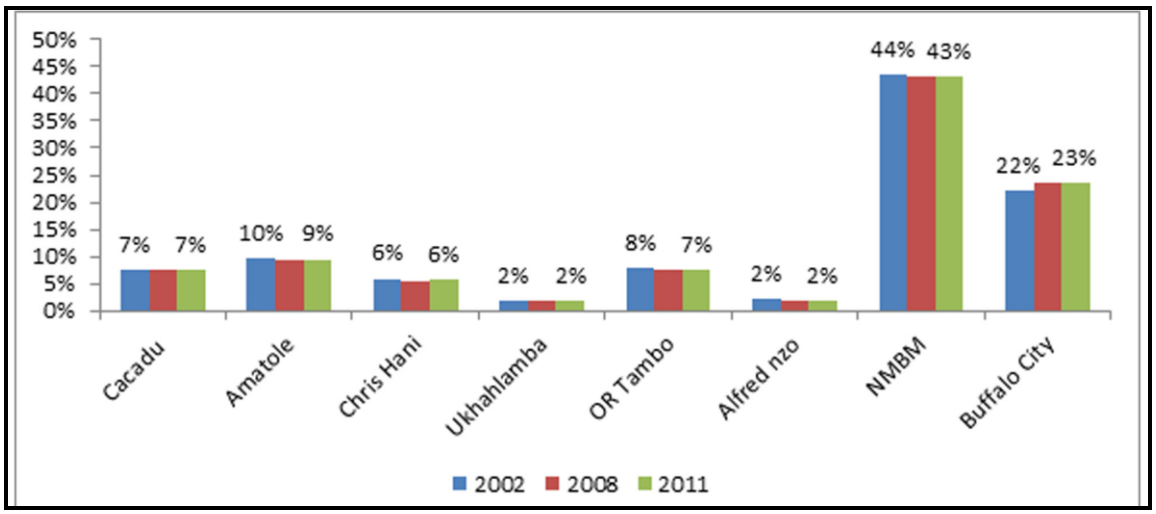


Figure 3.10: Contribution of District Municipalities to Provincial GDP
(Source: Eastern Cape, Socio-economic Review and Outlook, 2013)

In terms of key sectors in each of the DMs, as in the case at provincial level, the tertiary sector is the largest sector in all DMs followed by the secondary sector. In 2011 the contribution of the tertiary sector in each DM's GVA ranged between 63% (in Nelson Mandela Bay Metro) and 82% (in O.R Tambo DM), with that of the Chris Hani DM around 78%. The secondary sector is the second largest sector. The contribution of the primary sector was low for all DMs. In the Chris Hani DM, it only accounted for 4.3%. Furthermore, the contribution of the primary sector to GVA in all of the DMs declined between 2002 and 2011. That of the Chris Hani DM declined by 0.6% (Table 3.7). The low contribution of the primary sector to the GVA of the DMs and the decline over time is a concern given high number of rural households in these areas and the province as a whole.

Table 3.7: Sectoral Shares of GVA by District Municipality in the Eastern Cape (%)

	Cacadu		Amatole		Chris Hani		Ukhahlamba		O.R Tambo		Alfred Nzo		NMBM		Buffalo City	
	2002	2011	2002	2011	2002	2011	2002	2011	2002	2011	2002	2011	2002	2011	2002	2011
Primary	10.4	8.7	3.0	2.6	4.9	4.3	8.3	7.2	4.4	4.3	3.5	2.9	0.4	0.3	1	1
Agriculture	10.4	8.6	2.8	2.5	4.8	4.2	8.3	7.2	4.4	4.3	2.6	2.5	0.2	0.2	1	1
Mining	0.0	0.0	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.9	0.4	0.2	0.1	0	0
Secondary	12.2	13.4	15.6	15.1	8.6	8.6	13.4	12.2	5.5	5.7	4.6	4.9	26.5	24.8	20	20
Manufacturing	8.2	7.7	13.9	12.7	5.6	4.6	11.4	9.5	3.6	3.1	2.7	2.2	24.2	21.7	17	16
Electricity	2.0	2.1	0.5	0.5	1.1	1.1	0.6	0.6	0.7	0.6	0.6	0.6	1.0	1.0	1	1
Construction	2.0	3.6	1.2	1.9	1.9	2.9	1.4	2.1	1.3	2.0	1.3	2.0	1.3	2.2	2	3
Tertiary	68.1	68.9	70.6	71.2	76.7	77.8	66.5	68.7	81	81.5	79.3	79.8	61.5	62.9	69	69
Trade	12.6	13.6	12.7	11.8	15.2	13.5	9.0	7.9	18.2	16.2	23.9	20.5	11.6	11.4	12	12
Transport	5.9	6.6	3.2	3.1	6.1	5.2	3.6	3.1	3.6	3.3	2.9	2.2	11.3	11.4	7	7
Finance	18.8	19.0	14.6	17.0	10.8	13.7	9.1	12.2	15.7	17.8	5.4	6.7	18.4	19.9	22	25
Community	30.7	29.8	40.1	39.2	44.6	45.4	44.7	45.5	43.5	44.2	47.1	50.5	20.2	20.2	28	25
Total GVA	90.7	91.0	89.2	88.9	90.2	90.7	88.1	88.1	90.9	91.4	87.4	87.6	88.4	88.0	89	89
Taxes less Subs	9.3	9.0	10.8	11.1	9.8	9.3	11.9	11.9	9.1	8.6	12.6	12.4	11.6	12.0	11	11
Total	100	100	100.0	100.0	100	100	100	100	100	100	100	100	100	100	100	100

Source: Eastern Cape, Socio-economic Review and Outlook, 2013. Computation based on data from Global Insight

Employment

In terms of employment a total of 1.3 million people was employed in the Eastern Cape in 2011, which makes up 9.7% of the total number of people employed in the whole country. This makes the Eastern Cape the fourth largest employer after Gauteng (30.7%), KwaZulu-Natal (18.6%), and the Western Cape (13.2%) (Eastern Cape Socio-economic Review and Outlook, 2013).

The rate of unemployment in the province increased from 28.2% in the 3rd Quarter of 2011 to 30% in the 3rd Quarter of 2012, an increase of 1.8 percentage points. This is despite a 2.5% increase in employment. This simultaneous increase in both the unemployment rate and employment levels is explained by an increase in the total size of the labour force (by 5%), in excess of the increase in the total number of new jobs (Eastern Cape, Socio-economic Review and Outlook, 2013).

The majority of the employed (68%) were between the ages of 30 and 55. However, the youth defined as people between the ages between 15 and 30 years accounted for only 21.3% of the total number of employed people. This is despite the situation where this group make the majority of the working age population in the Province (51%).

In terms of key sectors, more than 60% of the 1.3 million people employed in the province in the third quarter of 2012 were employed in three sub-sectors, namely, government social and personal services (26.1%), wholesale and retail (23.5%), and manufacturing (12.2%). The primary sectors, comprising mining and quarrying (0.1%) and agriculture, forestry, hunting and fisheries (4.5%) employed far fewer numbers of people. As indicated in Figure 3.11, the role of the agriculture, forestry, hunting and fisheries sub-sector in terms of employment has fallen significantly since 2002. The share of Agriculture, forestry, hunting and fisheries declined to 4.5% from 21.1%, a significant decline of 16.6 %. During the same period all of the other sub-sectors reported an increase in their contribution to employment (Eastern Cape, Socio-economic Review and Outlook, 2013).

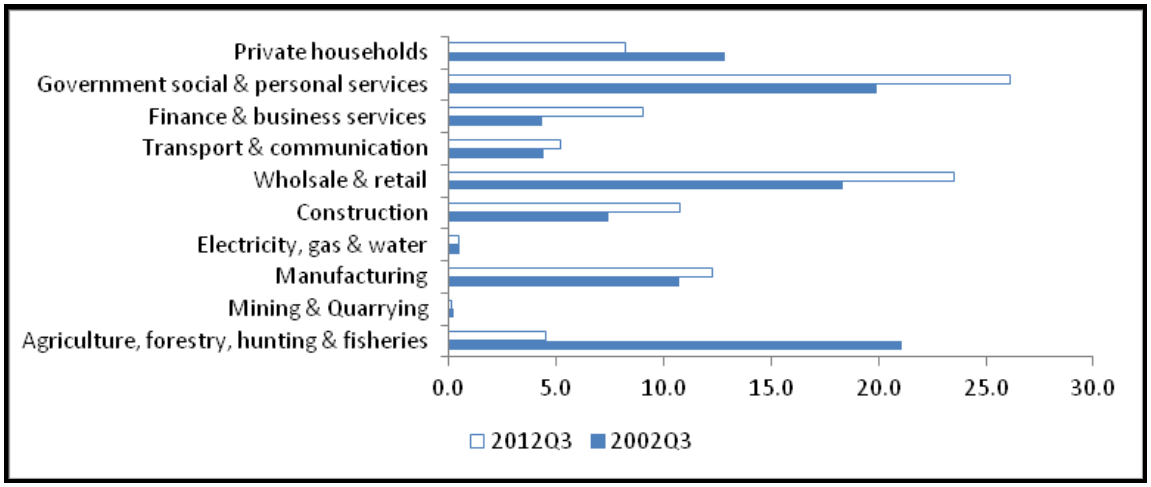


Figure 3.11: Employment by sector
Source: Eastern Cape, Socio-economic Review and Outlook, 2013

In terms of employment by occupation category, in 2008, elementary occupations made up of 28.4% of total employment, followed by service workers and shop and market sales at 13.4% and technical and associate professionals at 11.4%. In 2011, elementary activities decreased to 24.1% while employment in service workers and shop and market sales workers as well as technical and associate professionals increased respectively to 14.9% and 14.4% (Figure 3.12). Between the two years, employment declined in the unskilled job categories while employment in the semi-skilled and skilled categories increased – evidence of skill-biased employment growth. This reflects the decrease in the contribution of the agriculture, forestry, hunting and fisheries sectors which would have employed a large number of unskilled workers.

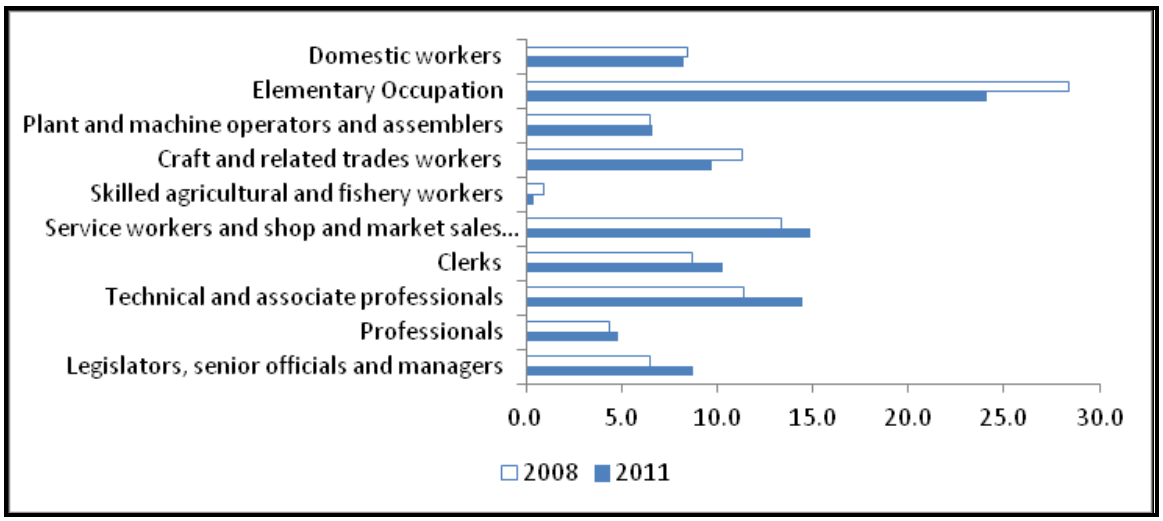


Figure 3.12: Employment by Occupation
Source: Eastern Cape, Socio-economic Review and Outlook, 2013.

In terms of employment in the DMs, over 50% of the 1.3 million people employed in the province were employed in the NMBM and Buffalo City Metropoles. These two areas accounted for 30% and 23% of the total provincial employment respectively. The Chris Hani DM accounted for approximately 7% (Figure 3.13).

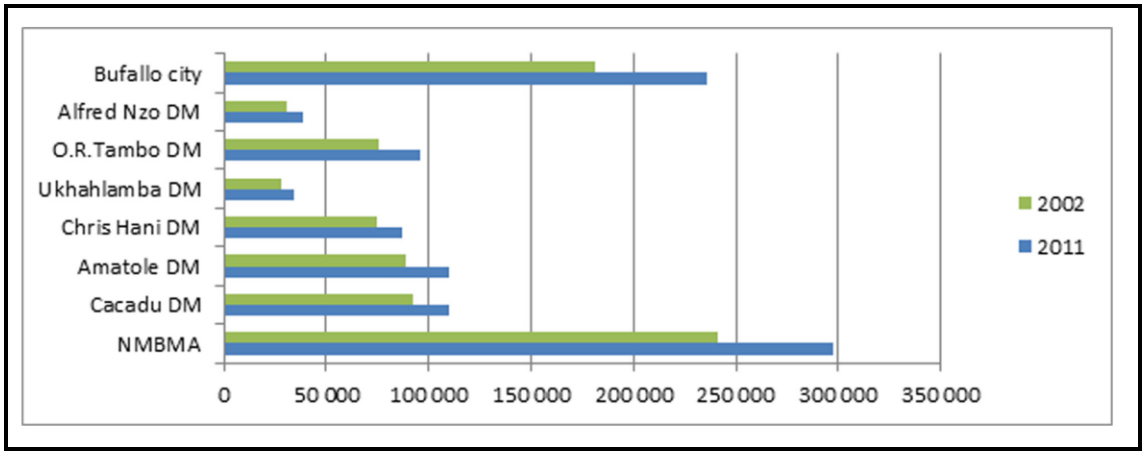


Figure 3.13: Employment in the District Municipalities
Source: Eastern Cape, Socio-economic Review and Outlook, 2013.

While all of the DMs and the Metros managed to reduce the rate of unemployment over the period 2002-2011, the average rate of unemployment the ECP in 2011 (31%), remained higher than the national rate of 24.7%. The rate for the Chris Hani DM was around 35% (Figure 3.14).

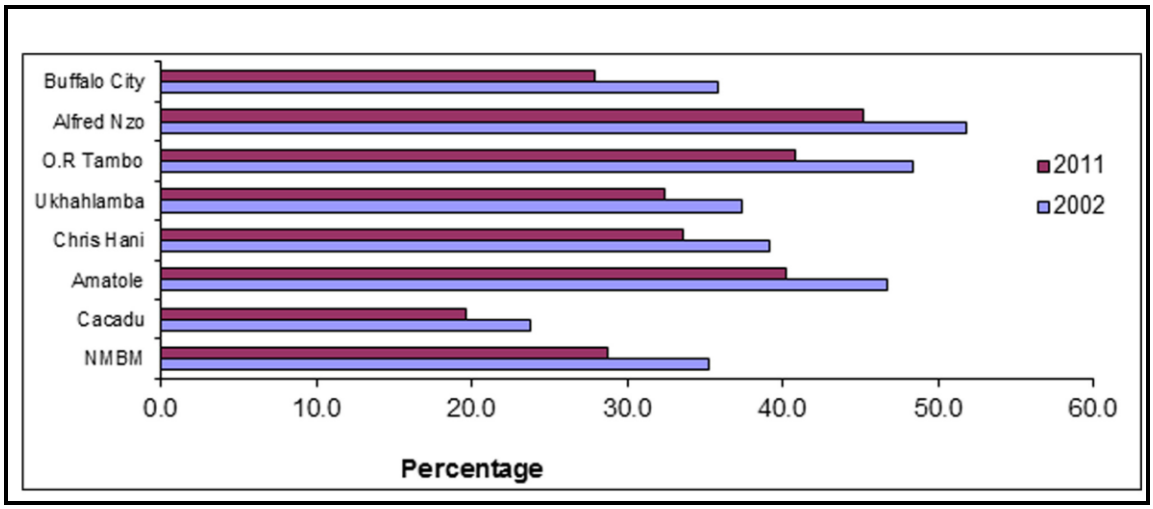


Figure 3.14: Unemployment rate in District Municipalities
Source: Eastern Cape, Socio-economic Review and Outlook,2013.

In terms of employment, the most important sector in all of the DMs and Metros is Community Services. In the Alfred Nzo and Amatole DMs the Community Services sector accounted for 45% of total employment. The figures for the O.R Tambo, Chris Hani, Cacadu, NMB, and Buffalo City Metro were 43%, 42%, 22%, 26%, and 32% respectively. Trade and Agriculture are the next two most important sectors in terms of employment. The share of agriculture in total employment declined in all the metros and DMs from 20002 to 2011. The Manufacturing sector also accounted for sizable proportion of employment in the province. However, total employment in manufacturing significantly declined in the metros between 2002 and 2011.

3.5 INXUBA YETHEMBA LOCAL MUNICIPALITY

3.5.1 Demographic Overview

According to Census 2011, the IYLM has a population of 65 560, and represented 8.2% of the Chris Hani DM's population (795 461) (Table 3.8). Census 2011 indicates that 84.4% of the IYLM population is urbanised. Commercial farms account for the balance (15.6%), with none of the population classified as living in traditional areas. Ligelihle (18 966), Middelburg (12 523) and Cradock (12 327) are the most populous towns in the IYLM, accounting for the bulk of the LMs population.

The IYLM population increased from 60 364 in 2001 - an increase of 5 196 or ~8.6%. As may be seen in Table 3.6, the population age structure has remained more or less the same, with the 15-64 age group remaining a constant 64.6%, while the youthful group's share decreased slightly by 1%, and that of the aged slightly increased by 0.3%. As may be expected from the increased population, the number of IYLM households also increased between 2001 and 2011. In this regard, the

number of households increased by 2 461 (15.3%) during this period. The disparity in growth rates between population and households is reflected in the decrease in household size over the period, namely from 3.6 (2001) to 3.4 (2011).

The majority of the population is in the IYLM is Black African (56.2%), followed by Coloured (32.2%), and Whites (10.5%). Other groups accounted for less than 1% (Census, 2011). The dominant language within the Municipality is isiXhosa (~48.9%), followed by Afrikaans (~43.6%), and English (~3%) (Census 2011).

Table 3.8: Overview of key demographic indicators for Inxuba Yethemba LM

ASPECT	2001	2011
Population	60 364	65 560
% Population <15 years	30.1%	29.1%
% Population 15-64	64.6%	64.6%
% Population 65+	5.9%	6.2%
Households	16 002	18 463
Household size (average)	3.6	3.4
Formal Dwellings %	97.1%	97%
Dependency ratio per 100 (15-64)	56.1	54.7
Unemployment rate (official) - % of economically active population	43.2%	25.7%
Youth unemployment rate (official) - % of economically active population 15-34	53.7%	33.2%
No schooling - % of population 20+	17%	10.7%
Higher Education - % of population 20+	6.2%	8.8%
Matric - % of population 20+	14.4%	20%

Source: Compiled from StatsSA Census 2001 and 2011 Municipal Fact Sheets

The dependency ratio in the IYLM decreased from 56.1 to 54.7. As indicated, this decrease represents a positive socio-economic improvement by indicating that there are a decreasing number of people dependent on the economically active age group.

The number of formal dwellings in the IYLM slightly decreased (by 0.1%) over the ten year period 2001 to 2011. The decrease was however from a high base (97.1%), and at a 15.3% increase in the number of households.

Employment

The official unemployment rate has dramatically decreased between the two Censuses, namely from 43.2% (2001) to 25.7% (2011), and with the latter figure more or less on par with the 2011 national unemployment rate. The IYLM's youthful unemployment rate also witnessed a significant decrease over the period, namely from 53.7% in 2001 to 33.2% in 2011. While these decreases are impressive, it should be noted that both the official unemployment and youthful unemployment rates are still very high.

Household income

According to Census 2011, 10.8 % of the IYLM population have no formal income, 4.1% earn between 1 and R 4 800, 6.5% earn between R 4 801 and R 9 600 per annum, 21.1% between R 9 601 and 19 600 per annum and 22.4% between R 19 600 and R 38 200 per annum (Census 2011). Based on the World Bank

Development Research Group poverty measure, 64.9% of the ULMs population live below the poverty line. As with the ULM, these low-income levels reflect the reliance on an extensive agricultural sector and limited formal local employment opportunities. As noted, such low income levels are a major concern given the link with dependency on social grants. Low income levels also result in reduced local spending and rates revenue for the municipality.

Education
IYLM education levels also showed improvement across all three measured indices. In this regard, the percentage of the population 20+ with no schooling decreased from 17% to 10.7%, and the percentage of the population 20+ with matric increased from 14.4% to 20%. Tertiary education levels witnessed a more modest increase, namely from 6.2% to 8.8%.

3.5.2 Municipal Services

According to StatsSA, service levels in the IYLM increased for all four relevant indices over the period 2001 to 2011 (Table 3.9). Significant progress was made with regard to access to waterborne sewerage (+21.5%) as well as the provision of potable water inside dwellings (+20.6%). Gains in terms of electricity for lighting (13%) and weekly refuse removal (+6.9%) were more modest, but still significant.

Table 3.9: Overview of access to basic services in the IYLM

Municipal Services	IYLM	
	2001	2011
% households with access to flush toilet	65.8	87.3
% households with weekly municipal refuse removal	76.3	83.2
% households with piped water inside dwelling	47.6	68.2
% households which uses electricity for lighting	82.6	95.6

Source: Compiled from StatsSA Census 2001 and 2011 Municipal Fact Sheets

3.5.3 Social Services

Education
According to the 2014/2015 IDP, the IYLM has a total of 52 education facilities (Table 3.10). Of these, nearly half (24) are crèches and 16 are primary schools. Seven secondary schools are located in the IYLM's towns, while the LM has only one tertiary educational facility, namely the Grootfontein Agricultural Development Institute near Middelburg. Ward 9 within which the San Kraal WEF site falls is represented by one crèche, two primary schools and one secondary school.

Key challenges identified in the IDP include:

- The facilities are not evenly spread throughout the municipality
- Rural earners have to travel long distances to reach nearest schools
- Crèches are unevenly spread throughout the municipality; and
- Unregulated crèches are mushrooming at an alarming rate.

Table 3.10: Education Facilities Inxuba Yethemba LM.

Ward	Crèche	Pre-primary	Primary	Secondary	Tertiary	Grand Total
1	5	1	1	0	0	7
2	3	0	2	1	0	6
3	4	0	2	1	0	7
4	5	1	1	1	0	8
5	3	2	1	1	0	7
6	1	0	4	0	0	5
7	1	0	1	1	0	3
8	1	0	2	1	1	5
9	1	0	2	1	0	4
IYLM Total	**24**	**4**	**16**	**7**	**1**	**52**

Source: Inxuba Yethemba 2014/2015 IDP.

Health

According to the 2014/2015 IDP, the IYLM has a grand total of 10 health care facilities (Table 3.11). Of these, only one is a hospital, namely the Wilhelm Stahl Hospital in Middelburg. The large rural Ward 9 is serviced by two clinics.

Table 3.11: Health Facilities Inxuba Yethemba LM.

Ward	Hospital	Clinic	Grand Total
1	0	0	0
2	0	1	1
3	0	1	1
4	0	1	1
5	1	1	2
6	0	0	0
7	0	1	1
8	1	2	2
9	0	2	2
IYLM Total	**1**	**9**	**10**

Source: Inxuba Yethemba 2014/2015 IDP

The 2014/2015 IDP notes that health care provision conditions for the IYLM are on average at best fair. Key challenges identified in the IDP include:

- The long distances travelled by vulnerable groups such as the elderly to access health care facilities;
- The need for mobile clinics in some parts of the LM;
- The lack of clinic staff; and
- Under stocked clinics (medication); and
- HIV/ Aids.

With regard to HIV/ AIDS, the 2014/2015 IDP indicates that, while the HIV+ case load as well as the number of HIV-related deaths have declined – the latter significantly - from 2009 to 2012, by 2012 ~8.4% of the IYLM's population was diagnosed as HIV+, and ~0.45% was dying as a result of HIV-related causes (Table 3.12).

Table 3.12: HIV+ case load and HIV-related deaths for IYLM 2009-2012

YEAR	HIV+ CASES	HIV-RELATED DEATHS
2009	6 440	498
2010	5 370	252
2011	5 495	273
2012	5 559	291

Source: Inxuba Yethemba 2014/2015 IDP.

3.6 PROJECT LOCATION AND SURROUNDING LAND USES

The San Kraal WEF site is located near the small Karoo town of Noupoort (population 7848, Census 2011) (Figure 3.15). Noupoort is located adjacent to the west of the N9 (Colesberg–Middelburg route). The WEF site is located 2.2 km to the east of the N9. The town of Middelburg (~19 000) is located ~20 km (linear) to the south-east of the site, also along the N9. The town of Colesberg (~17 500), located at the northern terminus of the N9, is located ~50 km north of the site.

The bulk of the site and proposed infrastructure is located in the Umsobomvu Local Municipality (LM) of the Pixley ka Seme District Municipality (DM) in the Northern Cape Province (NCP). The southernmost portion of the site (Beskuitfontein farm) and the terminal portions of all three proposed 132 kV transmission line (Tx line) Alternatives are located in the Inxuba Yethemba LM in the Chris Hani DM in the Eastern Cape Province (ECP). Noupoort is one of three towns in the Umsobomvu LM, the other being Colesberg (municipal seat and leader town) and the small town of Norvalspont. De Aar is the administrative seat of the Pixley ka Seme DM. The towns of Middelburg and Cradock (municipal seat) are the key settlements in the Inxuba Yethemba LM. Queenstown is the administrative seat of the Chris Hani DM.

Via links with the N1 in Colesberg and the N10 (south) in Middelburg, the N9 provides a direct link from Port Elizabeth to Bloemfontein, Gauteng and beyond. The portion of the N9 between Carlton Heights (south-west of the site) and Middelburg is currently being upgraded by SANRAL. The site farms Hartebeeshoek and Beskuitfontein are directly accessed from the N9, each via their own access roads (Photograph 3.1).

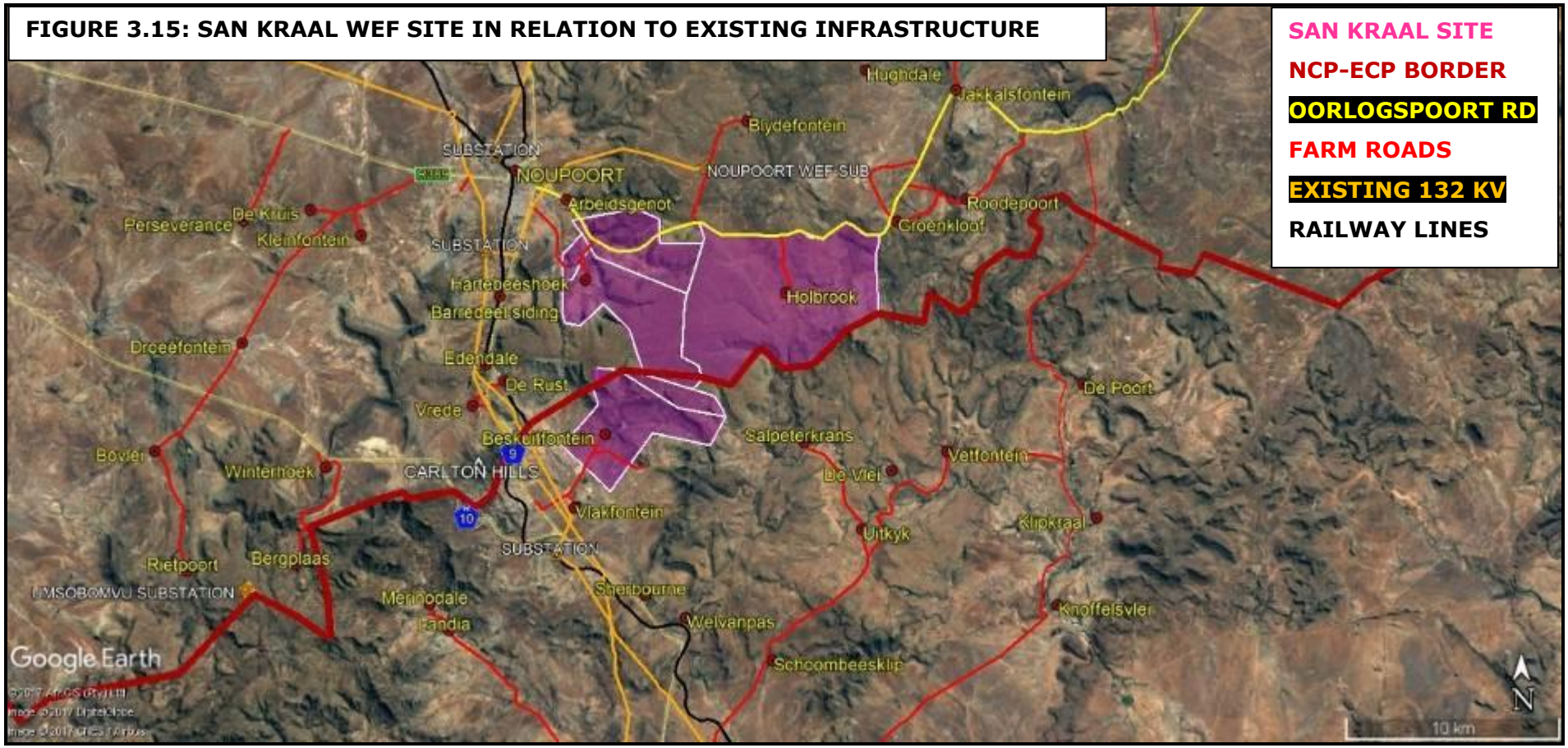


Figure 3.15. San Kraal site in relation to local roads, rail and transmission lines

Photograph 3.1: Entrance to Beskuitfontein farm off the N9

The N10 (north) intersects with the N9 ~3 km south-east of the site near Carlton Heights. The N10 provides a direct link to the N1 (at Hanover), and the key NCP towns of De Aar, Kimberley and Upington (Photograph 3.2). The properties Winterhoek and Bergplaas which would be affected by all three Tx line Alternatives, are accessed off the N10 via a single entrance road (Winterhoek turnoff).

Photograph 3.2: The N10, looking east towards the Carlton Hills

The Oorlogspoort gravel road intersects with the N9 in the extension of Murray Road to the east of Noupoort (Photograph 3.3). The Oorlogspoort Road provides access to the farming area in the mountainous Kikvorsberge area north-east of Noupoort (Photograph 3.4). The road runs eastward, northward, and then loops back west to the N9 at Arundel near Colesberg. The site property Holbrook is accessed directly off

the Oorlogspoort Road. A secondary entrance to Hartebeeshoek is also located off the road. The road provides access to the operational Noupoort WEF. Access to the San Kraal site is also proposed off the Oorlogspoort Road, from more or less opposite the Noupoort WEF entrance.

Photograph 3.3: The intersection of the Oorlogspoort Road with the N9 east of Noupoort (Murray Street)

Photograph 3.4: Looking towards Noupoort along the Oorlogspoort Road from ~1 km west of the entrance to the Noupoort WEF

The Oorlogspoort Road also provides access alternative (northern) access to the farming are south-east of the San Kraal site. These properties, such as Salpeterkrans, Die Poort, Vetfontein, La Rochelle, Kalkoenkrans, etc) are primarily accessed from the south via gravel roads from the N9 and R56 (Steynsburg Rd) near

Middelburg. Due to the hilly topography, none of these properties are directly accessible from the San Kraal WEF site.

3.6.1 Noupoort town

The town of Noupoort originated around a railway station, and its fortunes have always been closely linked to the railways. Naauwpoort station was established in 1884 on a portion of the farm Hartebeeshoek on the first sizeable flat area north of the defile on the line from Port Elizabeth to the Rand (via Bloemfontein) then under construction. The town gradually developed on both sides of the north-south aligned railway corridor (Photograph 3.4). The lines continue to serve as a barrier to spatial and socio-economic integration in Noupoort.

Photograph 3.4: Noupoort station seen from the train bridge in Noupoort

During the Second Anglo-Boer War (1899-1902) a garrison of British troops was based in Noupoort to protect this strategic point along the railway line. In Noupoort itself, two existing structures bear witness to the War, namely a well-preserved blockhouse to the east of the Bloemfontein line in the Kwazamuxolo suburb of Noupoort, and the All Souls Anglican Chapel in Shaw St opposite the Municipal offices, built by masons stationed at the British garrison (Photograph 3.5).

Photograph 3.5: All Souls Chapel, opposite the municipal and SASSA offices in Shaw Street

The Bloemfontein-Port Elizabeth line was later supplemented by a line from De Aar to Port Elizabeth, thus transforming Noupoort into a key railway junction. A rail yard and workshops were established at Midlandia, ~1km south of Noupoort. During its heyday a few decades ago, up to 100 trains a day used to pass through Noupoort station. Due to various factors such as a shift from steam to diesel and then electricity, as well as decreased freight volumes, Noupoort has witnessed a steady disinvestment over the last 20 or so years. As a result most shops, businesses and local services closed down and many owners relocated. In total, during the 1990s, an estimated 300 middle-class households moved out of Noupoort (Gillmer, pers. comm). Many houses were abandoned, and later torn down or vandalized (Photograph 3.6).

Photograph 3.6: Torn down building in historic part of Noupoort

At the same time, Noupoort attracted unskilled farm worker households from the region in response to the roll-out of RDP housing and other government

programmers and facilities, such as municipal and grant offices (Photograph 3.7). The lack of economic activities in the town and surrounds has led to very high local unemployment levels. The lack of significant local retail and business in the town also means that little of locally generated income is spent in Noupoort.

Photograph 3.7: Southernmost portion of Noupoort with RDP houses viewed from N9

Given the proximity of Middelburg, Colesberg and De Aar, Noupoort does not function as a major service center for local farmers. A Lewis Stores, an Agricultural Hardware store, a small fuel station, a large SAPS station, the station, and a few small general dealers are located in Noupoort, but virtually no other retail or services. Noupoort residents typically travel to Middelburg or Colesberg for shopping and services, including private health care. Higher order needs require travelling to Graaff-Reinet, De Aar or Bloemfontein.

Two secondary schools and two primary schools are located in Noupoort. The Noupoort Christian Care Centre has been running a well-known drug rehabilitation center in Noupoort since the 1990s. The Centre runs 1 and 2-year programmes, with wards and staff resident at the facility year-round. The Centre has also been running a number of local community outreach programmers in and around Noupoort. According to a local Municipal official, this has contributed to keeping Noupoort relatively drug-free. Tik and other hard drugs are currently not considered a major problem in the Noupoort community (Majuba, pers. comm).

Over the past 5 years things have started to improve somewhat for Noupoort. Back to back construction projects associated with the upgrading of the N10 and N9, the recent construction of the Noupoort WEF north-east of Noupoort and the current construction of a large stadium in Noupoort, have created significant employment and skills training opportunities to the Noupoort community. The Noupoort WEF currently also makes use of local community members as security personnel. Since the authors last visited Noupoort in November 2012, the number of in-town accommodation facilities have increased from 2 to at least 6, apparently in response to the demand for long-stay accommodation amongst contractors.

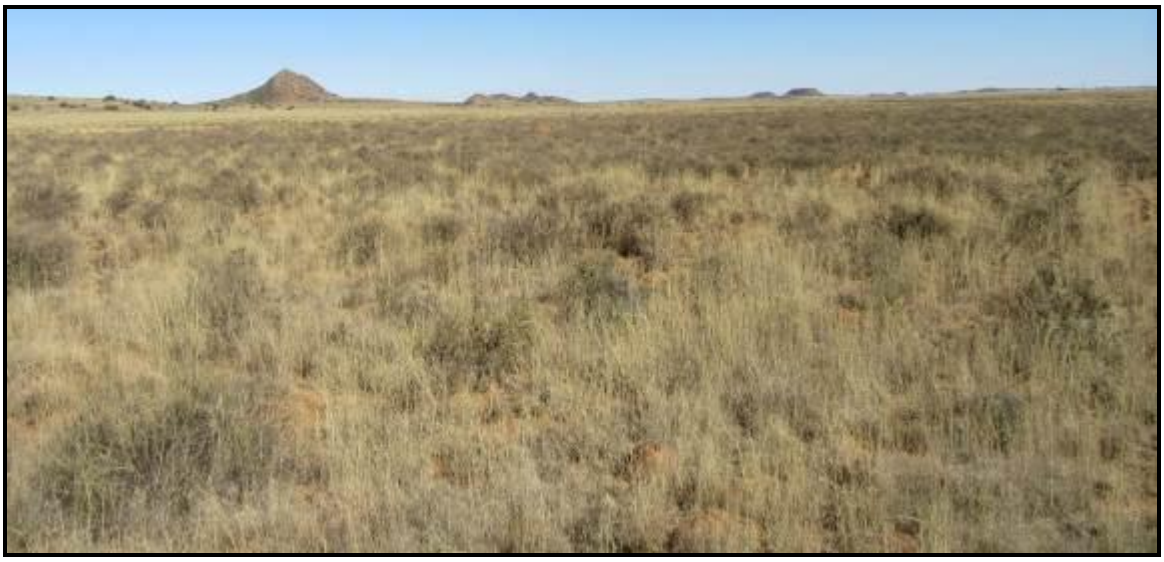
The government has also invested in at least three agriculture-based projects in Noupoort, namely a broiler farm, an olive planting scheme (aimed at producing oil bearing fruit), and a wool and craft project. None of the projects are currently functional. This appears to be linked to the lack of local management expertise. The broiler farm structures located on Hartebeeshoek in the extreme north-eastern portion of the WEF site, are intact, and will likely be used for the intended purpose in the future (Majuba, Mgcineni, pers. comm).

Noupoort station and railway facilities are also set to benefit from the upgrades associated with the relocation of Port Elizabeth manganese ore line terminal to the new deep-water port of Ngqura in the Coega Industrial Development Zone. This will result in increased volumes of ore traffic and upgrading of the railway route from Postmasburg to Port Elizabeth, including the Noupoort area. The Umsovombo LM is currently lobbying for the revival of some Transnet functions in Noupoort and the revitalizing the station compound (Mgcineni, pers. comm).

3.6.2 Noupoort rural area

Livestock farming is the predominant and almost exclusive land use in the Noupoort rural area. The area is too dry to sustain dryland cropping, and lacks significant water sources to sustain commercial-scale irrigated cropping. The area is too arid to sustain significant dairy operations. Most of the farms in the area are actively farmed as commercial operations. Hartebeeshoek (site farm) east of Noupoort is farmed by an informal collective of communal farmers from the local community.

In terms of the grazing resource, Noupoort is located in the transition zone from scrub-dominated Karoo bossiesveld to grassveld more typical of the Southern Free State Highveld (Photograph 3.8). For this reason, the area is colloquially known as 'skyn-Karoo' (pseudo-Karoo) to local farmers (Visser, pers. comm). Around Noupoort, the N9 is said to provide a rough demarcation line between progressively more bossiesveld towards its west, and progressively more grassveld towards its east (van der Walt, pers. comm).



Photograph 3.8: Mixed veld on Kleinfontein west of the farmstead

This mixed veld enables Noupoort farmers to farm with both sheep and cattle – typically wool or dual-purpose sheep, and beef cattle (Photograph 3.9 and 3.10). This mixture of scrub and grass also allows for year-round grazing, as the scrub provides food during the winter when the grass component dies back (de Villiers, pers. com).

Photograph 3.9: Wool sheep grazing on Winterhoek north of the N10

Photograph 3.10: Beef cattle grazing on De Rust east of the N9

Carrying capacities are around 4 hectares per 1 sheep (or 18 ha per head of cattle) (de Villiers, Visser, pers. comm). Large, multi-unit operations are typical. In the area immediately to the west of Noupoort, most farms are used as stock posts in operations based on farms elsewhere in the Noupoort district (Gillmer, pers. comm). These stock posts are typically near enough from main operations to be visited regularly by their owners. Supervising staff reside on a few properties.

Irrigated fodder-cropping for own use is associated with most operations. Cropping activities are typically in proximity to the historical farm werf on farms and stock posts on flat, low-lying areas. Irrigation for fodder plantings is from boreholes and earthen farm dams, some of which fed by fountains (Photograph 3.11).

Photograph 3.11: Irrigated fodder cropping area on Beskuitfontein farm adjacent to the east of the site

In the hilly area to the east of the N9 along the Oorlogspoort Road most of the farms are inhabited by their owners. Those which are not, typically form part of adjacent or near-adjacent inhabited farms, and effectively function as stock posts (van der Walt, pers. comm). The Municipally owned Hartebeeshoek is an exception. The property is uninhabited and used by members of the adjacent Noupoort urban community.

The settlement pattern south of Carlton Heights towards Middelburg is largely determined by the natural topography. Clusters of farmsteads are located on the available flat, lower lying areas, often separated from the next cluster by broken terrain and accessed by different roads from the N9 or Middelburg. The majority of these farms are inhabited and actively farmed, or used as stock posts by nearby farmers (John Moore, pers. comm).

Extensive livestock farming provides limited employment opportunities. Most farms in the study area have retained a resident labour force component, supplemented by workers driven in daily from Noupoort. Workers residing on farms typically reside on the main farms, i.e. those inhabited by the owner. Seasonal opportunities are mainly associated with annual shearing, typically done by travelling professional shearers from outside the area.

As in other stock farming areas, predators, stock theft and veld fires constitute major operational risks. Stock theft is an on-going concern, with proximity to urban Noupoort and exposure to and isolation from major roads seen as key risk factors. The major threat is to sheep, and at least one operation (Arbeidsgenot) on the outskirts of Noupoort has shifted from sheep to cattle to reduce the risk. Interviewees have however indicated that incidents of stock theft are currently limited, and mainly small-scale in nature. No syndicates are currently thought to operate in the area.

Veld fires remain an on-going concern on all operations due to the threat posed to grazing resources. While regrowth in grass species is generally stimulated by veld fires, the Karroid scrub 'bossiesveld' component may take years to recover. Farmers are reliant on the bossiesveld component for high-value winter grazing. Most interviewees indicated that veld fires are rare, with the exception of the Municipally-owned Hartebeeshoek and its neighbours. This seems linked to the property's proximity to Noupoort and a large number of people informally using the property for grazing and other purposes (fuel collection, hunting, etc.).

Game occurs on most farms in the study area, typically plains antelope, Kudu and Ribbok, but commercial hunting and eco-wildlife tourism activities are currently limited in the Noupoort area. Key exceptions are Brulberg, located 40 km east of Noupoort along the Oorlogspoort Road, and Wildberg, located ~6 km to the south of the Phezukomoya WEF site. Vrede (site farm) may be revived as an accommodation facility with paid hunting opportunities in future (Gillmer, pers. comm).

As in Noupoort town, the local guest farms are largely geared to passing travellers, and more recently, long-stay contractors. At least four guest farms are located in proximity to Noupoort, all of which accessed directly off the N9. All four are located on working farms – The Dairy on Arbeidsgenot Farm (Photograph 3.12), Carlton Heights Lodge on Vlakfontein Farm, Sherboure on Wolwekop Farm, and Welvanpas on Welvanpas Farm). None of the operations are geared at destination-tourism. All of them seem to have expanded in response to the demand for long stay opportunities for contractors working in the area over the past few years, and specifically the construction of the Noupoort WEF (Pieter Erasmus, Annatjie Moore, van Huyssteen, pers, comm).

Photograph 3.12: Guest accommodation on The Dairy, with extensions in progress. A Noupoort WEF turbine is just visible between the buildings

The areas sense of place is dominated by arid climate and hilly topography. The area to the east and south of Noupoort town is broken, consisting of a series of large hills. West of Noupoort, towards Hannover, the area is generally flatter, punctuated by Karoo koppies. This is locally referred to as 'die Vlak' (the Flats). As indicated above,

the local veld consists of Karroid scrub and grassveld. The natural tree component is limited, and mainly restricted to drainage lines and on hills. Large trees are mainly associated with farm yards (alien eucalyptus, pines, ashes, poplars) and water courses (alien willows, poplars).

The narrow gorge after which the town of Noupoort is named has had the effect of concentrating rail, road and transmission line corridors in the area south of Noupoort up to Carlton Heights. As a result the portion of the N9 between Carlton Heights and Noupoort – largely coinciding with the WEF site is not pristine with regard to existing service industrial infrastructure. The Port Elizabeth railway line is located roughly parallel and in proximity to this stretch of the N9. The operational line consists of above ground and below ground portions – the latter largely coinciding with the De Rust farm, east of the N9 to the south of the Carlton Heights. The line re-emerges west of the N9 near Edendale farmstead, and runs north to the west of the N9 via Barredeel siding to Noupoort station. The original railway line (1880s), now defunct, also traverses De Rust. The old line is entirely above ground, and located slightly to the east of the operational line. The cottages on De Rust farm yard are associated with the old De Rust siding.

At least 4 existing 132 kV Transmission line corridors are located in the Noupoort area. All are essentially located in proximity to the N9 corridor to the east of the San Kraal site. None traverse the site. The site is also not traversed by any rail corridors nor, apart from a small portion of the Oorlogspoort Road, any public roads.

The narrow kloof which had given Noupoort its name has had the effect of concentrating rail, road and transmission line corridors in the area south of Noupoort up to Carlton Heights. The rail corridor is located parallel to the west of the N9 (Photograph 3.13). As a result, the portion of the N9 from around Carlton Heights to Noupoort is visibly transformed by service industrial infrastructure. This area would be affected by all three proposed San Kraal transmission line (Tx line) Alternatives.

Photograph 3.13: Railway line 4.5 km south-east of the site looking towards Beskuitfontein from the N10 rail bridge. Turbines are proposed on the central portion of the ridgeline

The operational Noupoort WEF (35 turbines) to the east of Noupoort, north of the San Kraal site, is clearly visible from the N9, Noupoort, and some adjacent properties (see below). To many interviewees, the Noupoort WEF has become part of Noupoort's sense of place. A number of telecommunication structures (towers, etc.) are located on the Carlton Hills to the south of the site and are readily visible from both the N9 and N10. With the exception of the rail corridor which traverses the N10 just to the west of the N10-N9 intersection, the stretch of N10 south of Noupoort is not currently traversed by or aligned in proximity to any significant service industrial infrastructure.

3.6.3 San Kraal Site Properties

The San Kraal site occupies a number of cadastral units, belonging to three property owners (Table 3.13). All the relevant properties are primarily used for stock farming purposes. Hartbeeshoek is used for communal grazing by Noupoort-based farmers and is not inhabited. Beskuitfontein and Holbrook are used for commercial farming, and are both inhabited by their owners and associated labour forces. An overview of the properties in relation to proposed San Kraal infrastructure is provided in Figure 3.16 below. Each of the site properties are briefly described below.

Table 3.13: San Kraal site property owners

OWNER	FARM NAME	CADASTRAL	LAND USE	INHABITATION
Mr Pieter Erasmus	Beskuitfontein	1/11; RE/13	Commercial stock farming	Owner; 5 labourer households
Mr Gerhard Taljaard	Holbrook	RE/181	Commercial stock farming	Owner; Additional houses (2) inhabited on farm yard; 2 labourer households
Umsobomvu LM	Hartebeeshoek	14; 3/182; 15/182; 46/182	Communal stock farming	Users live in Noupoort town

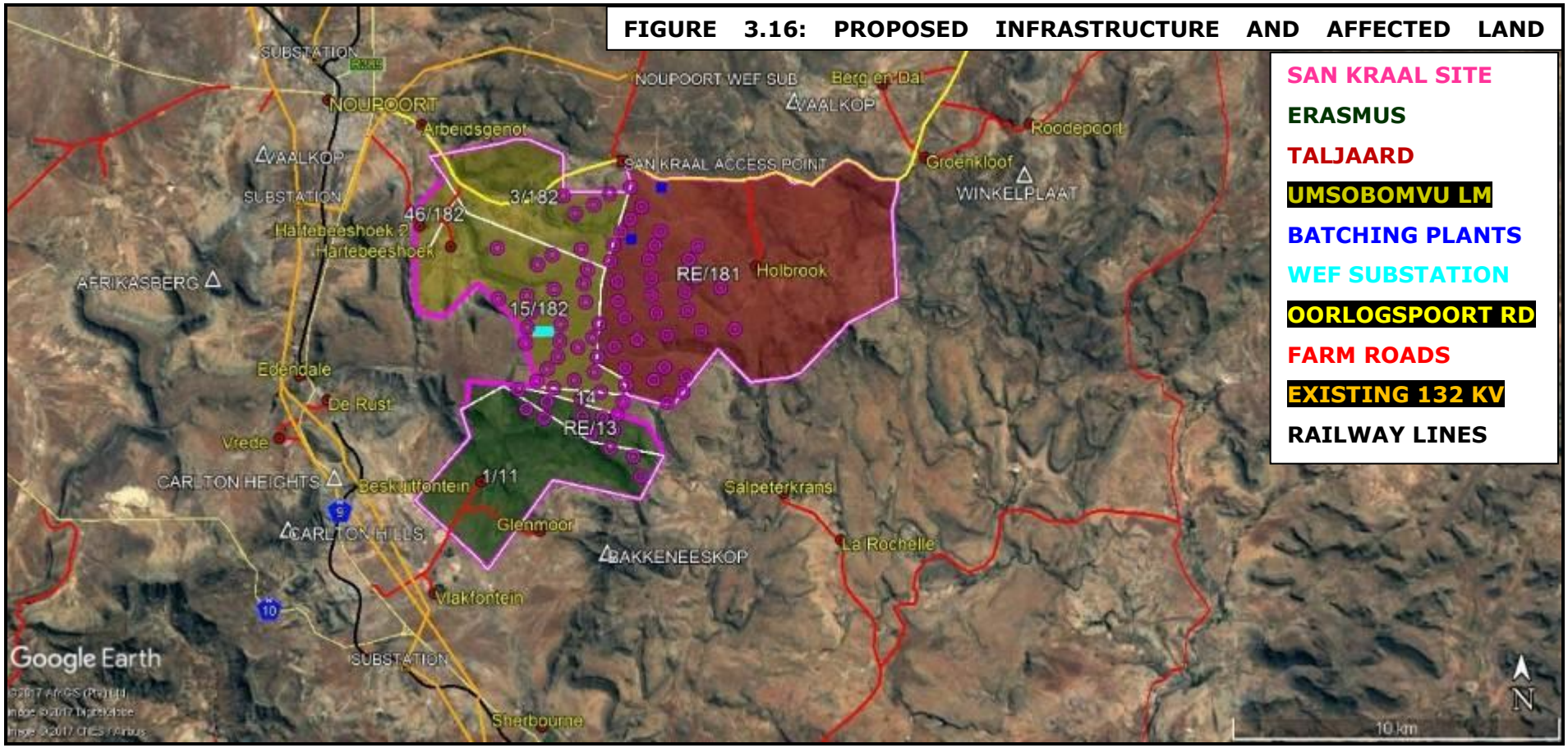


Figure 1.16: San Kraal site ownership and proposed turbines

Beskuitfontein

Beskuitfontein (1/11; RE/13) and adjacent Vlakfontein to its south are owned by Mr Pieter Erasmus (Beskuitfontein Trust). The two properties are farmed as one unit. Mr Erasmus lives on Vlakfontein (Photograph 3.14) and his son Stefan on Beskuitfontein (Photograph 3.15). The operation's labour force – five households - resides on Beskuitfontein, just to the north of the farm yard (Photograph 3.16). Carlton Heights Lodge is located on Vlakfontein, adjacent to the Vlakfontein farm house. Both properties are accessed via a single access road from the N9. The road also provides primary access to the adjacent Glenmoor farm.

Photograph 3.14: Farm house (left) and Carlton Heights Lodge on Vlakfontein farm

Photograph 3.15: Farm house and outbuildings on Beskuitfontein

Photograph 3.16: Labourers' houses on Beskuitfontein north of the farm yard

Beskuitfontein and Vlakfontein are used for livestock farming (Photograph 3.17). Wool sheep and Beef cattle are farmed. Stock is present year-round on the property, rotated between internal camps. The hilly northern portion of Beskuitfontein is considered too inaccessible to farm effectively. The area to the east and south-east of the farm yard on Beskuitfontein is used for growing irrigated fodder crops for own use (Photograph 3.18). No game farming or paid hunting is associated with the properties (Pieter and Stefan Erasmus, pers. comm).

Photograph 3.17: Stock pen and farm buildings on Beskuitfontein yard

Photograph 3.18: Irrigated fodder cropping area to the east of Beskuitfontein farmstead

Carlton Heights Lodge mainly caters to travellers along the N9, and, more recently, long-stay guests, typically contractors. The facility benefited from large construction projects in the area, such as the construction of the Noupoort WEF, and the owners have indicated that they intend focusing progressively more on long-stay guests. The owners also intend to expand operations by making more accommodation available on Vlakfontein (Pieter and Yolandi Erasmus, pers. comm).

No Tx lines are located on the Beskuitfontein portion of Mr Erasmus' property. Two 132 kV lines are however located on the Vlakfontein portion of the property. Both are located between the Vlakfontein farmstead and the N9. Both traverse the Beskuitfontein/ Vlakfontein access road (Photograph 3.19).

Photograph 3.19: Existing Tx line across Vlakfontein, with farm yard in middle distance, seen from farm access road to the north

The old railway line corridor (no longer in use) is located along the western boundary of Vlakfontein, near the N9. Abandoned railway cottages are also located in this portion of Vlakfontein. A private wind mast (the owner's) is also located on Vlakfontein. Turbines associated with the Noupoort WEF are not visible from the property.

Twelve turbines are proposed on Beskuitfontein. The nearest turbine would be 2.5 km to the north-east of Beskuitfontein farmstead, and 6.2 km to the north-east of the Vlakfontein one. All proposed turbine locations are on high ground associated with the hilly northern portion of Beskuitfontein (Photograph 3.20). As indicated, this area is considered of low agricultural potential. Beskuitfontein would not be affected by substations, switching stations, batch plants or site access roads.

Photograph 3.20: Entrance to Beskuitfontein farm from Vlakfontein. Turbines are proposed on the hills (ridgeline) in the far distance

A portion of Alternative 1 would be located on Beskuitfontein, while a small portion of the 500m lateral corridor associated with Alternative 3 (preferred) would also affect Beskuitfontein. In both instances, the extreme north-western hilly portion of Beskuitfontein would be affected. West of Beskuitfontein, Alternative 1 traverses more level terrain (on adjacent De Rust), and would be potentially be within the viewshed of the Vlakfontein and Beskuitfontein access road (Photograph 3.21). The owner has indicated a preference for Alternative 2 and the Preferred Alternative which would affect the broken terrain further to the north (Pieter Erasmus, pers. comm).

Photograph 3.21: Looking towards Carlton Heights from the entrance road to Beskuitfontein and Vlakfontein. Tx line Alternative 1 would be located to the south of (viewer's side) of the low koppie in the centre of the photo

Hartebeeshoek

Hartebeeshoek is located to the east of the N9. Noupoort station and town were established on a portion of the original Hartebeeshoek farm. Today, six adjacent cadastral portions of the original farm 182 are collectively known as Hartebeeshoek Farm. Hartebeeshoek belongs to the Umsobomvu Municipality. The farm is accessed from the Oorlogspoort gravel Rd to the north, or directly from the N9 east of Noupoort (extension of Moss Street).

The eastern portion of Hartebeeshoek (14; 3/182; 15/182; 46/182) form part of the San Kraal site. The western portion of Hartebeeshoek (RE/ 182; 47/ 182) forms part of the site of San Kraal's proposed sister farm, the Phezukomoya WEF. The entire farm is currently leased out to a loose collective of around 40 communal farmers living in Noupoort (Kapp, pers. comm).

The property is used for grazing by goats, sheep and cattle. The currently non-operational broiler farm community project is located approximately 300 m east of the N9, on the non-site portion of the farm (Photograph 3.22). As indicated, this project is envisaged to be revived at some point.

Photograph 3.22: Defunct broiler houses on non-site portion of Hartebeeshoek, seen from the N9

A number of houses are located on Hartebeeshoek, all in various stages of disrepair (Photograph 3.23). None are inhabited, although some are occasionally used as night shelters by herders (Kapp, Majuba, pers. comm).

Photograph 3.23: One of several uninhabited houses on Hartebeeshoek, this one located near the Oorlogspoort Rd on the site portion of the farm

The non-site portion of Hartebeeshoek is largely hidden from the N9 and Noupoort town by the hilly topography. The site portion of Hartebeeshoek may be described as isolated. With the exception of a small section of the Oorlogspoort road in the extreme north, no public roads traverse the property.

Turbines on the adjacent Noupoort WEF are clearly visible from small portions the Oorlogspoort road and Hartebeeshoek. However, the broken topography precludes

massed viewings, and screens the turbines from much of the lower-lying portions of the property. The non-site portion is unaffected by existing Tx lines. The westernmost portion of RE/182 (non-site portion) is traversed by the 132-kV line feeding power from the adjacent Noupoort WEF into the grid. The line is located parallel to the N9, less than 100 m from the road, on the non-site portion of Hartebeeshoek (Photograph 3.27).

Photograph 3.23: Noupoort WEF 132 kV feeder line across non-site portion of Hartebeeshoek east of the N9

Thirty-one turbines and the project substation are proposed on the site portion of Hartebeeshoek (Photograph 3.24). As only the inaccessible, difficult-to-farm higher-lying portions of Hartebeeshoek would be affected by proposed infrastructure, the Municipality envisages that existing grazing activities could comfortably co-exist with the operation of the proposed WEF (Ngcineni, pers. comm).

Photograph 3.24: Proposed turbine development area (ridgeline) on Hartebeeshoek seen from the Oorlogspoort Road

All three Tx line Alternatives would affect Hartebeeshoek, both the site and non-site portions. Alternatives 1 and 3 (Preferred) would only affect the extreme south-westernmost portion of the site, while 4.4 km of Alternative 2 would traverse the property. The bulk of all alignments is on high ground. A portion of Alternative 2 is also located on lower lying ground 700 m from the nearest farm house (uninhabited) on Hartebeeshoek.

Holbrook

Holbrook (RE/181) is owned by Mr Gerhard Taljaard. The property is accessed from the Oorlogspoort road, which is partially aligned along its northern boundary (Photograph 3.25).

Photograph 3.25: Entrance to Holbrook farmstead from the Oorlogspoort road

Holbrook is used primarily for beef cattle farming. In addition, a number of horses are also kept on the property. Three farm houses on Holbrook are inhabited, all located on the farm yard almost at the centre of the property. Two labourers are permanently employed on Hollbrook. They live with their households on Holbrook, near the farm yard (Taljaard, pers. comm). No accommodation facilities or commercial hunting are associated with Holbrook.

No major service industrial infrastructure is currently located on Holbrook. No Tx lines are currently located in significant proximity to Holbrook. Turbines associated with the Noupoort WEF are however clearly visible from Holbrook's northern boundary and access road (Photograph 3.26). The nearest turbine is 3.5 km from the Holbrook farmstead.

Photograph 3.26: Turbines on the Noupoort WEF seen from the entrance to Holbrook, looking west

Thirty turbines are proposed on Holbrook. A switching station and the two project batching plants (construction phase) are also proposed on Holbrook. In addition, the San Kraal site access point is proposed off the Oorlogspoort road via Holbrook. Holbrook would not be affected by any of the Tx line alternatives, but a portion of the medium-voltage overhead line from the switching station to the on-site substation on Hartebeeshoek would affect the extreme north-western portion of Holbrook. In all instances, the relevant infrastructure is concentrated in the hilly western portion of Holbrook (Photograph 3.27). The proposed site access road would be located ~4 km to the west of the access road to the farmstead, and would not affect this road.

Photograph 3.27: Turbine development area (ridge line) on Holbrook seen from the Oorlogspoort road

3.6.4 Adjacent Properties

To the west, the site borders onto properties which form part of the proposed Phezukomoya WEF. These properties include the non-site portion of Hartbeeshoek and the farm De Rust. Further properties associated with the Phezukomoya WEF are located further to the west, namely Edendale, Kleinfontein, Vrede, and Winterhoek. All of these properties would be affected by the San Kraal Tx line Alternatives, and are described in more detail below.

To the north, the site borders onto the farm Atrbeidsgenot, and to its east, the operational Noupoort WEF (Blydefontein). Arbeidsgenot is permanently inhabited, and primarily used for grazing cattle. The Dairy accommodation facility is located on Arbeidsgenot. The Dairy caters mainly to passing traffic on the N9 and long-stay visitors, typically contractors (van Huyssteen, pers, comm). Blydefontein, the stock post Glen Allan, and the farms Berg en Dal and Groenfkloof belong to the same owner, Mr Jurie Lessing. All the properties are used for stock farming. Main operations are based on Groenkloof, north-east of Holbrook (Photograph 3.28). As indicated, the Noupoort WEF is located on Blydefontein.

Photograph 3.28: Groenkloof farm yard adjacent to the Oorlogspoort road

To the east and south-east, the site borders onto farms located in very broken terrain. Due to topography, these properties are not directly accessible from the WEF site. These properties are accessible from a gravel road off the Oorlogspoort Rd east of Groenkloof, but primary access is from the south, via roads off the N9 and R56 near Middelburg. The area is primarily used for stock farming, with both main operations and stock farms located in this area. In as far as could be established, only one farm, Salpeterkrans, is not primarily used for farming (John Moore, pers. comm).

To the south, the site borders onto the Vlakfontein portion of Beskuitfontein), and the adjacent Glenmoor property. Glenmore is permanently inhabited by a supervisor, but is not currently used for commercial farming activities (Pieter Erasmus, pers.

comm). Further to the south, along the N9, are located the guest farms Sherborne and Welvanpas. Both are located on working farms. Both cater mainly to passing travellers and long-stay guests.

3.6.5 Relationship to receptors

An overview of distances from the Noupoort built edge, farm yards and key public roads within an 8-km radius of the nearest proposed turbine[21] is provided in Table 3.14 below. For the sake of comparison, distances to the nearest turbine locations on the operational Noupoort WEF north of the San Kraal site are also provided[22].

Table 3.14: Receptors within 8 km of the nearest proposed turbine location:

Receptor	San Kraal Turbine	Noupoort WEF Turbine	San Kraal Substation	Comment
Arbeidsgenot[23]/ The Dairy	4.3 km	3.3 km	7 km	Permanently inhabited; Guest accommodation
Beskuitfontein	2.5 km	11 km	4.7 km	Permanently inhabited; Forms part of San Kraal WEF site
Blydefontein	5.9 km	1.8 km	10.7 km	Noupoort WEF site
De Rust	6.2 km	11.5 km	6.6 km	Part of Phezukomoya WEF Stock post.
Edendale	6.5 km	11.6 km	7.3 km	Farm yard portion inhabited Farming portion part of Phezukomoya WEF site
Glenmoor	3.2 km	11.4 km	6 km	Inhabited by supervisor, but not actively farmed. Owner resides in Botswana
Hartebeeshoek1	1.4 km	5.1 km	3.5 km	Part of San Kraal WEF site Not inhabited.
Hartebeeshoek2	2.4 km	5.5 km	4.6 km	Part of San Kraal WEF site Not inhabited.
Holbrook	1.3 km	3.5 km	6.5 km	Permanently inhabited; Forms part of San Kraal WEF site
La Rochelle	6.3 km	12.1 km	10.7 km	Stock post
N9	5.3 km	4.5 km	6.6 km	
N10	7.6 km	16.5 km	9.9 km	
Noupoort (Hekkie Schoeman St)	8.3 km	6 km	10.4 km	Noupoort northern edge
Noupoort (N9/ Murray St)	6.4 km	4.5 km	8.3 km	Noupoort eastern edge
Noupoort (Tshishibi St)	5.2 km	5.6 km	7.6 km	Noupoort southern edge
Noupoort (R389/ Hanover St)	7.2 km	6.1 km	9.7 km	Noupoort western edge
Oorlogspoort Rd	500 m	250 m	3.8 km	
Salpeterkrans	4.3 km	10.1 km	8.6 km	Not permanently inhabited. Not primarily used for farming
Sherbourne Guest Farm	8 km	17.1 km	11.8 km	Part of Wolwekop stock farm
Vlakfontein/ Carlton Heights	6.1 km	14.5 km	8.5 km	Belongs to same owner as San Kraal WEF farm Beskuitfontein

[21] This is the distance used by the VIA project specialist as the outer limit of significant visual impacts, as adapted to the proposed 150 m tower structures.

[22] Based on turbine locations indicated by the most recent Google Earth imagery, namely February 2016. At that stage, around 10 turbines still had to be constructed.

[23] Farm names as per most recent edition (2001) of the relevant Chief Directorate: National Geo-Spatial Information 1: 50 000 topo-cadastral maps, viz. rasters Carlton, Middelburg, Kikvorsberg and Noupoort.

Lodge				
Vrede	7.4 km	13.8 km	8.5 km	Part of site; Uninhabited stock post

Turbines

None of the affected land owners raised concerns with regard to the proposed turbine locations. As indicated, the proposed turbine locations would affect hills and elevated areas on the site properties, considered of low agricultural potential. Turbine locations are therefore acceptable to all site owners from a land use point of view.

Based on the information in Table 3,12, farm yards on 13 properties would be located within 8 km of the nearest proposed turbines. With the exception of Arbeidsgenot and Blydefontein, the nearest proposed San Kraal turbine locations are closer to farm yards than existing turbines on the Noupoort WEF. Of the relevant 13 San Kraal properties, 8 are permanently inhabited. The closest proposed turbine locations to inhabited farmsteads are on Holbrook (1.3 km) and Beskuitfontein (2.5 km). In both instances, the turbines would be located on the higher-lying, more inaccessible portions of the properties.

The nearest turbines would be located between 8.3 km and 5.2 km from Noupoort. The nearest turbine would be located 5.2 km from the south-eastern edge of Noupoort (Tshishibi Street). The nearest Noupoort WEF turbines are located within a distance of 4.5 to 6.1 km, i.e. comparable or slightly closer than the proposed San Kraal turbines. The Noupoort WEF is clearly visible from Noupoort. Many interviewees have indicated that they now consider the Noupoort WEF as part of Noupoort's sense of place.

At least 6 accommodation facilities in Noupoort town would be within an 8-km radius of turbines. In addition, three guest farm operations are also based within 8 km of the site, namely The Dairy (Arbeidsgenot Farm), Carlton Heights Lodge (Vlakfontein), and Sherbourne (Wolwekop). As was indicated, the Noupoort tourism sector is largely geared towards passing traffic and long-stay accommodation, and has been perceptibly stimulated by large construction projects in the area. In addition, the owner of The Dairy has indicated that some of her guests consider the existing turbines a positive draw card (van Huyssteen, pers. comm).

The nearest turbines would be located 5.3 km and 7.6 km from the N9 and N10, respectively. The nearest turbines on the Noupoort site are currently located 4.5 km and 16.5 km from the N9 and N10, respectively. The N9 is already affected by rail and electricity corridors, while the relevant portion of the N10 is not. The telecommunication infrastructure on Carlton Hills is however visible from this stretch of the N10.

The nearest proposed turbine to the Oorlogspoort road would be 500 m to the south. As indicated, Noupoort WEF turbines are clearly visible from this portion of the road. The nearest existing turbine is located 250 m from the road. Existing and proposed turbines are likely to create the effect of one large singe wind farm.

Substation

As indicated in Table 3.12, the proposed on-site substation is not located in meaningful proximity to any farm yards. This is linked to the substation site's location in a relatively isolated, hilly portion of Hartebeeshoek.

Access roads
Only one access point is proposed, namely off the Oorlogspoort Road. The proposed entry point is located just inside the western boundary of Holbrook. Existing access points to the Noupoort WEF are located 300m to the west and 1km to the east of the San Kraal access point, also off the Oorlogspoort Road. Construction traffic would mainly impact on users of the road located to its east of the access point. As indicated, many of the properties are inhabited. Interviewees have however indicated that experience from the construction of the Noupoort WEF had been largely positive, with acceptable waiting periods, and the road timeously upgraded, and repaired to good condition after construction (van der Walt, Huyssteen, pers. comm).

3.6.6 Properties Affected by Power Line Alternatives

Three Transmission line (Tx line) Alternatives are proposed. All three alternatives would feed into the approved Eskom Unsovombu substation to be constructed just across Bergplaas' south-eastern boundary, ~3.7 km south of the site. A lateral corridor of 500 m on either side of the line (1 km total) is associated with the Alternatives.

The three proposed Tx line Alternatives would affect properties which form part of the San Kraal site, the adjacent Phezukomoya WEF site, and non-site portions of the properties of one of the Phezukomoya site owners, Ms Vivian van der Merwe (Figure 3.17).

The Preferred Alternative is approximately 23 km long. It is the shortest and most direct of the three proposed Alternatives. The preferred Alternative would traverse properties belonging to five land owners, all of whom form part of either the San Kraal or Phezukomoya WEF sites (Table 3.15).

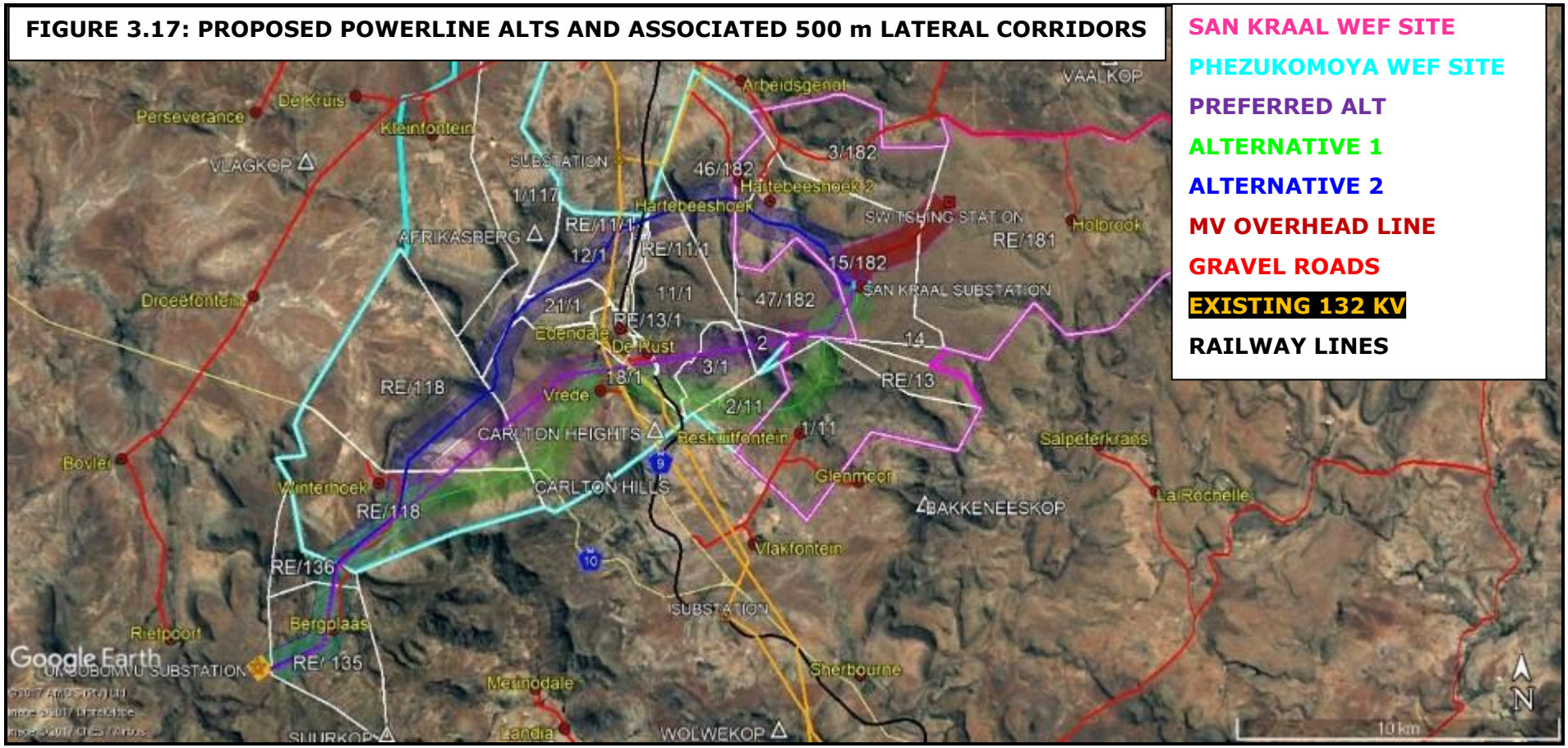


Figure 3.17: Proposed San Kraal Overhead power lines and associated 1 km lateral corridors in relation to affected properties and existing infrastructure

Table 3.15: Preferred Alternative Tx line and 1 km lateral corridor property owners (from east to west)

OWNER	FARM NAME	LINE DISTANCE	LINE TO FARM YARD	COMMENT
Umsobomvu LM	Hartebeeshoek 15/182; 47/182	2.4 km	3.7 km	San Kraal WEF site Not inhabited
Mr Pieter Erasmus	Beskuitfontein RE/13	450 m	2.9 km	San Kraal WEF site Inhabited
Mr Jean Gillmer	De Rust 2; 3/1; 11/1; 18/1	5 km	300 m	Phezukomoya WEF site Not inhabited
Mr Tollie Jordaan	Vrede RE/1/1	4.1 km	620 m	Phezukomoya WEF site Not inhabited
Ms Vivian van der Merwe	Winterhoek RE/118	6.9 km	1.2 km	Phezukomoya WEF site Inhabited
Ms Vivian van der Merwe	Bergplaas RE/ 135; RE/ 136	4.2 km	260 m	Not inhabited

The site properties Hartebeeshoek and Beskuitfontein would be affected along distances of 2.4 km and 450 m, respectively. The Phezukamoya WEF properties would be affected along distances of 5 km (De Rust), 4.1 km (Vrede), and 6.9 km (Winterhoek). In addition, Bergplaas would be affected along 4.2 km. Bergplaas and Winterhoek belong to the same owner, Ms van der Merwe. Ms van der Merwe's properties would thus be affected over a distance of 11.1 km.

The longest line portion is located on land which belongs to Ms Vivian van der Merwe. The lateral corridor would be contained on the properties affected by the line. Only two farm yards are located within the 500-m corridor, namely De Rust (old rail siding) and Bergplaas. Neither is inhabited. The nearest inhabited farmstead is Winterhoek (1.2 km). The farmstead is screened from the proposed line by intervening topography. This Alternative would traverse the N9 and N10. The relevant portion of the N9 is already affected by service industrial infrastructure, while the relevant portion of the N10 is not.

Alternative 1 is approximately 25.4 km long. It is the southernmost of the Alternative alignments. It would traverse different portions of the properties belonging to same five land owners as the Preferred Alternative (Table 3.16).

Table 3.16: Alternative 1 Tx line and 1 km lateral corridor property owners (from east to west)

OWNER	FARM NAME	LINE DISTANCE	LINE TO FARM YARD	COMMENT
Umsobomvu LM	Hartebeeshoek 15/182; 47/182	1.8 km	3.9 km	San Kraal WEF site Not inhabited
Mr Pieter Erasmus	Beskuitfontein 1/11; RE/13	3.2 km	850 m	San Kraal WEF site Inhabited
Mr Jean Gillmer	De Rust 2/11; 3/1; 11/1; 18/1	4.3 km	800 m	Phezukomoya WEF site Not inhabited
Mr Tollie Jordaan	Vrede RE/1/1	5 km	360 m	Phezukomoya WEF site Not inhabited
Ms Vivian van der Merwe	Winterhoek RE/118	6.9 km	970 m	Phezukomoya WEF site Inhabited
Ms Vivian van der Merwe	Bergplaas RE/ 135; RE/ 136	4.2 km	220 m	Not inhabited

The relevant distances over which these properties would be affected are 1.8 km (Hartebeeshoek), 3.2 km (De Rust), 5 km (Vrede), 6.9 km (Winterhoek) and 4.2 km (Bergplaas).

Again, the longest line portion is located on land which belongs to Ms Vivian van der Merwe (~11.1 km). The 500 m lateral corridors (1 km total) would be contained on the properties affected by the line. Only two farm yards are located within the 500 m corridor, namely Vrede and Bergplaas. As indicated, neither are inhabited. The nearest inhabited farmstead is Winterhoek (970 m). The farmstead is screened from the proposed line by intervening topography. This Alternative would traverse the N9 and N10. The relevant portion of the N9 is already affected by service industrial infrastructure, while the relevant portion of the N10 is not.

Alternative 2 is approximately 26.9 km in length. It is the northernmost and longest of the Alternative alignments. It would traverse properties belonging to six land owners. All owners form part of either the San Kraal or Phezukomoya WEF sites (Table 3.17).

Table 3.17: Alternative 2 Tx line and 1 km lateral corridor property owners (from east to west)

OWNER	FARM NAME	LINE DISTANCE	LINE TO FARM YARD	COMMENT
Umsobomvu LM	Hartebeeshoek 15/182; 47/182; 46/182; RE/ 182	6.4 km	620 m	San Kraal and Phezukamoya WEF sites Not inhabited
Mr Jean Gillmer	De Rust 11/1; RE/ 11/1	1.1 km	3.7 km	Phezukomoya WEF site Same farming operation as Edendale Not inhabited
Mr Jean Gillmer	Edendale RE/ 11/1; 12/1; 21/1	5.6 km	1.2 km	Phezukomoya WEF site Same farming operation as De Rust Not inhabited Farm yard (Ballard) not part of Phezukomoya site
Mr Jim de Villiers	Kleinfontein 1/117	1.4 km Corridor only	6.1 km	Phezukomoya WEF site Not inhabited
Mr Tollie Jordaan	Vrede RE/1/1	2.1 km	3.5 km	Phezukomoya WEF site Not inhabited
Ms Vivian van der Merwe	Winterhoek RE/118	7.5 km	750 m	Phezukomoya WEF site Inhabited
Ms Vivian van der Merwe	Bergplaas RE/ 135; RE/ 136	4.2 km	260 m	Not inhabited

In addition to the De Rust portion of Mr Jean Gillmer's property affected by the other two Alternatives, it would also affect the Edendale portion. The relevant distances over which these properties would be affected are 6.4 km (Hartebeeshoek), 1.1 km (De Rust), 5.6 km (Edendale), 2.1 km (Vrede), 7.5 km (Winterhoek) and 4.2 km (Bergplaas). In addition to the five landowners affected by the Preferred Alternative and Alternative 1, Alternative 2 would affect a sixth, namely Kleinfontein. Kleinfontein also forms part of the Phezukomoya WEF site. Kleinfontein would only be affected by the Alternative 2 corridor along its south-eastern boundary, over a distance of 1.4 km.

The longest line portion is located on land belonging to Ms Vivian van der Merwe (~11.7 km). Only one farm yard is located within the 500-m corridor, namely Bergplaas. Bergplaas is an uninhabited stock post. The nearest inhabited farmstead is Winterhoek (950 m). The farmstead is screened from the proposed line by intervening topography. This Alternative would traverse the N9 and N10. The

relevant portion of the N9 is already affected by service industrial infrastructure, while the relevant portion of the N10 is not.

All three alternatives would feed into the approved Eskom Moomba substation to be constructed just across Bergplaas' south-eastern boundary. The line portions south of the N10 and the Umsobomvu substation terrain are located in very broken terrain, only accessible by 4x4 or bakkie via internal farm roads. It is therefore relatively isolated.

The non-site properties are each briefly described below.

Edendale/ De Rust
De Rust and Edendale are located to the east and west of the N9 and Noupoort-Middelburg rail corridors, respectively. Both properties, each consisting of a number of cadastral units, belong to Mr Jean Gillmer. Both properties are used as stock posts in Mr Gillmer's larger farming operation which is based on Droeefontein farm west of Noupoort.

A small portion of the original Edendale Farm was reserved by the previous owners (Ballard) from the sale of the property to Mr Gillmer some years ago. The original farmstead and yard are located on this portion of Edendale, ~150 m to the west of the N9 (Photograph 3.29). Two inhabited farm houses are located on this portion of Edendale (Gillmer, pers. comm).

Photograph 3.29: Two inhabited farm houses on non-site portion of Edendale ~150 m west of the N9. The railway line corridor is hidden in a cutting in the middle distance

Both properties are used for grazing livestock (sheep and cattle). Both properties support year-round grazing, rotated between internal camps. Irrigated fodder for own use is cropped on the portion of the property located near the Edendale farm yard.

A supervisor, who keeps an eye on both properties, lives on Edendale, adjacent to the farm yard (Ballard). No other houses or farm buildings are located on Edendale. Two cottages, formerly part of De Rust siding, are located on De Rust. Neither is inhabited. No other buildings are located on De Rust (Photograph 3.30).

Photograph 3.30: Cottages associated with former De Rust siding on De Rust

As indicated above, De Rust and Edendale are located on either side of the N9 and associated rail corridors. The underground portion of the Middelburg-Noupoort railway line is located across the western portion of De Rust, as testified to by ventilation structures on the property. The old above ground railway line (no longer in use) is located in proximity to the tunnel. The cottages on De Rust used to be the De Rust siding associated with this line. The westernmost portion of De Rust is affected by an existing 132 kV line (Photograph 3.31).

The underground portion of the rail corridor from De Rust emerges above ground west of the N9, ~100m west of the Edendale farm yard. The rail portion near Edendale farm yard is sunk in a deep cutting, and is not visible from the N9. A 132-kV line is located across Edendale, parallel to, and ~500 m west of the railway corridor (Photograph 3.32). The line is located ~550 m to the west of the farm yard. Approximately 630 m south-west of the farm yard, the line splits into south and south-east aligned components, affecting the southernmost portion of Edendale.

Photograph 3.31: Existing 132 kV line across south-western portion of De Rust. Alternative 1 would be aligned parallel to the south (other side) of the existing line

Photograph 3.32: Railway line and 132 kV transmission line on Edendale north of farmyard

Sixteen turbines associated with the Phezukomoya WEF are proposed on De Rust, and two on Edendale. The Phezukomoya substation is also proposed on Edendale. All turbine locations are proposed on high ground, considered of low agricultural potential. The nearest proposed turbine location to the houses on Edendale is ~1.1 km to the west (on adjacent Vrede). The on-site substation is proposed on Edendale (21/1) ~1.4 km to the north-west of the Edendale farm yard. The site is partially obscured from the yard by a low intervening koppie.

As indicated in the above tables the San Kraal Preferred Alternative and Alternative 1 would affect De Rust, while Alternative 2 would also affect Edendale. Alternative 2 would affect Mr Gillmer's properties over a distance of ~6.7 km, while the Preferred

Alternative would affect De Rust over a distance of 5 km, and Alternative 1 over 4.3 km. All Alternatives would be located on land used for grazing. No fodder cropping areas would be affected.

The Preferred Alternative is located ~320 m south of old De Rust siding (Photograph 3.33). As indicated, the buildings are not inhabited. Both the Preferred Alternative and Alternative 1 are located more than 1 km from the inhabited Edendale farm yard (Ballard). However, both lines would be screened from the yard by intervening topography. Alternative 2 would be located 2.1 km to the north-west of the Edendale farm yard. The area to the north of Edendale is already transformed by road, rail and transmission line corridors. An existing Tx line is located ~670 m west of the Edendale farm yard. The owner has indicated that, due to existing service industrial infrastructure, neither De Rust nor Edendale are considered visually sensitive (Gillmer, pers. comm).

Photograph 3.33: Portion of De Rust south of the old De Rust siding which would be affected by the Preferred Alternative and Alternative 1

Kleinfontein

Kleinfontein is located to the west of Noupoort. Kleinfontein belongs to Mr Jim de Villiers, and is used as a stock post in Mr de Villiers's operations which are based on Toitdale farm, located ~8 km further to the north. A farm house and outbuildings such as sheds and kraals are located on Kleinfontein. None of the buildings are inhabited (Photograph 3.34).

Photograph 3.34: Farm house on Kleinfontein, now used for storage

The balance of Kleinfontein is used for year-round grazing by livestock. Small numbers of plains game - springbok, blesbok, black wildebeest – occur on the property, but do not support any tourism or commercial hunting. Mainly the lower lying northern and mid-portions are used for grazing, as the hilly southern portion is considered too inaccessible to farm effectively.

No dedicated labour force is associated with Kleinfontein. The property is close enough to Toitsdale to be visited by Mr de Villiers and staff on a regular basis. Ten permanent workers are associated with Mr De Villiers' operations, with tenure split between Noupoort and Toitsdale (de Villiers, pers. comm).

Apart from the extreme north-eastern portion of Kleinfontein which is traversed by the R389 gravel road, no service industrial infrastructure – rail, telecom, high voltage power lines - is currently located on Kleinfontein. Fourteen turbines associated with the Phezukomoya WEF are proposed on Kleinfontein, all on the southern hilly portion of the property.

Kleinfontein would only be affected by Alternative 2. No portion of the line would be located on the property, but it would be affected by the 500-m lateral corridor along a distance of 1.4 km. This would affect the extreme south-eastern portion of Kleinfontein. The relevant portion of Kleinfontein consists of hilly terrain. The line and corridor would not be in significant proximity to the (uninhabited) farmstead on Kleinfontein.

Vrede

Vrede (RE/1/1), 2826 ha in extent, straddles the N9, with the largest portion to the west of the N9. The farm is accessed directly from the N9 via private gravel roads with locked entrances. The bulk of the property is located on relatively flat terrain, hemmed in by large hills on all sides (Photograph 3.35). These include the Carlton Hills which straddle the property's southern boundary.

Photograph 3.35: Vrede farm yard and access road off the N9. Note 132 kV cables traversing access road in foreground

Vrede is currently registered to Mr Tollie Jordaan. However, Vrede has recently been sold, and is in the process of being transferred to Mr Jean Gillmer (Droeefontein). (Gillmer, pers. comm).

Mr Jordaan's farming operations are based in Somerset-East. Vrede was historically used for livestock grazing and in recent years, also keeping plains game for sale or paid hunting. Until around 7 years ago, the farm was also used as guest accommodation facility. A farm house, outbuildings and labourer's houses are located on Vrede (Photograph 3.36). The farm house and nearby labourers houses are currently uninhabited.

Photograph 3.36: Uninhabited farm house and out buildings on Vrede

Mr Jordaan is currently in the process of concluding the relocation of his livestock and game from the property. Mr Gillmer envisages integrating Vrede into his existing stock farming operations on adjacent Edendale and De Rust. Mr. Gillmer is also considering reintroducing plains game onto Vrede, and reviving the farm house as an accommodation facility, also catering to paid hunters (Gillmer, pers. comm).

The easternmost portion of Vrede is currently affected by the N9, the Noupoort-Middelburg rail corridor, and two 132 kV power lines (Photograph 3.37). The farm house is located ~700 m west of the N9. A 132 kV line traverses the main farm entrance road, and is located ~650 m east of the farm house. Topography screens much of the property from the rail corridor and the second 132 kV line.

Photograph 3.37: N9 and 132kV line across north-eastern portion of Vrede

The extreme southernmost portion of Vrede, south-west of the Carlton Hills, is traversed by the N10. A number of telecommunication structures (towers, etc) are located on the Carlton Hills in the extreme south-eastern portion of Vrede. These facilities are partly located on Vrede, and partly just across its southern boundary. They gain access via Vrede from the N10. Vrede is part of the Phezukomoya WEF site. Nine turbines are proposed on Vrede, all on high ground associated with large hills in the north and north-western portions of the property.

Portions of all three Tx line Alternatives would traverse Vrede, roughly from north-east to south-west. Approximately 4.1 km of the Preferred Alternative would traverse Vrede, while 5 km of Alternative 1 and 2.1 km of Alternative 2 would traverse the property. The Preferred Alternative and Alternative 1 would largely be located on lower lying, flatter terrain in the central part of the property, while Alternative 2 would be located in hilly terrain just inside the property's north-western boundary.

All three Alternatives traverse Vrede to the north of the farm yard, with Alternative 1 the nearest (360m), followed by the Preferred Alternative (620m), and Alternative 2 (3.5 km) (Photograph 3.38). The portions of the Preferred Alternative and Alternative 1 in proximity to the farm yard would affect a portion of Vrede which already accommodates an existing Tx line.

Photograph 3.38: Area north-west of Vrede farm yard. The Preferred Alternative and Alternative 1 would traverse the flat area in the foreground, while Alternative 2 would be located in the hilly area in the distance

Winterhoek and Bergplaas

Winterhoek (RE/ 118) borders onto the site farms of Kleinfontein and Vrede to the north-east. Portions of Winterhoek are located both to the north and south of the N10. The farmstead is located on the portion south of the N10, and directly accessed off the N10. Bergplaas (RE/ 135; RE/ 136) is located to the south of Winterhoek, and accessed via Winterhoek. Winterhoek forms part of the Phezukomoya WEF site. However, no turbines are proposed on the property.

The owner, Ms. Vivian van der Merwe, is aged and lives in Middelburg. Her Estate, including the properties, is currently in the process of being placed under curatorship (Nel, pers. comm). The bulk of the properties are currently rented out to farmers from the Noupoort area, namely to Mr Frikkie Visser and Kleintjie Retief. The farm house on Winterhoek and a surrounding portion of land has been reserved for use by the owner's daughter in law, Ms Eleanor van der Merwe. Ms. Eleanor Van der Merwe and two labourer families reside on Winterhoek (Photographs 3.39 and 3.40).

Photograph 3.39: Inhabited farm house on Winterhoek. All three Tx line Alternatives would be located to the east of the farm yard, behind the koppie

Photograph 3.40: Farm labourers' houses to the west of the Winterhoek farm yard

The reserved portion is used for grazing by Ms van der Merwe. No houses are located on Bergplaas. The farm yard consists of a shed and stock pens (Visser, pers. comm). Both properties, including the portion of Winterhoek not rented out, are used for livestock grazing. Both properties occupy very broken terrain. Apart from the N9, no service industrial infrastructure is currently associated with Winterhoek or Bergplaas. Bergplaas is accessed via the Winterhoek access road off the N10. The road to Bergplaas traverses the Winterhoek farm yard ~30 m to the north of the farmstead (Photograph 3.41). The road is only passable by bakkie or 4x4. Bergplaas is consequently fairly isolated.

Photograph 3.41: Existing road to Bergplaas located ~30 m to the north of the inhabited farm house on Winterhoek

The Preferred Alternative and Alternative 2 would affect portions of Winterhoek located to the north and south of the N10, while Alternative 1 would only affect the property portion located to the south of the N10.

All three Alternatives would affect mainly broken topography south of the N10 (Photograph 3.42). All three Alternatives would traverse Winterhoek to the east of the farm yard. Alternative 2 would be located nearest to the farm yard, namely 750m, followed by the Preferred Alternative (970m) and Alternative 1 (1.2 km). The lines would be screened from the farm yard by intervening topography. All three Alternatives would traverse Bergplaas within 260 m of the farm yard. However, as indicated, Bergplaas is uninhabited, and used as a stock post.

Photograph 3.42: Portion of Winterhoek south of the N9, east of the farmstead. The preferred Alternative and Alternative 2 would traverse the hills in the background

N9

All three Alternatives would traverse the N9 between Carlton Heights and Noupoort. The relevant portion of the N9 is already affected by 3 Tx line corridors (Photograph 3.43), as well as the rail corridor and associated infrastructure (Barredeel siding, Midlandia rail yard). Turbines on the Noupoort WEF are clearly visible from the road. The area may be described as transformed.

Photograph 3.43: Existing feed in Tx line from the Noupoort WEF which traverses the N9 between Barredeel rail siding and Midlandia.

N10

All three Tx line Alternatives would traverse the N10. The three Alternatives would traverse the road within a straight 3.8 km stretch of the road to the east of the Winterhoek farm turnoff (Photograph 3.44). The relevant portion of the N10 is not currently in any significant proximity to existing transmission lines or the rail corridor, and turbines of the Noupoort WEF are not within viewing distance. Telecommunications infrastructure on Carlton Hills is however visible from the N10 along this stretch.

Photograph 3.44: Straight portion of N10 east of Winterhoek turnoff, seen from ~4 km the east. All three Tx lines would traverse the N10 along this road portion

Distances to key receptors

A summary of impacts associated with the three Tx line Alternatives is presented in Table 3.18 below. As indicated, the Preferred Alternative is the shortest, followed by Alternatives 1 and 2. All three Alternatives are located on land used for grazing, or considered of low agricultural potential. All three Alternatives would affect the same set of land owners. Alternative 2 would affect an additional owner (Kleinfontein), and an additional property (Edendale).

Table 3.18: Tx line Alternatives and existing Tx lines in relation to affected properties

FARM	Pref. Alt distance	Pref. Alt to farm yards	Alt 1 distance	Alt 1 to farm yards	Alt 2 distance	Alt 2 to farm yards	Existing tx to farm yards
Hartebees-hoek	2.4 km	3.7 km	1.8 km	3.9 km	6.4 km	620 m	3.4 km
Beskuit-fontein	450 m	2.9 km	3.2 km	850 m	N.a.	N.a.	3.3 km
De Rust	5 km	300 m	4.3 km	800 m	1.1 km	3.7 km	700 m
Edendale[24]	N.a.	1.2 km	N.a.	1.4 km	5.6 km	1.2 km	560 m
Klein-fontein	N.a.	N.a.	N.a.	N.a.	1.4 km Corridor only	6.1 km	5.6 km
Vrede	4.1 km	620 m	5 km	360 m	2.1 km	3.5 km	600 m
Winter-hoek	6.9 km	1.2 km	6.9 km	970 m	7.5 km	750 m	8 km
Bergplaas	4.2 km	260 m	4.2 km	220 m	4.2 km	260 m	12 km

[24] Line distances across Phezukomoya WEF site portion of Edendale. Distance to farm yard.

The Preferred Alternative would be located within 1km of the yards on De Rust, Vrede and Bergplaas. As indicated, none of the relevant properties are inhabited. Alternative 1 would be located within 1 km of four farm yards. Of these, only Winterhoek is permanently inhabited. Alternative 2 would be located within 1 km of three farm yards. Of these, only Winterhoek is permanently inhabited. In both instances, the relevant line Alternatives are located to the east of the Winterhoek farm yard, screened from the yard by intervening topography.

1.7.1 Other renewable energy facilities

Based on information provided by Arcus there are eleven approved renewable energy projects located within a 35 km radius of the site. These include 3 wind and 8 solar energy projects (Figure 3.18). It would appear that only one wind farm, the Mainstream Noupoort WEF, and two solar projects, have been established to date. The remaining sites have not been developed as yet.

The two closest renewable energy projects are the Phezukomoya WEF (proposed by Phezukomoya Wind Power (Pty) Ltd) and the Noupoort WEF (Mainstream). These are discussed below.

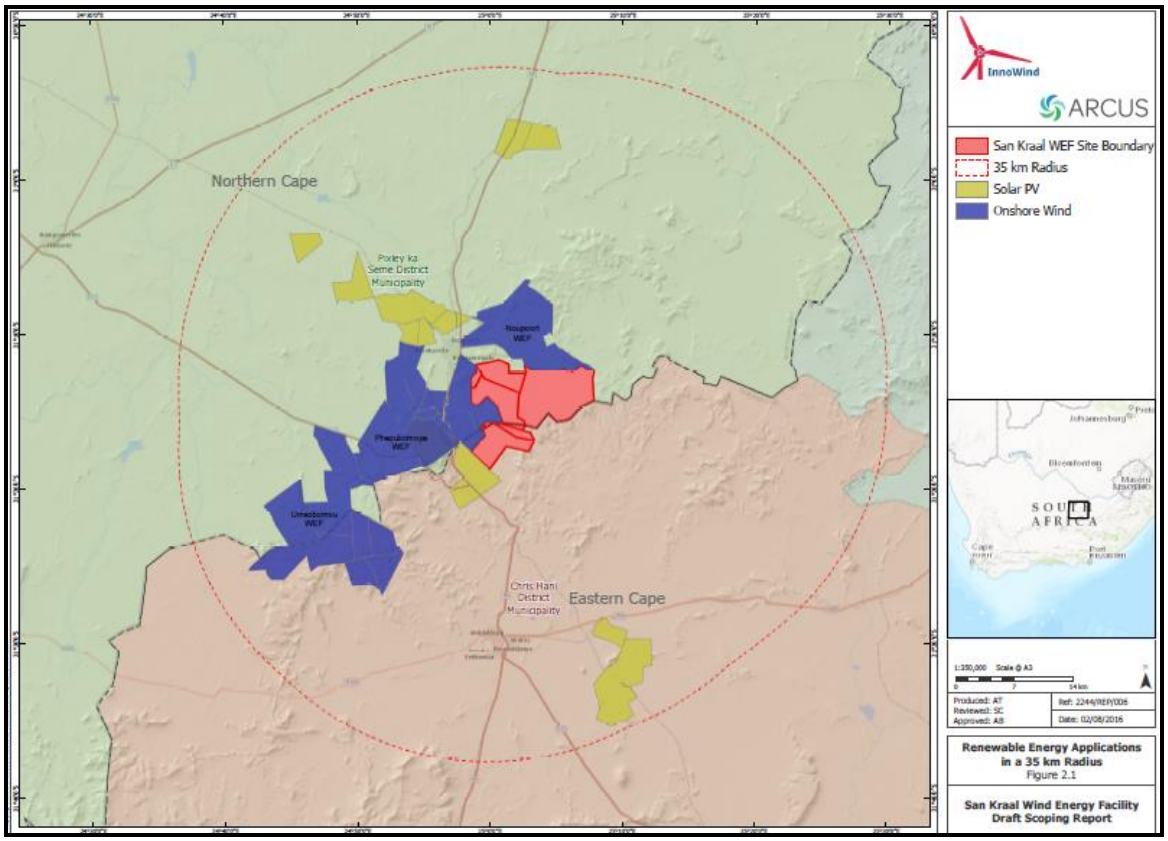


Figure 3.18: Location of renewable energy projects within 35 km radius of site

Phezukomoya WEF

In parallel with San Kraal, Phezukomoya Wind Power (Pty) Ltd is also proposing the development of the Phezukomoya WEF near Noupoort (separate EIA process, also managed by Arcus). The Phezukomoya site is located directly to the west of the San Kraal site. It straddles the N9, and portions are located both to the west and east of Noupoort town. As indicated, the remaining portions of the Municipally-owned Hartebeeshoek farm form part of the site. In addition, land belonging to three other owners form part of the San Kraal site, namely Edendale/ de Rust (Mr Jean Gillmer), Vrede (Mr Tollie Jordaan), and Kleinfontein (Mr Jim de Villiers). As indicated, De Rust/ Edendale and Vrede are affected by the proposed San Kraal Tx line Alternatives.

Up to 63 turbines with a total generating capacity of 315 MW are proposed. Turbine specifications are the same as for Phezukomoya, namely individual generating capacities of 3-5 MW, with hub heights of up to 150m and rotor diameters of up to 150 m. Additional facilities will include an on-site switching station and an on-site control and operations centre. The site will be accessed via a number of entrances from the N9 and R389 (Hanover gravel road to the west of Noupoort) during the construction and operational phases. WEF infrastructure would occupy less than 1% of the 15 271-ha site. Three powerline alternatives are proposed. From the proposed Phezukomoya on-site substation north-west of Edendale farmstead to the new Eskom Umsobomvu substation south of Bergplaas, the three Tx Alternatives for San Kraal and Phezukomoya follow identical alignments.

Noupoort WEF

Mainstream's operational 80MW Noupoort WEF is located east of Noupoort on Blydefontein farm, directly to the north of the San Kraal site, across the Oorlogspoort road. The WEF was approved in the third round of the REIPPPP. Construction of the Noupoort WEF was completed in mid-2016. The power purchase agreement is for 20 years. The facility consists of 35 turbines on a site 7500 ha in extent. The turbines are of identical dimensions, namely a hub height is 99 m, and total turbine (blade tip) height of 152 m. The turbine tower structures were manufactured in Atlantis in the Western Cape, and transported to site by truck via the N1 and N10. The blades and nacelles were imported to Saldanha Bay, and from there transported to the site by truck. The WEF is accessed off the Oorlogspoort Rd (Photograph 3.45). The generated power is fed into a substation north-west of Barredeel siding. A portion of the 132-kV line is located parallel to the east of the N9 across the non-site portion of Hartebeeshoek.

Photograph 3.45: One of two entrances to the Noupoort WEF off the Oorlogspoort gravel road

Turbines associated with the Noupoort WEF are visible from Noupoort, the N9, the Oorlogspoort Rd, and some adjacent properties (Photograph 3,56). However, due to the turbines being located in very broken terrain, only portions of the WEF are visible at any given time. In addition, topography often screens out turbines from nearby receptors, such as farmsteads.

Photograph 3.46: Turbines of the Noupoort WEF seen from the eastern edge of Noupoort (Murray Street)

The Noupoort community benefited from skills training and employment during the construction phase (Majuba, Mgcineni, pers. comm). The construction phase also stimulated development of the local accommodation sector, with a number of new establishments coming into being, and some established ones being expanding to cater specifically for long-stay guests.

The Noupoort Renewable Energy Community Trusts owns a 5% stake in the Noupoort WEF. The Trust was established with loans from the Noupoort WEF shareholders and the Development Bank of South Africa. Community benefits would start accruing once the loans have been repaid. The Trust focuses on community development in the fields of education, health care, agriculture, sports, recreation and social welfare.

In addition, the Noupoort WEF also funds community and enterprise development projects. The enterprise development programmes focus on assisting existing and emerging local entrepreneurs. Application for assistance is open to entrepreneurs within 50km from the site, and may be applied for via the Noupoort WEF's Economic Development Manager.

Noupoort WEF's socio-economic development programmes focus on aspects such as HIV/AIDS, early childhood development, education, and the development of marginalised groups such as women, children and unemployed youth (https://noupoortwind.co.za/). Through these programmes, Noupoort WEF is currently supporting a much-needed maths and science programme at Noupoort schools (Mgcineni, pers. comm).

SECTION 4: ASSESSMENT OF SOCIAL ISSUES

4.1 INTRODUCTION

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

- Review of project related information;
- Interviews with key interested and affected parties;
- Experience/ familiarity of the authors with the area and local conditions;
- Experience with similar projects.

The assessment section is divided into the following sections:

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

4.2 ASSESSMENT OF POLICY AND PLANNING FIT

As indicated in Section 1.6, legislative and policy context plays an important role in identifying and assessing the potential social impacts associated with a proposed development. In this regard a key component of the SIA process is to assess the proposed development in terms of its fit with key planning and policy documents. The findings of the review indicated that renewable energy is strongly supported at a national and local level. At a national level the White Paper on Energy Policy (1998) notes:

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

The development of and investment in renewable energy is also supported by the National Development Plan (NDP), New Growth Path Framework and National Infrastructure Plan, which all make reference to renewable energy. At a provincial level the development of renewable energy is supported by the Northern Cape Provincial Growth and Development Strategy and Northern Cape Provincial Spatial

Development Framework[25]. The PKSDM IDP also highlights the importance of renewable energy for the area.

However, the provincial and local policy and planning documents also make reference to the importance of tourism and the region's natural resources. Care therefore needs to be taken to ensure that the development of large renewable energy projects, such as the proposed facility, does not impact on the region's natural resources and the tourism potential of the Province.

4.3 CONSTRUCTION PHASE SOCIAL IMPACTS

The key social issues associated with the construction phase include:

Potential positive impacts
- Creation of employment and business opportunities, and opportunity for skills development and on-site training;
- Benefits associated with providing technical advice on wind energy to local farmers and municipalities.

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, waste and safety impacts of construction related activities and vehicles.

4.3.1 Creation of local employment, training, and business opportunities

Based on the information from other WEF projects the construction phase for the proposed WEF is expected to extend over a period of approximately 2 years and create approximately 350 (full-time equivalent) employment opportunities during peak construction. The work associated with the construction phase will be undertaken by contractors and will include the establishment of the WEF and the associated components, including, access roads, substation, services and power line. It is anticipated that approximately 55% (193) of the employment opportunities will be available to low skilled workers (construction labourers, security staff etc.), 30% (105) to semi-skilled workers (drivers, equipment operators etc.) and 15% (52) for skilled personnel (engineers, land surveyors, project managers etc.).

Members from the local community in the area are likely to be in a position to qualify for the majority of the low skilled and a proportion of the semi-skilled employment opportunities. The majority of these employment opportunities are also likely to accrue to Historically Disadvantaged (HD) members from the local ULM and IYLM community. As indicated above, the levels of unemployment in the ULM and IYLM are high. The towns that are most likely to benefit are Noupoort, Colesburg and Middelburg. The creation of potential employment opportunities, even temporary employment, will represent a significant, if localised, social benefit. Where feasible

[25] The majority of the site is located in the Northern Cape Province. The focus of the review was therefore on the Northern Cape.

the implementation of a training and skills development programme prior to the commencement of construction would also increase the potential to employ local community members. The number of low skilled and semi-skilled positions taken up by members from the local community will depend on the effective implementation of the enhancement measures listed below by the proponent in consultation with the ULM and IYLM.

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

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

The capital expenditure associated with the construction of a 390 MW WEF will be in the region of R 4 billion (2017 Rand value). A percentage of the capital expenditure associated with the construction phase has the potential to benefit local companies and communities. Given the proximity of the site to Port Elizabeth there is likely to be a pool of suitably qualified companies that can provide key services, such as locally based construction and engineering companies.

The Green Jobs study (IDC, DBSA, and TIPS, 2011) found that South Africa is in a position to leverage upon some of its existing manufacturing capacities in order to produce components and parts for 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. These types of industries are all located in the Nelson Mandela Bay Metropolitan Municipality (NMBMM). The proposed WEF will therefore create potential opportunities for engineering and construction companies in Port Elizabeth and Utinhage. Implementing the enhancement measures listed below can enhance these opportunities.

The total wage bill for the two year construction phase will be in the region of R 104 million (2017 Rand value). This is based on an average monthly wage of R 8 000 for low-skilled workers, R 12 000 for semi-skilled workers and R 30 000 for skilled workers over a period of 24 months. Given that the majority of the low and semi-skills construction workers will be sourced from the local towns in the area, such as Noupoort, Colesburg and Middleburg, a percentage of the wage bill will be spent in the local economy over the two year construction phase. This will create opportunities for local businesses in local towns in the area. The sector of the local

economy that is most likely to benefit from the proposed development is the local service industry. This is confirmed by the experience with the other renewable projects. The potential opportunities for the local service sector are linked to accommodation, catering, cleaning, transport and security, etc. associated with the construction workers on the site.

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 renewable energy projects indicates that the potential opportunities are not limited to on-site construction workers but also to consultants and product representatives associated with the project. The benefits to the local economy will be confined to the construction period (20-24 months). The findings of the SIA also indicate that the hospitality sector and the local economy in Noupoort has benefited from recent construction projects related to the N9, N10 and the Noupoort WEF.

The findings of the SIA also indicate that the establishment of the Noupoort WEF has benefited the town. During the construction phase the project provided local skills training, employment and local spending. The construction phase also stimulated development of the local accommodation sector. The operational phase benefits have been linked to the Community Trust which has benefitted community development and local SMMEs, such as security services. The Noupoort community therefore regards large development projects – such as WEFs – as a major boon, and are in principle positive about any new WEF projects (Majuba, Ngcineni, pers. comm).

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

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

Impact Phase: Construction							
Potential impact description: Creation of employment and business opportunities during the construction phase							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation/ Enhancement	M	L	M	Positive	Medium	M	High
With Mitigation/ Enhancement	H	L	H	Positive	High	H	High
Can the impact be reversed?			Yes: By not implementing the project				
Will impact cause irreplaceable loss or resources?			No				
Can impact be avoided, managed, enhanced and or mitigated?			Yes, see measures below.				

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

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

Employment
- Where reasonable and practical the proponent should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. 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 ULM and IYLM 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, relevant community representatives and local farmers 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 a training and skills development programmes for local workers 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 ULM and IYLM 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 ULM and IYLM, 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

Experience has shown that the presence of construction workers can pose a potential risk to family structures and social networks. These risks however tend to be more pronounced in isolated rural areas. 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. The risks are linked to:

- 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.

However, while the risk does exist, the majority of the low skilled (193) and semi-skilled (105) work opportunities associated with the construction phase are likely to benefit members from the local community. If these opportunities are taken up by local residents the potential impact on local family and social networks will be low as these workers come from local community. As indicated in the Overview of the Renewable Energy Independent Power Producers Procurement Programme (IPPPP) (September 2016), in terms benefits for local communities, significantly more people from local communities were employed during construction than was initially planned. The expectation for local community participation was 6 771 job years. To date 15 215 job years have been realised (i.e. 125% greater than initially planned). The likelihood of local community members being employed during the construction phase is therefore high.

Employing members from the local community to fill the low-skilled job categories will therefore reduce the risk and mitigate the potential impact on the local communities. The use of local residents to fill the low skilled job categories will also reduce the need to provide accommodation for construction workers in local towns in the area, such as Noupoort, Colesburg and Middelburg. The non-local skilled workers (52) are likely to be accommodated in local guest houses and guest farms in the area. The presence of an additional 52 or so worker's over a period of two years months is unlikely to have a significant impact on local family networks and structures in the area. In addition, the findings of the SIA indicate that the local hospitality sector in and around Noupoort has expanded to accommodate workers associated with construction related projects in the area in recent years. The presence of construction workers in the area is therefore not a new phenomenon.

In terms of potential threat to the families of local farm workers in the vicinity of the site, the risk is likely to be low. This is due to the relatively low number of permanent workers residing on local farms in the area. The potential risk is therefore likely to be limited. The risks can also be effectively mitigated by ensuring that the movement of construction workers on and off the site is carefully controlled and managed. However, given the nature of construction projects it is not possible to totally avoid these potential impacts at an individual or family level.

Mr Pieter Erasmus of Beskuitfontein indicated that lower skilled construction labourers should not be accommodated on-site. Mr Erasmus recommended that the as in the case of the Noupoort WEF and N9 construction projects, labourers should be accommodated either in Noupoort or Middelburg. The key concerns relate to security and potential negative dynamics with local farm labourers living on farms in the study area.

While the risks associated with construction workers at a community level will be low, at an individual and family level they may be significant, especially in the case of contracting a sexually transmitted disease or an unplanned pregnancy. However,

it will not be possible to avoid this. This potential risk should also be viewed within the context of the socio-economic benefits associated with the creation of employment opportunities for locals.

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

Impact Phase: Construction							
Potential impact description: Potential impacts on family structures and social networks associated with the presence of construction workers							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation/ Enhancement	M	L	M	Negative	Medium	M	High
With Mitigation/ Enhancement	M	L	L	Negative	Low	M	High
Can the impact be reversed?			Yes: By not implementing the project				
Will impact cause irreplaceable loss or resources?			Unlikely at a community level				
Can impact be avoided, managed, enhanced and or mitigated?			Yes, see measures below.				

Assessment of No Go option
There is no impact as the current status quo would be maintained. The potential positive impacts on the local economy associated with creation of employment opportunities for local community members would be forgone.

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

- Where possible the proponent should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically for semi and low-skilled job categories;
- The proponent should consider the need for 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 the ULM and IYLM, farmers and the contractor(s). The MF should also be briefed on the potential risks to the local community and farm workers 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 contractor (s) should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase;
- The contractor should provide transport to and from the site on a daily basis for low and semi-skilled construction workers. This will enable the contractor to

effectively manage and monitor the movement of construction workers on and off the site;
- Where necessary, the contractors should make the necessary arrangements to enable low and semi-skilled workers from outside the area to return home over weekends and/ or on a regular basis. This would reduce the risk posed to local family structures and social networks;
- 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.

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

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

However, the findings of the SIA indicate that potential for economically motivated in-migration and subsequent labour stranding in the area linked to the proposed project is likely to be low. This is due to the isolated location of the town of Noupoort and the limited economic opportunities in the town, coupled with the short duration of the construction phase (2 years). The risks associated with job seekers moving to the area staying on in Noupoort are therefore likely to be low and are likely to be limited the construction phase.

Table 4.4: Assessment of impact of job seekers on local communities associated with the construction phase

Impact Phase: Construction							
Potential impact description: Potential impacts on family structures, social networks and community services associated with the influx of job seekers							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation/ Enhancement	M	L	L	Negative	Low	M	Medium
With Mitigation/ Enhancement	M	L	L	Negative	Low	M	Medium
Can the impact be reversed?			Yes: By not implementing the project				
Will impact cause irreplaceable loss or resources?			Unlikely at a community level				
Can impact be avoided, managed, enhanced and or mitigated?			Yes, see measures below.				

Assessment of No Go option
There is no impact as the current status quo would be maintained.

Recommended mitigation measures
It is not possible to prevent job seekers from coming to the area in search of a job. However, as indicated above, the potential influx of job seekers to the area as a result of the proposed WEF is likely to be low. In addition:

- 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 and or in the local towns in the area (except for local residents).

4.3.4 Risk to safety, livestock, farm infrastructure and farming operations

The presence on and movement of construction workers on and off the site may pose a potential safety threat to local famer's and farm workers in the vicinity of the site threat. In addition, farm infrastructure, such as fences and gates, may be damaged and stock losses may also result from gates being left open and/or fences being damaged or stock theft linked either directly or indirectly to the presence of farm workers on the site. The local farmers in the area interviewed indicated that the presence of construction workers on the site increased the exposure of their farming operations and livestock to the outside world, which, in turn, increased the potential risk of stock theft and crime. The findings of the SIA indicate that stock theft is not currently regarded as a key concern. However, most of the farms in the study area carry small stock and are therefore vulnerable. The farms located closest to Noupoort are at greatest risk.

The local farmers interviewed did, however, indicate that the potential risks (safety, livestock and farm infrastructure) can be effectively mitigated by careful planning and managing the movement of construction on the site workers during the construction phase.

Table 4.4: Assessment of risk to safety, livestock, infrastructure and farming operations

Impact Phase: Construction							
Potential impact description: Potential risk to safety of farmers and farm workers, livestock and damage to farm infrastructure associated with the movement of construction workers on and to the site							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation/ Enhancement	M	L	M	Negative	Medium	M	High
With Mitigation/ Enhancement	M	L	L	Negative	Low	M	High
Can the impact be reversed?			Yes: By repairing damage and compensating for stock losses etc.				
Will impact cause irreplaceable loss or resources?			No				
Can impact be avoided, managed, enhanced and or mitigated?			Yes, see measures below.				

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 enter into an agreement with the local farmers in the area whereby damages to farm property etc. during the construction phase proven to be associated with the construction activities for the WEF will be compensated for. The agreement should be signed before the construction phase commences;
- Contractors appointed by the proponent should provide daily transport for workers to and from the site. This would reduce the potential risk of trespassing on the remainder of the farm and adjacent properties;
- The proponent should consider the option of establishing a MF (see above) that includes local farmers and develop a Code of Conduct for construction workers. This committee should be established prior to commencement of the construction phase. The Code of Conduct should be signed by the proponent and the contractors before the contractors move onto site;
- The proponent should hold contractors liable for compensating farmers 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 Programme (EMP) should 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 trespassing, stealing livestock and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of

Conduct. All dismissals must be in accordance with South African labour legislation;
- The housing of construction workers on the site should be limited to security personnel.

4.3.5 Increased fire risk

The presence of construction workers and construction-related activities on the site poses an increased fire risk, which could, in turn, pose a threat to crops, livestock, and farmsteads in the area. In the process, farm infrastructure may also be damaged or destroyed and human lives threatened. Grass fires would pose a threat to grazing and livestock, which in turn, would have a significant impact on the livelihoods of local farmers who are affected.

While the grass component is likely to recover relatively quickly, the bossiesveld component would take much longer. The bossiesveld component is crucial to year-round grazing as it provides nutritious winter fodder. According to interviewees, veld fires are currently rare (Gillmer, pers. comm). However, the owners on Beskuitfontein indicated that their property is regularly at risk from fires originating on the Municipal owned site farm Hartebeeshoek (Pieter and Stefan Erasmus, pers. comm). The potential fire risk of grass fires is highest towards the end of the winter months (October-November). This period also coincides with dry, windy conditions in the area.

Table 4.5: Assessment of impact of increased risk of fires

Impact Phase: Construction							
Potential impact description: Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of grass fires							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation/ Enhancement	M	L	M	Negative	Medium	M	High
With Mitigation/ Enhancement	M	L	L	Negative	Low	M	High
Can the impact be reversed?			Yes: By repairing damage and compensating for damages and losses				
Will impact cause irreplaceable loss or resources?			No				
Can impact be avoided, managed, enhanced and or mitigated?			Yes, see measures below.				

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 losses associated with fires that can be proven to be associated with the construction activities for the WEF will be compensated for. The agreement should be signed before the construction phase commences;

- Contractor should ensure that open fires on the site for cooking or heating are not allowed except in designated areas;
- No smoking should be permitted on site, except in designated areas;
- Contractor should ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced. Measures to reduce the risk of fires include avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high risk dry, windy summer months;
- Contractor to provide adequate fire-fighting equipment on-site;
- Contractor to provide fire-fighting training to selected construction staff;
- No construction staff, with the exception of security staff, to be accommodated on site over night;
- As per the conditions of the Code of Conduct, in the event of a fire proven to be caused by construction workers and or construction activities, the appointed contractors must compensate farmers for any damage caused to their farms. The contractor should also compensate the fire-fighting costs borne by farmers and local authorities.

4.3.6 Impacts associated with construction vehicles

The movement of heavy construction vehicles during the construction phase has the potential to damage local farm roads and create dust and safety impacts for other road users in the area and also impact on farming activities.

At a local site level only one access point is proposed, namely off the Oorlogspoort Road. The proposed entry point is located just inside the western boundary of Holbrook. Existing access points to the Noupoort WEF are located 300m to the west and 1km to the east of the San Kraal access point, also off the Oorlogspoort Road. Construction traffic would mainly impact on users of the road located to its east of the access point. As indicated, many of the properties are inhabited. Interviewees have however indicated that experience from the construction of the Noupoort WEF had been largely positive, with acceptable waiting periods, and the road timeously upgraded, and repaired to good condition after construction (van der Walt, Huyssteen, pers. comm).

At a broader regional level, the N9 via the N10 provides a key link between Port Elizabeth and the N1. This route is also an important route for holiday makers and visitors to the coast. The transport of components of the WEF to the site therefore has the potential to impact on other road users travelling along these roads, including tourists. Measures will need to be taken to ensure that the potential impact on motorist using these roads is minimised. The potential impacts on tourists and locals can be effectively mitigated by restricting construction traffic movements to weekdays, and, where possible, limiting activities during over holiday periods, specifically Christmas and Easter holiday periods and other long weekends.

Experience from other projects also indicates that the transportation of construction workers to and from the site can result in the generation of waste along the route (packaging and bottles etc. thrown out of windows etc.)

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

Impact Phase: Construction							
Potential impact description: Potential dust and safety impacts and damage to road surfaces associated with movement of construction related traffic to and from the site							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation/ Enhancement	M	L	M	Negative	Medium	M	High
With Mitigation/ Enhancement	M	L	L	Negative	Low	M	High
Can the impact be reversed?			Yes, by rehabilitating disturbed areas				
Will impact cause irreplaceable loss or resources?			No				
Can impact be avoided, managed, enhanced and or mitigated?			Yes, see measures below.				

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:

- As far as possible, the transport of components to the site along the N10 and N9 should be planned to avoid weekends and holiday periods;
- The contractor should inform local farmers and representatives from the ULM and IYLM Tourism of dates and times when abnormal loads will be undertaken;
- The contractor must ensure that damage caused by construction related traffic to internal farm roads is repaired on a regular basis throughout the construction phase. The costs associated with the repair must be borne by the contractor;
- Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis, adhering to speed limits and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers;
- All vehicles must be road-worthy and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits;
- The Contractor should ensure that workers are informed that no waste can be thrown out of the windows while being transported to and from the site. Workers who throw waste out windows should be fined;
- The Contractor should be required to collect waste along the road reserve on a weekly basis;
- Waste generated during the construction phase should be transported to the local landfill site.
- EMP measures (and penalties) should be implemented to ensure farm gates are closed at all times;
- EMP measures (and penalties) should be implemented to ensure speed limits are adhered to at all times.

4.3.7 Impacts associated with loss of farmland

Activities such as the establishment of access roads, the movement of heavy vehicles, the establishment of lay-down areas and foundations for the wind turbines, as well as the establishment of substations and power lines will potentially damage topsoil and vegetation. The findings of the SIA indicate that the proposed turbines are located on hills and elevated areas on the site properties that are considered of low agricultural potemtial. The proposed turbine locations are therefore acceptable to all site owners from a land use point of view.

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

Impact Phase: Construction							
Potential impact description: 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 WEFs and power lines will damage farmlands and result in a loss of farmlands for grazing.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation/ Enhancement	M	L	L	Negative	Low	M	High
With Mitigation/ Enhancement	M	L	L	Negative	Low	M	High
Can the impact be reversed?			Yes, by rehabilitating disturbed areas				
Will impact cause irreplaceable loss or resources?			No				
Can impact be avoided, managed, enhanced and or mitigated?			Yes, see measures below.				

Assessment of No-Go option

There would be no impact as the current status quo is maintained. Potential negative impacts on local soils and vegetation would be avoided.

Recommended mitigation measures

With mitigation, the potential impacts on farming activities and livelihoods as a result of damage to and loss of farmland are assessed to be of low significance due to the relatively small portions of arable land likely to be affected. Impacts may be further reduced by the implementation of the following mitigation measures:

- The location of wind turbines, access roads, laydown areas etc. should be informed by the findings of the soil and vegetation study. In this regard areas of high potential agricultural and sensitive vegetation soils should be avoided;
- The developer should consult with affected property owners in order to enable them to factor construction activities into their farming schedules;
- The location of wind turbines, access roads, laydown areas etc. should be discussed with the locally affected landowner in the finalisation process and inputs provided should be implemented in the layout as best as possible;
- The footprint areas for the establishment of individual wind turbines should be clearly demarcated prior to commencement of construction activities. All

construction related activities should be confined to the demarcated area and minimised where possible;
- 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 rehabilitation plan should be informed by input from the soil scientist and discussed with the local farmer;
- The implementation of a rehabilitation programme should be included in the terms of reference for the contractor/s appointed. The specifications for the rehabilitation programme should be drawn up the Environmental Consultants appointed to undertake the EIA;
- The implementation of the Rehabilitation Programme should be monitored by the ECO;
- All workers should receive training/ briefing on the reasons for and importance of not driving in undesignated areas;
- EMP measures (and penalties) should be implemented to strictly limit all vehicle traffic to designated roads and construction areas. Under no circumstances should vehicles be allowed to drive into the veld;
- Disturbance footprints should be reduced to the minimum.
- Compensation should be paid by the developer to farmers that suffer a permanent loss of land due to the establishment of the WEF. Compensation should be based on accepted land values for the area.

4.4 OPERATIONAL PHASE SOCIAL IMPACTS

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

Potential positive impacts
- Establishment of renewable energy infrastructure;
- 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;
- Benefits for affected landowners.

Potential negative impacts
- The visual impacts and associated impact on sense of place;
- Impact on tourism.
- Impact on property values;

4.4.1 Development of renewable energy infrastructure

The establishment of renewable energy infrastructure, such as the proposed WEF, 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 carbon dioxide (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 greenhouse gases (GHG) associated with the construction phase are offset within a very short period of time compared with the project's lifespan. Wind power therefore provides an ideal means for reaching emission reduction targets in a relatively easy manner. In addition, and of specific relevance to South Africa, wind as energy source is not dependent on water (as compared to the massive water requirements of conventional power stations), has a limited footprint and therefore does not impact on large tracts of land, poses limited pollution and health risks, specifically when compared to coal and nuclear energy plants.

The Greenpeace Report (powering the future: Renewable Energy Roll-out in South Africa, 2013), notes that within a broader context of climate change, coal energy does not only have environmental impacts, it also has socio-economic impacts. Acid mine drainage from abandoned mines in South Africa impacts on water quality and poses the biggest threat to the country's limited water resources. Huge volumes of water are also required to wash coal and cool operating power stations. Eskom uses an estimated 10 000 litres of water per second due to its dependency on coal (Greenpeace, 2012).

Benefits associated with REIPPPP

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

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

The report notes that for a programme of this magnitude, with construction procurement spend alone estimated at R73 billion, the result is a substantial stimulus for establishing local manufacturing capacity. The report also notes that the strategy

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

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

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 addresses the environmental issues associated with climate change and consumption of scarce water resources, but also creates significant socio-economic opportunities and benefits, specifically for historically disadvantaged, rural communities.

Table 4.8: Implementation of clean, renewable energy infrastructure

Impact Phase: Operational							
Potential impact description: Development of infrastructure to generate clean, renewable energy							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation/ Enhancement	M	H	M	Positive	Medium	M	High
With Mitigation/ Enhancement	M	H	H	Positive	High	H	High
Can the impact be reversed?			Yes, by removing infrastructure				
Will impact cause irreplaceable loss or resources?			No				
Can impact be avoided, managed, enhanced and or mitigated?			Yes, see measures below.				

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

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

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

- Implement a skills development and training programme aimed at maximizing the number of employment opportunities for local community members;
- Maximise opportunities for local content, procurement and community shareholding;
- Establish a visitor centre. As indicated in the literature review, visitor centers in Scotland have attracted large numbers of visitors to wind farms.

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

Based on information from other wind projects the establishment of a 390 MW WEF would create ~ 30 employment opportunities for over a 20 year period. Of this total approximately 18 will be low skilled, 9 semi-skilled and 3 high skilled positions. The annual wage bill for the operational phase would be ~ R 3 million (2017 Rand values). The majority of employment opportunities associated with the operational phase is likely to benefit HD members of the community. 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 employment and skills development contained in the ULM and IYLM. However, the total number of employment opportunities is limited to ~ 20.

A percentage of permanent employees who are not locally based may purchase houses in one of the local towns in the area, such as Noupoort, Colseburg and Middleburg, while others may decide to rent. Both options would represent a positive economic benefit for the region. In addition, a percentage of the monthly wage bill earned by permanent staff would be spent in the regional and local economy. 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.

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

The establishment of WEFs, such as the proposed WEF, also supports the development of a green energy manufacturing sector in South Africa. Manufacturing segments with high employment potential in the long term would include suppliers of components for wind farms, such as Gestamp in Atlantis. The Green Jobs study (2011) found that South Africa is in a position to leverage upon some of its existing

manufacturing capacities in order to produce components and parts for 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 establishment of WEFs, such as the proposed WEF, would therefore contribute to achieving this critical mass.

The study also found that there was also significant potential for local involvement in the wind sector. 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 4.9: Impact assessment of employment and business creation opportunities

Impact Phase: Operational							
Potential impact description: Creation of employment and business opportunities associated with the operational phase							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation/ Enhancement	M	M	L	Positive	Low	M	High
With Mitigation/ Enhancement	M	M	M	Positive	Medium	High	High
Can the impact be reversed?			Yes, by removing project				
Will impact cause irreplaceable loss or resources?			No				
Can impact be avoided, managed, enhanced and or mitigated?			Yes, see measures below.				

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. In addition:

- The proponent should implement a training and skills development programme for locals during the first 5 years of the operational phase. The aim of the programme should be to maximise the number of South African's and locals employed during the operational phase of the project;
- The proponent, in consultation with the ULM and IYLM, should investigate the options for the establishment of a Community Development Trust (see below).

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 WEF plant can be used to support a number of social and economic initiatives in the area, including:

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

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

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

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

In addition to the benefits for local communities, the establishment of a WEF has a limited impact on the current agricultural land uses that underpin the local economic activities in the area and does consume negligible volumes of water during the operational phase. Based on the findings of the review it is clear that the

establishment of Community Trusts associated with renewable energy projects have the potential to create significant benefits for local rural communities. However, Community Trusts can also be mismanaged. This is an issue that will need to be addressed when setting up the trust.

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

Impact Phase: Operational							
Potential impact description: Establishment of a community trust funded by revenue generated from the sale of energy. The revenue can be used to fund local community development							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation/ Enhancement	M	H	M	Positive	Medium	M	High
With Mitigation/ Enhancement[27]	M	H	H	Positive	High	H	High
Can the impact be reversed?			Yes, by not implementing project				
Will impact cause irreplaceable loss or resources?			No				
Can impact be avoided, managed, enhanced and or mitigated?			Yes, see measures below.				

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.

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 ULM and IYLM should be consulted as to the structure and identification of potential trustees to sit on the Trust. The key departments in the ULM and IYLM 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 WEF.

4.4.4 Generate income for affected landowners

The proponent has entered into rental agreements with the affected landowners for the use of the land for the establishment of the proposed WEF. In terms of the rental agreement the affected landowner(s) will be paid an annual amount dependent upon the number of wind turbines located on the property. Based on the findings of the SIA the area is prone to droughts and farming operations can be challenging. Any additional source of income therefore represents a significant benefit for the affected

[27] Assumes effective management of Community Trust

landowner(s). The additional income reduces the risks to their livelihoods posed by droughts and fluctuating market prices for sheep and farming inputs, such as fuel, feed etc.

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

Impact Phase: Operational							
Potential impact description: 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.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation/ Enhancement	M	M	L	Positive	Low	M	High
With Mitigation/ Enhancement	M	M	M	Positive	Medium	High	High
Can the impact be reversed?			Yes, by not implementing agreements				
Will impact cause irreplaceable loss or resources?			No				
Can impact be avoided, managed, enhanced and or mitigated?			Yes, see measures below.				

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

Recommended enhancement measures
Implement agreements with affected landowners.

4.4.5 Impact on sense of place and rural character of the landscape

The potential visual impact on the areas sense of place and rural character was raised as a concern by a number of key stakeholders interviewed, specifically owners of game farms in the area. The visual impacts were also linked to impact property values. The impact on property values is discussed in more detail in Section 4.4.5.

The VIA undertaken by SiVEST (September 2017) notes that the visual impacts associated with the proposed WEF were not significant enough to prevent the project from proceeding. From a visual impact perspective, only two visually sensitive receptors with tourism significance were identified within the study area, namely The Dairy B&B and the Carlton Heights Lodge[28]. The visual impact of the proposed development on the sensitive visual receptor locations identified was rated as being **Moderate Negative.** In addition a total number of twenty-one potentially sensitive visual receptors were also identified. These included scattered farmsteads / homesteads which accommodate local farmers and farm workers. The VIA notes that these dwellings were regarded as potentially sensitive visual receptors as they are located within a mostly rural setting and the proposed development will likely alter natural vistas experienced from these dwellings. The VIA found that the proposed

[28] The owner of The Dairy has indicated that some of her guests consider the existing turbines a positive draw card (van Huyssteen, pers. comm).

WEF would have a **Moderate Negative** visual impact on five of the potentially sensitive visual receptor locations, a **Low Negative** visual impact on twelve of the potentially sensitive visual receptors, and a **Negligible** visual impact on four of the potentially sensitive receptors. Based on these findings the VIA concludes that the visual impacts associated with the construction and operation phases of the proposed WEF can be mitigated to acceptable levels provided the recommended mitigation measures are implemented.

Based on the findings of the SIA none of the affected land owners interviewed raised concerns with regard to the proposed turbine locations. As indicated, the proposed turbine locations would affect hills and elevated areas on the site properties, considered too steep to farm effectively. Turbine locations are therefore acceptable to all site owners from a land use point of view.

Farm yards on 13 properties would be located within 8 km of the nearest proposed turbines. With the exception of Arbeidsgenot and Blydefontein, the nearest proposed San Kraal turbine locations are closer to farm yards than existing turbines on the Noupoort WEF. Of the relevant 13 San Kraal properties, 8 are permanently inhabited. The closest proposed turbine locations to inhabited farmsteads are on Holbrook (1.3 km) and Beskuitfontein (2.5 km). In both instances, the turbines would be located on the higher-lying, more inaccessible portions of the properties.

The nearest turbines would be located between 8.3 km and 5.2 km from Noupoort. The nearest turbine would be located 5.2 km from the south-eastern edge of Noupoort (Tshishibi St). The nearest Noupoort WEF turbines are located within a distance of 4.5 to 6.1 km, i.e. comparable or slightly closer than the proposed San Kraal turbines. The Noupoort WEF is clearly visible from Noupoort. Many interviewees have indicated that they now consider the Noupoort WEF as part of Noupoort's sense of place.

At least 6 accommodation facilities in Noupoort town would be within an 8-km radius of turbines. In addition, three guest farm operations are also based within 8 km of the site, namely The Dairy (Arbeidsgenot Farm), Carlton Heights Lodge (Vlakfontein), and Sherbourne (Wolwekop). As was indicated, the Noupoort tourism sector is largely geared towards passing traffic and long-stay accommodation, and has been perceptibly stimulated by large construction projects in the area. In addition, the owner of The Dairy has indicated that some of her guests consider the existing turbines a positive draw card (van Huyssteen, pers. comm).

The nearest turbines would be located 5.3 km and 7.6 km from the N9 and N10, respectively. The nearest turbines on the Noupoort site are currently located 4.5 km and 16.5 km from the N9 and N10, respectively. The N9 is already affected by rail and electricity corridors, while the relevant portion of the N10 is not. The telecommunication infrastructure on Carlton Hills is however visible from this stretch of the N10.

The nearest proposed turbine to the Oorlogspoort road would be 500 m to the south. As indicated, Noupoort WEF turbines are clearly visible from this portion of the road. The nearest existing turbine is located 250 m from the road. Existing and proposed turbines are likely to create the effect of one large singe wind farm.

Apart from the owners of Merinodale and Landia, none of the local landowners interviewed raised concerns with regard to the potential visibility of turbines and the impact on the areas sense of place. Both Merinodale and Landia are located 14 km

south-west from the nearest turbine placements and are therefore unlikely to be impacted. The concerns raised by the owners of Merinodale (Mr Barnard) and Landia (Mr Miller) relate to the transmission lines and not the wind turbines. However, in both instances the proposed infrastructure is unlikely to be visible to any significant extent on either of the properties.

Comment on findings of the VIA

The findings of the SIA indicate that while certain stakeholders raised concerns about the potential visual impacts associated with the proposed WEF, others indicated that they did not regard the potential visual impacts as problematic. This highlights the nature of social impacts, namely that they can differ from person to person. As such two assessment tables have been provided. The first table is based on the findings of the VIA. The second assessment table reflects the position of the stakeholders who indicated that the proposed wind turbines would not have high negative impact.

Table 4.12: Assessment of visual impact based on findings of VIA

Impact Phase: Operational							
Potential impact description: Visual impact associated with the proposed WEF and the potential impact on the areas rural sense of place.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation/ Enhancement	M	M	M	Negative	Medium	M	Medium
With Mitigation/ Enhancement	M	M	M-L	Negative	Medium	M	Medium
Can the impact be reversed?			Yes, by removing turbines				
Will impact cause irreplaceable loss or resources?			No				
Can impact be avoided, managed, enhanced and or mitigated?			Yes, see measures below.				

Table 4.13: Assessment of visual impact based on comments from stakeholders who did not identify major concerns

Impact Phase: Operational							
Potential impact description: Visual impact associated with the proposed WEF and the potential impact on the areas rural sense of place.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation/ Enhancement	M	M	M	Negative	Medium	M	Medium
With Mitigation/ Enhancement	M	M	L	Negative	Low	M	Medium
Can the impact be reversed?			Yes, by removing turbines				
Will impact cause irreplaceable loss or resources?			No				
Can impact be avoided, managed, enhanced and or mitigated?			Yes, see measures below.				

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

Recommended mitigation measures
The recommendations contained in the VIA should be implemented, specifically the measures aimed at addressing the impact of aviation lights at night.

4.4.6 Potential impact on property values

The potential impact of the proposed WEF on property values has been raised as a concern in other WEF projects. As indicated in Section 2, a literature review was undertaken as part of the SIA. It should be noted that the review does not constitute a property evaluation study and merely seeks to comment on the potential impact of wind farms on property values based on the findings of studies undertaken overseas. The assessment rating is based on the findings of the review.

In total five articles were identified and reviewed namely:

- Stephen Gibbons (April, 2014): Gone with the wind: Valuing the Visual Impacts of Wind turbines through house prices. London School of Economics and Political Sciences & Spatial Economics Research Centre, SERC Discussion Paper 159;
- Review of the Impact of Wind Farms on Property Values, Urbis Pty Ltd (2016): Commissioned by the Office of Environment and Heritage, NSW, Australia;
- Yasin Sunak and Reinhard Madlener (May 2012): The Impact of Wind Farms on Property Values: A Geographically Weighted Hedonic Pricing. School of Business and Economics / E.ON Energy Research Center, RWTH Aachen University. Model Working Paper No. 3/2012;
- Martin D. Heintzelman and Carrie M. Tuttle (March 3, 2011): Values in the Wind: A Hedonic Analysis of Wind Power Facilities. Economics and Financial Studies School of Business, Clarkson University;
- Ben Hoen, Jason P. Brown, Thomas Jackson, Ryan Wiser, Mark Thayer and Peter Cappers (August 2013): A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States. Ernest Orlando Lawrence Berkeley National Laboratory.

The literature reviewed was based on an attempt by the authors of the SIA to identify what appear to be "academically and or scientifically" based studies that have been undertaken by reputable institutions post 2010. However, the literature review does not represent an exhaustive review. The most comprehensive study appears to the study by Gibbons (2014), which found that "averaging over wind farms of all sizes" the price reduction was around 5-6% within 2km, falling to less than 2% between 2 and 4km, and less than 1% by 14km which is at the limit of likely visibility. While the focus of the Gibbons study was on residential properties it does indicate that the larger the distance the less the impact. The findings of the Urbis (2016) study indicate that "wind farms may not significantly impact rural properties used for agricultural purposes".

Based on the outcome of the Urbis study (2016) the authors were of the opinion that wind farms may not significantly impact rural properties used for agricultural purposes. In conclusion, the authors of the Urbis study found that appropriately located wind farms within rural areas, removed from higher density residential areas, are unlikely to have a measurable negative impact on surrounding land values.

Based on this information the potential impact of the proposed WEF on the property values in the area is likely to be low.

Table 4.14: Assessment of potential impact on property values

Impact Phase: Operational							
Potential impact description: Potential impact on property values linked to the visual impact associated with the proposed WEF and the potential impact on the areas rural sense of place.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation/ Enhancement	M	M	M	Negative	Medium	M	Medium
With Mitigation/ Enhancement	M	M	L	Negative	Low	M	Medium
Can the impact be reversed?			Yes, by removing turbines				
Will impact cause irreplaceable loss or resources?			No				
Can impact be avoided, managed, enhanced and or mitigated?			Yes, see measures below.				

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

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

4.4.7 Potential impact on tourism

The potential impact of the proposed WEF on property values has been raised as a concern in other WEF projects. The concerns are typically linked to the visual impacts associated with wind turbines and impact that this would have on visitors and their decision to either visit the area and or return to the area.

The findings of the SIA indicate that Noupoort is not a recognized tourism destination. The local accommodation facilities – at least 6 in Noupoort and 4 on guest farms – mainly cater for overnight travellers and long-stay workers working in the area. Local accommodation facilities have increased and expanded in response to recent construction projects in the area, such as the Noupoort WEF and the upgrading of the N9. Of the three guest farm owners interviewed, none raised concerns about the potential impact on tourism associated with the impact on the proposed WEF on the areas sense of place (Pieter Erasmus, Annatjie Moore, van Huyssteen, pers. comm). The owner of the Diary on Arbeidsgenot also indicated that she considered the existing Noupoort WEF turbines a positive draw card (van Huyssteen, pers. comm).

A review of international literature in the impact of wind farms was also undertaken as part of the SIA (Section 2.6). Three articles were reviewed, namely:

- Atchison, (April, 2012). Tourism Impact of Wind Farms: Submitted to Renewables Inquiry Scottish Government. University of Edinburgh
- Glasgow Caledonian University (2008). The economic impacts of wind farms on Scottish tourism. A report prepared for the Scottish Government

- Regeneris Consulting (2014). Study into the Potential Economic Impact of Wind Farms and Associated Grid Infrastructure on the Welsh Tourism Sector

The research by Aitchison (2012) found that that previous research from other areas of the UK has demonstrated that wind farms are very unlikely to have any adverse impact on tourist numbers (volume), tourist expenditure (value) or tourism experience (satisfaction) (Glasgow Caledonian University, 2008; University of the West of England, 2004). In addition, to date, there is no evidence to demonstrate that any wind farm development in the UK or overseas has resulted in any adverse impact on tourism. In conclusion, the findings from both primary and secondary research relating to the actual and potential tourism impact of wind farms indicate that there will be neither an overall decline in the number of tourists visiting an area nor any overall financial loss in tourism-related earnings as a result of a wind farm development.

In addition, all of the studies that have sought to predict impact have demonstrated that any negative impact of wind farms on tourism will be more than outweighed by the increase in tourists that are attracted by wind farms, by the increase in employment brought about by the development of wind farms and/or by the continuing growth of tourism. The study by the Glasgow Caledonian University (2008) found that only a negligible fraction of tourists will change their decision whether to return to Scotland as a whole because they have seen a wind farm during their visit. The study also found that 51.0% of respondents indicated that they thought wind farms could be tourist attractions. In this regard the visitor centre at the Whitelee Wind Farm in east Ayrshire Scotland run by ScottishPower Renewables has become one of the most popular 'eco-attractions' in Scotland, receiving 200 000 visitors since it opened in 2009.

The study by Regeneris Consulting (2014) found that there was no evidence that wind farms would deter tourists from traveling along designated visitor or tourists routes. The study indicated that small minorities of visitors would be encouraged, whilst others would be discouraged. Overall, however, there was no evidence to suggest that there would be any significant change in visitor numbers using these routes to reach destination elsewhere. The study also found that in more sensitive locations the potential negative effect on visitor numbers may still be low overall, but in some circumstances could be moderate. The greatest concern exists amongst areas and businesses closest to wind farms and appealing to visitor markets most sensitive to changes in landscape quality.

Based on the findings of the literature review there is limited evidence to suggest that the proposed West WEF would impact on the tourism in the ULM and IYLM. The findings also indicate that wind farms do not impact on tourist routes.

Table 4.15: Impact on tourism in the region

Impact Phase: Operational							
Potential impact description: Potential impact of the WEF on local tourism							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation/ Enhancement	M	M	L	Negative	Low	M	High
With Mitigation/ Enhancement	M	M	L	Negative	Low	M	High
Can the impact be reversed?			Yes, by removing turbines				
Will impact cause irreplaceable loss or resources?			No				
Can impact be avoided, managed, enhanced and or mitigated?			Yes, see measures below.				

Assessment of No-Go option

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

Recommended mitigation/ enhancement measures

- The recommendations contained in the VIA should be implemented;
- The proponent should consider the establishment of a visitor center should the proposed WEF be approved.

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. The number of people employed during the operational phase will be in the region of 20. Given the relatively low number of people employed during the operational phase the decommissioning of the facility is unlikely to have a significant negative social impact on the local community. The potential impacts associated with the decommissioning phase can also be effectively managed with the implementation of a retrenchment and downscaling programme.

The decommissioning phase will also create employment opportunities. This will represent a positive impact. These jobs will, however, be temporary.

Table 4.16: Impacts associated with decommissioning

Impact Phase: Decommissioning							
Potential impact description: social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation/ Enhancement	M	M	M	Negative	Medium	M	High
With Mitigation/ Enhancement	M	L	L	Negative	Low	M	High
Can the impact be reversed?			Yes, by removing turbines				
Will impact cause irreplaceable loss or resources?			No				
Can impact be avoided, managed, enhanced and or mitigated?			Yes, see measures below.				

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

Recommended mitigation measures
The following mitigation measures are recommended:

- The proponent should ensure that retrenchment packages are provided for all staff retrenched when the WEF is decommissioned.
- All structures and infrastructure associated with the proposed facility should be dismantled and transported off-site on decommissioning;
- The proponent should investigate the option of establishing an Environmental Rehabilitation Trust Fund to cover the costs of decommissioning and rehabilitation of disturbed areas. The Trust Fund should be funded by a percentage of the revenue generated from the sale of energy to the national grid over the 20 year operational life of the facility. The rationale for the establishment of a Rehabilitation Trust Fund is linked to the experiences with the mining sector in South Africa and failure of many mining companies to allocate sufficient funds during the operational phase to cover the costs of rehabilitation and closure. Alternatively, the funds from the sale of the WEF as scrap metal should be allocated to the rehabilitation of the site.

4.6 POTENTIAL HEALTH IMPACTS

The potential health impacts typically associated with WEFs include, noise, shadow flicker and electromagnetic radiation. The findings of a literature review undertaken by the Australian Health and Medical Research Council published in July 2010 indicate that there is no evidence of wind farms posing a threat to human health. The research also found that wind energy is associated with fewer health effects than other forms of traditional energy generation, and may therefore in fact result in the minimization of adverse health impacts for the population as a whole (WHO, 2004).

4.7 CUMULATIVE IMPACT ON SENSE OF PLACE

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. The key concerns in terms of cumulative impacts are 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. The relevant issues raised by the Scottish Natural Heritage Report include:

- Combined visibility (whether two or more wind farms will be visible from one location).
- Sequential visibility (e.g. the effect of seeing two or more wind farms along a single journey, e.g. road or walking trail).
- The visual compatibility of different wind farms 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 at a time, but if each successive stretch of the road is dominated by views of a wind farm, then that can be argued to be a cumulative visual impact (National Wind Farm Development Guidelines, DRAFT - July 2010).

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

Based on information provided by Arcus there are eleven approved renewable energy projects located within a 35 km radius of the site. These include 3 wind and 8 solar energy projects. It would appear that only one wind farm, the Mainstream Noupoort WEF, and two solar projects, have been established to date. The remaining sites have not been developed as yet.

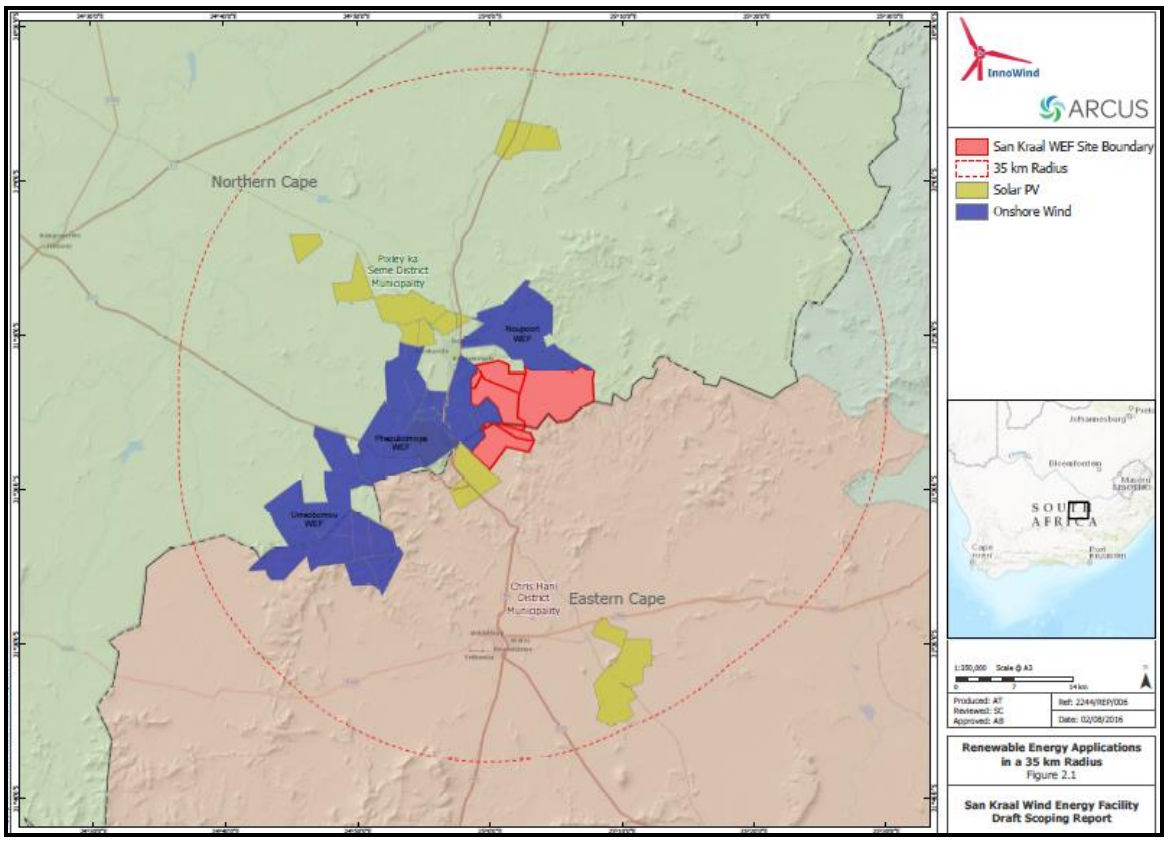


Figure 4.1: Location of renewable energy projects within 35 km radius of site

There is therefore the potential for cumulative visual impacts linked to combined visibility (whether two or more wind / solar farms will be visible from one location), and sequential visibility (e.g. the effect of seeing two or more wind / solar farms along a single journey, e.g. road or walking trail), and the potential loss of a characteristic element, namely a relatively undisturbed Karoo type landscape.

However, as indicated above, a number of stakeholders interviewed indicated that they were not concerned about the potential visual impacts associated with the proposed WEF and the associated impact on the areas sense of place. In this regard some stakeholders viewed the turbines associated with the existing Noupoort WEF in a positive manner. This will also have implications for the perceptions of different people towards to the nature and significance of the cumulative impacts associated with wind and solar farms on the areas sense of place.

However, the potential impact of wind energy facilities on the landscape is an issue that does need to be considered, specifically given South African's strong attachment to the land and the growing number of wind facility applications. With regard to the area, a number of WEFs have been proposed in the Northern and Eastern Cape Province. The Environmental Authorities should therefore be aware of the potential cumulative impacts when evaluating applications and the potential implications for other land uses, specifically game farming and associated tourist activities.

The findings of the VIA (Sivest, September 2017) indicate that the cumulative impacts are not significant enough to prevent the WEF from being approved.

Based on the findings of the SIA and the VIA the overall cumulative impact of the areas sense of place does not represent a fatal flaw for the proposed WEF.

Table 4.17: Cumulative impacts on sense of place and the landscape[29]

Impact Phase: Operational							
Potential impact description: Cumulative visual impact associated with the establishment of a WEF on the on the areas rural sense of place and character of the landscape							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation/ Enhancement	M	H	M	Negative	Medium	M	Medium
With Mitigation/ Enhancement	M	M	M	Negative	Medium	M	Medium
Can the impact be reversed?			Yes, by removing turbines				
Will impact cause irreplaceable loss or resources?			No				
Can impact be avoided, managed, enhanced and or mitigated?			Yes, see measures below.				

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

Recommended mitigation measures
- The final placement of wind turbines associated with the proposed WEF should be discussed with the affected landowners;
- The recommendations of the VIA should be implemented;

4.8 CUMULATIVE IMPACT ON LOCAL SERVICES AND ACCOMMODATION

The establishment of the proposed WEF and the other renewable energy facilities in the ULM and IYLM may place pressure on local services, specifically medical, education and accommodation facilities. This pressure will be associated with the influx of workers to the area associated with the construction and operational phases of renewable energy projects proposed in the area, including the proposed WEF. The potential impact on local services can be mitigated by employing local community members. The presence of non-local workers during both the construction and operation phase will also place pressure on property prices and rentals. As a result, local residents, such as government officials, such as municipal workers, school teachers, and the police, may no longer be able to buy or afford to rent accommodation in towns such as Noupoort, Colesburg and Middelburg. Experience from other renewable energy projects indicates that inflationary pressure is placed on rental prices in local towns during the construction phase.

However, as indicated below, the potential impacts 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. These

[29] Based on findings of the VIA

benefits will create opportunities for investment in Noupoort, Colesburg and Middelburg, including the opportunity to up-grade and expand existing services and the construction of new houses. In this regard the establishment of a renewable energy will create an opportunity for economic development in the area.

The Community Trusts associated with each project will also generate revenue that can be used by the ULM and IYLM in consultation with the Northern and Eastern Cape 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 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 ULM and IYLM.

Table 4.18: Cumulative impacts on local services

Impact Phase: Operational							
Potential impact description: The establishment of a number of renewable energy facilities has the potential to place pressure on local services, specifically medical, education and accommodation							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation/ Enhancement	M	L	L	Negative	Low	M	Medium
With Mitigation/ Enhancement	M	L	L	Negative	Low	M	Medium
Can the impact be reversed?			Yes, by implementing effective mitigation				
Will impact cause irreplaceable loss or resources?			No				
Can impact be avoided, managed, enhanced and or mitigated?			Yes, see measures below.				

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

Recommended mitigation measures
The Northern and Eastern Cape Provincial Government, in consultation with the ULM and IYLM and the proponents involved in the development renewable energy projects in the ULM and IYLM area 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 ULM and IYLM.

4.9 CUMULATIVE IMPACT ON LOCAL ECONOMY

In addition to the potential negative impacts, the establishment of the proposed WEF and other renewable energy facilities in the area has the potential to result in significant positive cumulative socio-economic opportunities for the region, which, in turn, will result in a positive social benefit. As indicated above, there are a large number of renewable energy projects proposed in the study area. The positive cumulative impacts include creation of employment, skills development and training opportunities, and downstream business opportunities. The Community Trusts associated with each project will also create significant socio-economic benefits.

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

The potential cumulative benefits for the local and regional economy are therefore associated with both the construction and operational phase of renewable energy projects and extend over a period of 20-25 years.

Table 4.19: Cumulative impacts on local economy

Impact Phase: Operational							
Potential impact description: The establishment of a number of renewable energy facilities in the region will create employment, skills development and training opportunities, creation of downstream business opportunities.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation/ Enhancement	M	H	M	Positive	Medium	M	High
With Mitigation/ Enhancement	H	H	M	Positive	High	M	High
Can the impact be reversed?			Yes, by not implementing project				
Will impact cause irreplaceable loss or resources?			No				
Can impact be avoided, managed, enhanced and or mitigated?			Yes, see measures below.				

Assessment of No-Go option
There is no impact as it maintains the current status quo. This would represent a lost socio-economic opportunity for the ULM and IYLM.

Recommended mitigation measures
The proposed establishment of suitably sited renewable energy facilities within the ULM and IYLM should be supported.

4.10 ASSESSMENT OF POWER LINE ATERNATIVES

The potential social impacts associated with the power line options are largely linked to visual impacts and the potential impact on the areas sense of place.

The Preferred Alternative is the shortest (~23 km), followed by Alternatives 1 (~25.4 km) and 2 (26.9 km). All three Alternatives are located on land used for grazing, or considered of low agricultural potential. All three Alternatives would affect the same set of five land owners. Alternative 2 would affect an additional owner (Kleinfontein), and an additional property (Edendale). Properties of all the relevant owners form part of either the San Kraal or Phezukomoya WEF sites. The Preferred Alternative would be located within 1km of the yards on De Rust, Vrede and Bergplaas. None of the relevant properties are inhabited. Alternative 1 would be located within 1 km from four farm yards. Of these, only Winterhoek is permanently inhabited. Alternative 2 would be located within 1 km of three farm yards. Of these, only Winterhoek is permanently inhabited. In both instances, the relevant line Alternatives are located to the east of the Winterhoek farm yard, screened from the yard by intervening topography.

Only one concern was raised, namely by Mr Pieter Erasmus of Beskuitfontein. The concern pertains only to Alternative 1, as it would be within the viewshed of the farm access road to Beskuitfontein and adjacent Vlakfontein.

All three Alternatives would cross the N9 and N10. The N9 crossings would affect an area already transformed by rail, road and transmission line infrastructure. The relevant portion of the N10 on the other hand is currently unaffected by rail or transmission line infrastructure. Based on the findings of the SIA the social impacts associated with all three alternatives are likely to be low. However, the Preferred Alternative is supported given that it has the shortest distance.

Table 4.20: Assessment of transmission line alternatives

Impact Phase: Operational Phase							
Potential impact description: The potential social impacts associated with the power line options are largely linked to visual impacts and the potential impact on the areas sense of place.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation/ Enhancement	L	M	L	Negative	Low	M	High
With Mitigation/ Enhancement[30]	L	M	L	Positive	Low	M	High
Can the impact be reversed?			Yes, by removing the transmission lines				
Will impact cause irreplaceable loss or resources?			No				
Can impact be avoided, managed, enhanced and or mitigated?			Yes, see measures below.				

[30] Assumes establishment of a Community Trust that is well managed

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

4.11 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 producer of carbon emissions in the world, this would represent a significant negative social cost.

However, at a provincial and national level, it should be noted that the proposed WEF development is not unique. In this regard, a significant number of other renewable energy developments are currently proposed in the Northern and Eastern Cape and other parts of South Africa. Foregoing the proposed establishment of WEFs would therefore not necessarily compromise the development of renewable energy facilities in the Northern and Eastern Cape Province and or South Africa. However, the socio-economic benefits for local communities in the ULM and IYLM would be forfeited.

Table 4.21: Assessment of no-development option

Impact Phase: No Development Option							
Potential impact description: The no-development option would result in the lost opportunity for South Africa to supplement is current energy needs with clean, renewable energy and a lost opportunity for the towns of Noupoort, Colesburg and Middelburg							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation/ Enhancement	M	H	L	Negative	Medium	M	High
With Mitigation/ Enhancement[31]	H	H	L	Positive	Medium	M	High
Can the impact be reversed?			Yes, by not implementing project				
Will impact cause irreplaceable loss or resources?			No				
Can impact be avoided, managed, enhanced and or mitigated?			Yes, see measures below.				

Recommended enhancement measures
The proposed establishment of suitably sited renewable energy facilities within the ULM and IYLM should be supported.

[31] Assumes establishment of a Community Trust that is well managed

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;
- Semi-structured interviews with interested and affected parties;
- A review of social and economic issues associated with similar developments;
- A review of selected specialist studies undertaken as part of the EIA;
- A review of relevant literature on social and economic impacts;
- The experience of the authors with other wind energy projects in South Africa

5.2 SUMMARY OF KEY FINDINGS

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

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

5.2.1 Policy and planning issues

As indicated in Section 1.6, legislative and policy context plays an important role in identifying and assessing the potential social impacts associated with a proposed development. In this regard a key component of the SIA process is to assess the proposed development in terms of its fit with key planning and policy documents.

The findings of the review indicated that renewable energy is strongly supported at a national, provincial and local level. The development of and investment in renewable energy is supported by the National Development Plan (NDP), New Growth Path Framework and National Infrastructure Plan, which all make reference to renewable energy. At a provincial level the development of renewable energy is supported by the Northern Cape Provincial Growth and Development Strategy and Northern Cape Provincial Spatial Development Framework[32]. The PKSDM IDP also highlights the importance of renewable energy for the area.

However, the provincial and local policy and planning documents also make reference to the importance of tourism and the region's natural resources. Care

[32] The majority of the site is located in the Northern Cape Province. The focus of the review was therefore on the Northern Cape.

therefore needs to be taken to ensure that the siting of renewable energy facilities (including wind farms) does not impact negatively on the areas tourism potential[33].

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 the proposed WEF is expected to extend over a period of 2-year period and create approximately ~ 350 employment opportunities. It is anticipated that approximately 55% (193) of the employment opportunities will be available to low skilled workers (construction labourers, security staff etc.), 30% (105) to semi-skilled workers (drivers, equipment operators etc.) and 15% (52) for skilled personnel (engineers, land surveyors, project managers etc.). The majority of the low and semi-skilled employment opportunities will be available to local residents in the area, specifically residents from Noupoort, Colebsurg and Middelburg. 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. In order to maximise the potential benefits the developer should commit to employing local community members to fill the low and medium skilled jobs.

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

The capital expenditure associated with the construction phase for the proposed 390 MW WEF will be in the region of R 4 billion (2017 Rand value). The total wage bill will be in the region of R 104 million (2017 Rand value). A percentage of the wage bill will be spent in the local economy which will create opportunities for local businesses in the towns of Noupoort, Colebsurg and Middelburg. The sector of the local economy that is most likely to benefit from the proposed development is the local service industry. The potential opportunities for the local service sector would be linked to accommodation, catering, cleaning, transport and security, etc. associated with the construction workers on the site. The benefits to the local economy will be confined to the construction period (2 years).

[33] The findings of the literature review indicate that the impact of wind farms impact on tourism is low to negligible

Potential negative impacts

- Impacts associated with the presence of construction workers on site and in the area;
- Influx of job seekers to the area;
- Increased safety risk to farmers, risk of stock theft and damage to farm infrastructure associated with presence of construction workers on the site;
- Increased risk of grass fires;
- Impact of heavy vehicles, including damage to roads, safety and dust;
- Impact on farming activities.

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

Table 5.1: Summary of impacts associated with construction phase

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 (-)
Increased risks to livestock and farming infrastructure associated with the construction related activities and presence of construction workers on the site	Medium (-)	Low (-)
Increased fire risk	Medium (-)	Low (-)
Impact of heavy vehicles and construction activities	Medium (-)	Low (-)
Impact on farming activities	Medium (-)	Low (-)

5.2.3 Operational phase

The key social issues affecting the operational phase include:

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;
- Benefits associated with the establishment of a Community Trust;
- Benefits for affected landowners.

Development of renewable energy infrastructure

The establishment of renewable energy infrastructure, such as the proposed WEF, should be viewed, firstly within the context of the South Africa's current reliance on

coal powered energy to meet the majority of its energy needs, and secondly, within the context of the success of the REIPPPP.

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

The Green Jobs study (2011) identifies a number of advantages associated with wind power as a source of renewable energy, including zero carbon dioxide (CO_2) emissions during generation and low lifecycle emissions. Greenhouse gases (GHG) associated with the construction phase are offset within a very short period of time compared with the project's lifespan. Wind power therefore provides an ideal means for reaching emission reduction targets in a relatively easy manner. In addition, and of specific relevance to South Africa, wind as energy source is not dependent on water (as compared to the massive water requirements of conventional power stations), has a limited footprint and therefore does not impact on large tracts of land, poses limited pollution and health risks, specifically when compared to coal and nuclear energy plants.

In terms of investment, the REIPPPP has attracted R53.4 billion in foreign investment and financing in the three finalized bid windows. This is more than double the inward FDI attracted into South Africa during 2015 (R22.6 billion). In terms of local equity shareholding, 47% (R31.5 billion) of the total equity shareholding (R66.7 billion) was held by South African's across BW1 to BW4 and BW1S2. As far as Broad Based Black Economic Empowerment is concerned, Black South Africans own, on average, 31% of projects that have reached financial close. The combined (construction and operations) procurement value for BW1 to BW4 and 1S2 is projected as R142.9 billion, of which R44.3 billion has been spent to date. In terms of employment, a total of 28 4842 job years[34] have been created for South African citizens, of which 26 207 were in construction and 2 276 in operations.

The establishment of renewable energy facilities, such as the 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.

Creation of employment and business opportunities

The total number of permanent employment opportunities associated with a 390 MW WEF would be ~ 30. Of this total ~ 18 are low skilled workers, 9 semi-skilled and 3 skilled. The annual wage bill for the operational phase will be ~ R 3 million (2017 Rand value). The majority of the low and semi-skilled beneficiaries are likely to be historically disadvantaged (HD) members of the community. Given the location of the

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

proposed facility the majority of permanent staff is likely to reside in the towns of Noupoort, Colebsurg and Middelburg.

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

Community Trust

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

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

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

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

Potential negative impacts

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

Visual impacts and impact on sense of place
The findings of the Visual Impact Assessment (VIA) (Sivest, September 2017) indicate that the visual impacts associated with the construction and operation phases of the proposed WEF can be mitigated to acceptable levels provided the recommended mitigation measures are implemented. The significance of the visual impact was rated at **Moderate Negative**.

The SIA found that only two of the local landowners initially raised concerns with regard to the proposed San Kraal WEF, specifically with regard to potential visual impacts associated with wind turbines. However, upon investigation it was found that the two landowners had confused the proposed WEF with another proposed WEF, namely the Umsobomvu WEF. This was confirmed by the relevant land owners in subsequent e-mails to the SIA study team. The relevant owners further indicated that the proposed San Kraal WEF turbines would be too distant from their properties to have any significant visual impact.

Impact on property values
The most comprehensive study appears to the study by Gibbons (2014), which found that "averaging over wind farms of all sizes" the price reduction was around 5-6% within 2km, falling to less than 2% between 2 and 4km, and less than 1% by 14km which is at the limit of likely visibility. The findings of the Urbis study (2016) indicate that appropriately located wind farms within rural areas, removed from higher density residential areas, are unlikely to have a measurable negative impact on surrounding land values. Based on this information the potential impact of the proposed WEF on the property values in the area is likely to be low.

Impact on tourism
Based on the findings of the literature review there is limited evidence to suggest that wind farms impact on the tourism. The findings also indicate that wind farms do not impact on tourist routes.

Table 5.2 summarises the significance of the impacts associated with the operational phase.

Table 5.2: Summary of impacts associated with operational phase

Impact	Significance No Mitigation/ Enhancement	Significance With Mitigation/ Enhancement
Promotion of renewable energy projects	High (-)	High (+)
Creation of employment and business opportunities	Medium (+)	Moderate (+)
Establishment of Community Trust	Medium (+)	High (+)
Benefits for local affected landowners	Low (+)	Medium (+)
Visual impact and impact on sense of place[35]	Medium-High (-) Low (-)	Medium (-) Low (-)
Impact on property values[36]	Low (-)	Low (-)
Impact on tourism[37]	Low (- and +)	Low (- and +)

[35] Ratings reflect findings of VIA (Medium-High Negative) and findings of stakeholders interviewed that do not regard wind farm as a having a negative visual impact (Low Negative).
[36] The rating applies to the impact on property prices in the broader area.
[37] The rating applies to the impact on tourism in the broader area.

5.2.4 Assessment of cumulative impacts

Cumulative impact on sense of place
Based on information provided by Arcus there are eleven approved renewable energy projects located within a 35 km radius of the site. These include 3 wind and 8 solar energy projects. It would appear that only one wind farm, the Mainstream Noupoort WEF, and two solar projects, have been established to date. The remainder have been approved but not developed as yet. There is therefore the potential for cumulative visual impacts linked to combined visibility (whether two or more wind / solar farms will be visible from one location), and sequential visibility (e.g. the effect of seeing two or more wind / solar farms along a single journey, e.g. road or walking trail), and the potential loss of a characteristic element, namely a relatively undisturbed Karoo type landscape.

However, as indicated above, a number of stakeholders interviewed indicated that they were not concerned about the potential visual impacts associated with the proposed WEF and the associated impact on the areas sense of place. In this regard some stakeholders viewed the turbines associated with the existing Noupoort WEF in a positive manner. This will also have implications for the perceptions of different people towards to the nature and significance of the cumulative impacts associated with wind and solar farms on the areas sense of place.

The findings of the VIA (Sivest, September 2017) indicate that the cumulative impacts are not significant enough to prevent the WEF from being approved.

Based on the findings of the SIA and the VIA the overall cumulative impact of the areas sense of place does not represent a fatal flaw for the proposed WEF.

Cumulative impact on services
The establishment of the proposed WEF and the other renewable energy facilities in the ULM and IYLM 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 WEF. The potential impact on local services 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 WEF and other renewable energy projects in the area also has the potential to create a number of socio-economic opportunities for the ULM and IYLM, 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. This benefit is rated as **High Positive** with enhancement.

5.2.5 Assessment of transmission line alternatives

Based on the findings of the SIA the social impacts associated with all three alternatives are likely to be low. However, the Preferred Alternative is supported given that it has the shortest distance.

5.2.6 Potential health impacts

The potential health impacts typically associated with WEFs include, noise, shadow flicker and electromagnetic radiation. As indicated above, the findings of a literature review undertaken by the Australian Health and Medical Research Council published in July 2010 indicate that there is no evidence of wind farms posing a threat to human health. The research also found that wind energy is associated with fewer health effects than other forms of traditional energy generation and in fact will have positive health benefits (WHO, 2004). Based on these findings it is assumed that the significance of the potential health risks posed by the proposed WEF is of **Low Negative** significance.

5.2.7 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 producer of carbon emissions in the world, this would represent a High negative social cost. The no-development option also represents a lost opportunity in terms of the employment and business opportunities (construction and operational phase) associated with the proposed WEF 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 WEF development is not unique. In this regard, a significant number of other renewable energy developments are currently proposed in the Northern and Eastern Cape and other parts of South Africa. Foregoing the proposed establishment of WEFs would therefore not necessarily compromise the development of renewable energy facilities in the Eastern Cape Province and or South Africa. However, the socio-economic benefits for local communities in the ULM and IYLM would be forfeited.

5.2.8 Decommissioning phase

In the case of decommissioning ~ 20 permanent jobs associated with the operational phase would be lost. The potential impacts associated with the decommissioning phase can however be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be **Low Negative.** The proponent should also investigate the option of establishing an Environmental Rehabilitation Fund to cover the costs of decommissioning and rehabilitation of disturbed areas. The Fund should be funded by a percentage of the revenue generated from the sale of energy to the national grid over the 20-25 year operational life of the facility. The rationale for the establishment of a Rehabilitation Trust Fund is linked to the experiences with the mining sector in South Africa and failure of many mining companies to allocate sufficient funds during the operational phase to cover the costs of rehabilitation and closure. Alternatively, the funds from the sale of the WEF as scrap metal should be allocated to the rehabilitation of the site.

5.3 CONCLUSIONS AND RECOMMENDATIONS

The findings of the SIA indicate that the development of the proposed San Kraal WEF will create employment and business opportunities for locals during both the construction and operational phase of the project. The establishment of a Community Trust will also benefit the local community. The potential negative social impacts can also be effectively mitigated.

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.

Based on the findings of the SIA the establishment of the proposed San Kraal WEF is supported. In this regard the project will create significant socio-economic opportunities for the area and have limited potential negative social impacts.

ANNEXURE A

INTERVIEWS

- De Villiers, Mr Jim (08-09-2017). Kleinfontein Farm.
- Erasmus, Ms Alet (07-09-2017). Carlton Heights Lodge.
- Erasmus, Mr Pieter (07-09-2017). Beskuitfontein and Vlakforntein Farns.
- Erasmus, Mr Stefan (07-09-2017). Beskuitfontein and Vlakforntein Farns.
- Erasmus, Ms Yolandi (07-09-2017). Beskuitfontein and Vlakforntein Farns.
- Gillmer, Mr Jean (08-09-2017). Edendale and De Rust Farms.
- Kapp, Mr Birtus (13-09-2017, e-mail). Umsovombo Municipality: Head Corporate Services.
- Majuba, Mr Lungile (07-09-2017). Umsobomvu Municipality: Special Projects Manager, Noupoort.
- Mgcinene, Mr George (07-09-2017). Umsobomvu Municipality: Head Community Development.
- Moore, Ms Annatjie (07-09-2017). Sherbourne Guest Farm.
- Moore, Mr John (07-09-2017). Wolwekop Farm.
- Nel, Ms Ilze (04-09-2017, telephonic). Minnaar De Kock Attorneys, Middelburg. Administrators of Ms Vivien van der Merwe's properties Winterhoek and Bergplaas.
- Van der Walt, Mr Kobie (08-09-2017). Kleinfontein Farm.
- Van Huyssteen, Ms Annatjie (07-09-2017). Arbeidsgenot Farm and The Dairy Guest
- Farm.
- Visser, Mr Frikkie (08-09-2017). Rents Winterhoek and Bergplaas from Ms Vivien van der Merwe.

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ANNEXURE B

ASSESSMENT METHODOLOGY

The evaluation method for determining significance of impacts is shown below.[38]

Note that an adjustment was made, which involved changing the consequence column to the significance column, due to the fact that probability should not necessarily determine significance, as, for example, catastrophic events would be highly significant, even though the probability of such an event occurring is low.

Definitions of or criteria for environmental impact parameters

The significance of environmental impacts is a function of the environmental aspects that are present and to be impacted on, the probability of an impact occurring and the consequence of such an impact occurring before and after implementation of proposed mitigation measures.

Extent (spatial scale):

Ranking criteria

L	M	H
Impact is localized within site boundary	Widespread impact beyond site boundary; Local	Impact widespread far beyond site boundary; Regional/national

Take into consideration:
Access to resources; amenity
Threats to lifestyles, traditions and values
Cumulative impacts, including possible changes to land uses at and around the site.

Duration:

Ranking criteria

L	M	H
Quickly reversible, less than project life, short term (0-5 years)	Reversible over time; medium term to life of project (5-15 years)	Long term; beyond closure; permanent; irreplaceable or irretrievable commitment of resources

Take into consideration:
Cost – benefit economically and socially (e.g. long or short term costs/benefits)

[38] (Adapted from T Hacking, AATS – Envirolink, 1998: An innovative approach to structuring environmental impact assessment reports. In: IAIA SA 1998 Conference Papers and Notes

Intensity (severity):

Type of Criteria	Negative			Positive		
	H-	M-	L-	L+	M+	H+
Qualitative	Substantial deterioration, death, illness or injury, loss of habitat/ diversity or resource, severe alteration or disturbance of important processes.	Moderate deterioration, discomfort, Partial loss of habitat/ biodiversity/ resource or slight or alteration	Minor deterioration, nuisance or irritation, minor change in species/habitat/ diversity or resource, no or very little quality deterioration.	Minor improvement, restoration, improved management	Moderate improvement, restoration, improved management, substitution	Substantial improvement, substitution
Qualitative	Measurable deterioration Recommended level will often be violated (e.g. pollution)	Measurable deterioration Recommended level will occasionally be violated	No measurable change; Recommended level will never be violated	No measurable change; Within or better than recommended level.	Measurable improvement	Measurable improvement
Community response	Vigorous	Widespread complaints	Sporadic complaints	No observed reaction	Some support	Favourable publicity

Take into consideration:
Cost – benefit economically and socially (e.g. high nett cost = substantial deterioration)
Impacts on human-induced climate change
Impacts on future management (e.g. easy/practical to manage with change or recommendation)

Probability of occurrence:

Ranking criteria

L	M	H
Unlikely; low likelihood; Seldom No known risk or vulnerability to natural or induced hazards.	Possible, distinct possibility, frequent Low to medium risk or vulnerability to natural or induced hazards.	Definite (regardless of prevention measures), highly likely, continuous High risk or vulnerability to natural or induced hazards.

The specialist study must attempt to quantify the magnitude of impacts and outline the rationale used. Where appropriate, international standards are to be used as a measure of the level of impact.

Status of the impact:

Describe whether the impact is positive, negative or neutral for each parameter. The ranking criteria are described in negative terms. Where positive impacts are identified, use the opposite, positive descriptions for criteria.

Based on a synthesis of the information contained in (a) to (e) above, the specialist will be required to assess the significance of potential impacts in terms of the following criteria:

Significance: (Duration X Extent X Intensity)

Intensity = L				
Duration	H			
	M			Medium
	L	Low		
Intensity = M				
Duration	H			High
	M		Medium	
	L	Low		
Intensity = H				
Duration	H			
	M			High
	L	Medium		
		L	M	H
		Extent		

Positive impacts would be ranked in the same way as negative impacts, but result in high, medium or low positive consequence.

Degree of confidence in predictions:

State the degree of confidence in the predictions, based on the availability of information and specialist knowledge.

Significance Table Format:

Example of how significance tables should be formatted.

	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation							
With Mitigation							

ANNEXURE C:

CV
Tony Barbour
ENVIRONMENTAL CONSULTING AND RESEARCH

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(E-Mail) tbarbour@telkomsa.net

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

EDUCATION

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

EMPLOYMENT RECORD

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

LECTURING

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

RELEVANT EXPERIENCE AND EXPERTISE

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

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

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

ANNEXURE D

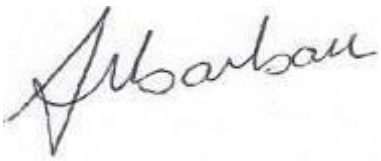
DECLARATION OF INDEPENDENCE

The specialist declaration of independence in terms of the Regulations_

I, Tony Barbour , declare that --

General declaration:

I act as the independent specialist in this application;
I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
I declare that there are no circumstances that may compromise my objectivity in performing such work;
I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
I will comply with the Act, Regulations and all other applicable legislation;
I have no, and will not engage in, conflicting interests in the undertaking of the activity;
I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
all the particulars furnished by me in this form are true and correct;
and
I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



Signature of the specialist:

Tony Barbour Environmental Consulting and Research

Name of company (if applicable):

10 December 2017

Date: