

**SOCIAL IMPACT ASSESSMENT
(DRAFT REPORT)
PROPOSED KOINGNAAS WIND ENERGY
FACILITY
NORTHERN CAPE PROVINCE
JUST PALM TREE POWER**

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Prepared for

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EXECUTIVE SUMMARY

INTRODUCTION AND LOCATION

Savannah Environmental (Pty) Ltd was appointed by Just Palm Tree Power as the lead consultants to manage the Basic Assessment (BA) process for the establishment of a wind energy facility (WEF) and associated infrastructure within the De Beers mining area, near the mining town of Koingnaas in the Northern Cape Province.

Tony Barbour Consulting was appointed by Savannah Environmental (Pty) Ltd to undertake a specialist Social Impact Assessment (SIA) as part of the BA process. This report contains the findings of the Draft SIA undertaken as part of the BA process.

DESCRIPTION OF THE PROPOSED WIND ENERGY FACILITY

An area of approximately 100 hectares located within the De Beers mining area is being considered for the construction of ~ 24 appropriately spaced turbines with a total generating capacity of up to 7.2 MW. The basic infrastructure associated with the proposed Koingnaas WEF would include:

- ~ 24 wind turbines;
- Cabling between the turbines, to be laid underground where practical, which will connect to the existing on-site substation);
- A switching yard 50m x 40m will be constructed to convert the current from 33 kV to 11kV
- A short power line (of 11kv) to connect the facility to the De Beers mine's substation located at Koingnaas;
- Existing roads will be used as far as possible. However, where required, internal access roads of approximately 6m wide will be constructed between the turbines and the on-site substation,
- Workshop area for maintenance and storage purposes, and
- A component laydown area of approximately 1250m² (50m x 25m) will be required next to each turbine location.

The proposed WEF would feed into the existing De Beers Koingnaas substation located near the site. A short section of overhead power line would need to be constructed to link the WEF to the substation. Two alternatives are being assessed, viz. Alternative 2A, ~2.7 km in length, and Alternative 2B, ~3 km in length. Both alternatives would be located along existing roads for the most part. In addition, both alternatives essentially traverse an area which has been disturbed by mining activities, including a large overburden dump.

Based on information provided by the developer the total estimated capital expenditure associated with the construction of ~24 wind turbines is anticipated to be in the region of R143 million (2011 rand). The construction phase is expected to extend over a period of ~9 months and create approximately 83 employment opportunities (all skills levels). The estimated lifespan of the WEF is 20 years, and it would create an estimated 10 permanent employment opportunities. The annual operational budget is estimated to be in the region of R 3 million.

APPROACH TO THE STUDY

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

- Describing and obtaining an understanding of the proposed intervention (type, scale, location), the communities likely to be affected and determining the need and scope of the SIA;
- Collecting baseline data on the current social environment and historical social trends;
- Identifying and collecting data on the Social Impact Assessment variables and social change processes related to the proposed intervention. This requires consultation with affected individuals and communities;
- Assessing and documenting the significance of social impacts associated with the proposed intervention;
- Identifying alternatives and mitigation measures.

In this regard the study involved:

- Review of demographic data from the 2001 Census Survey and other available sources (IDPs, etc.);
- Review of relevant planning and policy frameworks for the area;
- Site specific information collected during the site visit to the area and interviews with key stakeholders;
- Review of information from similar projects;
- Identification of social issues associated with the proposed project.

No alternative sites were identified within the area. As such, the EIA does not assess any additional site alternatives for the 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.

The potential health impacts associated with WEFs are also discussed.

Policy and planning issues

The key documents reviewed included:

The key documents reviewed included:

- The National Energy Act (2008);

- The White Paper on the Energy Policy of the Republic of South Africa (December 1998);
- The White Paper on Renewable Energy (November 2003);
- Integrated Resource Plan (IRP) for South Africa (2010-2030);
- Northern Cape Provincial Growth and Development Strategy (2004-2014);
- Namakwa District Municipality Integrated Development Plan (2006-2011);
- Strategic Initiative to Introduce Commercial Land Based Wind Energy Development to the Western Cape. *Towards a Regional Methodology for Wind Energy Site Selection* (May 2006).

The findings of the review indicated that wind energy is strongly supported at a national, provincial, and local level. Based on this it is reasonable to assume that the establishment of the proposed Koingnaas WEF is supported.

At a provincial level the NCPGDP notes that availability of inexpensive energy is a key requirement in order to promote economic growth in the Northern Cape. The NCGDS goes on to indicate that "the development of (renewable) energy sources (...) could be some of the means by which new economic opportunity and activity is generated in the Northern Cape".

At the local level the Namakwa DM IDP identifies the need for a Renewable Energy Cluster and sets a target of establishing wind farms with a capacity to generate 200 MW within 3 Municipal areas, including the Kamiesberg LM, within which the proposed project is located.

Construction phase

The key social issues associated with the construction phase include:

Potential positive impacts

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

The construction phase is expected to extend over a period of 9 months and create approximately 83 employment opportunities. Approximately 53% (44) of the employment opportunities will be available to low-skilled workers (construction labourers, security staff etc.), 37% (30) for semi-skilled (drivers, equipment operators etc.) and 10% (8) to skilled personnel (engineers, land surveyors, project managers etc.). The majority of the low and semi-skilled employment opportunities are likely to be taken up by members from the local community. In this regard the majority of the beneficiaries are likely to be historically disadvantaged (HD) members of the community. The skilled positions are likely to be taken up by people from outside the area and be linked to the contactors appointed to construct the proposed WEF and associated infrastructure.

The total wage bill for the 9 month construction phase will be in the region of R 3.125 million. Of this total 30% (R900 000) will accrue to low skilled workers, 30% (R900 000) to semi-skilled workers and 40% (R1.25 million) to skilled workers. The injection of income into the area in the form of wages will represent a significant benefit, specifically given the limited income earning opportunities in the area since the closure of the mine in 2009.

The low education and skills levels in the area have the potential to impact on the potential opportunities for local communities. In this regard the proponents have indicated that training will be provided to ensure all work is undertaken to the specifications required for the wind farm.

The capital expenditure is anticipated to be in the region of R 143 million (2011 rand). The wind turbines for the project will be manufactured in South Africa and this will benefit the South African economy. However, given the technical nature of the turbines the potential opportunities for the local Kamiesberg economy and the towns of Koingnaas, Kleinzee and Garies are likely to be limited. Implementing the enhancement measures listed in the report can, however, assist to enhance these limited opportunities. The proposed WEF also has the potential to create opportunities to promote private sector investment and the development of SMMEs in the Northern Cape Province. In this regard the NCPGDS highlights the importance of enterprise development, and notes that the current levels of private sector development and investment in the Northern Cape are low.

Potential negative impacts

- Influx of construction workers employed on the project;
- Impact of heavy vehicles, including damage to roads, safety, noise and dust;

The significance of the potential negative impacts with mitigation was assessed to be of Low significance. All of the potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented. However, the impact on individuals who are directly impacted on by construction workers and or job seekers (i.e. potential to contract HIV/ AIDS) was assessed to be of Medium-High negative significance. However, due to the relatively small size of the labour force (83) and the potential risk to local family structures and social networks is regarded as low. The majority of the low and semi-skilled employment opportunities will also be taken up by members from the local community which will also reduce the potential risks to local family structures and social networks. Potential opportunities also exist for skilled workers who used to be employed on the mine.

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

Table 1: Summary of social impacts during construction phase

Impact	Significance No Mitigation / Enhancement	Significance With Mitigation / Enhancement
Creation of employment and business opportunities	Low (Positive impact)	Medium (Positive impact)
Presence of construction workers and potential impacts on family structures and social networks	Low (Negative impact for community as a whole) Medium-High (Negative impact of individuals)	Low (Negative impact for community as a whole) Medium-High (Negative impact of individuals)
Impact of heavy vehicles and construction activities	Low (Negative impact)	Low (Negative impact)

Operational phase

The key social issues affecting the operational phase include:

Potential positive impacts

- Creation of employment and business opportunities. The operational phase will also create opportunities for skills development and training;
- Establishment of Community Trust;
- The establishment of infrastructure to generate renewable energy.

The proposed development will create 10 permanent employment opportunities. The potential employment opportunities will therefore be limited. The proponent has, however, indicated that they are committed to employing people from the local communities and implementing a training and skills development program for local community members. This would support the strategic goals of promoting local employment and skills development contained in the Northern Cape Growth and Development Plan.

Just Palm Tree Power has also indicated that they are committed to establishing a Community Trust as a part owner of the project. In terms of the agreement a percentage of the dividends from the project will accrue to the Community Trust. This revenue will in turn be used to fund and support local economic development. The Community Trust will own ~ 10% of the project. In terms of the funding model, a percentage of the ownership will be donated to the community, while the remainder will be funded via a loan sourced at a competitive interest rate. The dividends from the project will then be used to pay off the loan. Once the loan has been repaid all of the dividends will accrue to the Trust. This is likely to be after year 5-6 of the project. Although it's a relatively small project, these revenues will still provide funding over a 20 year period that will be used to support local economic development activities. In an area that has been dependent upon mining and where there are limited employment opportunities this is regarded as a significant social benefit.

The proposed development also represents an investment in infrastructure for the generation of clean, renewable energy, which, given the challenges created by climate change, represents a positive High social benefit for society as a whole.

Potential negative impacts

- The visual impacts and associated impact on sense of place and the landscape;
- Impact on tourism.

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

However, having said this, the proposed Koinaas WEF is located in an area that has been disturbed by diamond mining over the last 70 years. In this regard the proposed site is compatible with a key consideration listed in the Western Cape Strategic Regional Methodology for Wind Energy Site Selection (May 2006). The strategy recommends focusing on existing disturbed rural landscapes, and in

particular, those rural landscapes that have already been “vertically compromised” by the location, for example, of transmission lines, railway lines, and all phone towers. In the case of the proposed Koingnaas WEF the site is located in an area where the natural landscape has been impacted upon by overburden dumps associated with diamond mining activities. The site is therefore located in an area that is well suited for the establishment of WEFs. In addition the WEF is relatively small in terms of both the total number of turbines (23) and the height (35 m).

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

Table 2: Summary of social impacts during operational phase

Impact	Significance No Mitigation	Significance With Mitigation
Creation of employment and business opportunities	Low (Positive impact)	Low (Positive impact)
Establishment of a Community Trust	Medium (Positive impact)	High (Positive impact)
Promotion of renewable energy projects	Medium (Positive impact)	Medium (Positive impact)
Visual impact and impact on sense of place	Medium (Negative impact)	Medium (Negative impact)
Impact on tourism	Low (Positive and Negative)	Low (Positive and Negative)

Cumulative impacts

The cumulative impacts associated with WEFs, such as the proposed Koingnaas WEF, are largely linked to the impact on sense of place and visual impacts. With regard to the area, a number of WEFs have been proposed for the area in and around Koingnaas and Kleinzee. However, these areas have been extensively disturbed by diamond mining and the landscape is dotted with both large and small overburden dumps and other mining infrastructure. The proposed WEFs are therefore located in an area that is not pristine and is, in many regards, very well suited for the establishment of wind turbines. In addition the area is sparsely populated. The significance of the potential cumulative social impacts, specifically the impact on the landscape, is therefore rated to be low.

However, it is recommended that the Department of Environmental Affairs consider the overall cumulative impact on the areas sense of place before a final decision is taken with regard to the optimal number of WEFs in the area.

Power lines

The findings of the SIA indicate that the impacts associated with the proposed overhead power line will be low. The preferred Alternative is 2A.

Potential health impacts

The potential health impacts typically associated with WEFs include, noise, shadow flicker and electromagnetic radiation. As indicated in Section 4.5.5, 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 Koingnaas WEF is of low 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) and for the establishment of a Community Trust. This also represents a negative social cost. In addition, the opportunity to manufacture the wind turbines locally will also be lost.

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 ~ 20 years post commissioning (due to this being the extent of the power purchase agreement likely to be issued). The decommissioning phase is therefore likely to create additional, construction type jobs, as opposed to the jobs losses typically associated with decommissioning.

In addition, the social impacts associated with final decommissioned are likely to be limited due to the relatively small number of permanent employees (10) affected. The potential impacts associated with the decommissioning phase can also be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be Low (negative).

Just Palm Tree Power should also investigate the option of establishing an Environmental Rehabilitation Trust Fund to cover the costs of decommissioning and rehabilitation of disturbed areas associated with the wind energy facility. 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.

RECOMMENDATIONS

The findings of the SIA indicate that the Koingnaas WEF will create employment and business opportunities for locals during both the construction and operational phases of the project. While these opportunities are likely to be limited, the mitigation measures listed in the report should be implemented in order to enhance them. In addition, the proposed development will also create an opportunity to establish a Community Trust that will be funded from revenue generated by the WEF. The revenues will provide funding to support local economic development activities. In an area that has been dependent upon mining and where there are limited employment opportunities this is regarded as a significant social benefit. The mitigation measures listed in the report to address the potential negative impacts during the construction phase should also be implemented.

The findings of the SIA also indicate that the proposed WEF is located in an area that has been disturbed by diamond mining and is, in many regards, very well suited for the establishment of wind turbines. In addition the area is sparsely populated. The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the challenges created by climate change, represents a positive social benefit for society as a whole. The establishment of the proposed Koingnaas WEF is therefore supported by the findings of the SIA.

However, the potential impacts associated with WEFs on an area's sense of place and landscape cannot be ignored. These impacts are an issue that will need to be addressed by the relevant environmental authorities.

IMPACT STATEMENT

The findings of the SIA undertaken for the proposed Koingnaas WEF indicate that the development will create employment and business opportunities for locals during both the construction and operational phase of the project. During the operational phase the major benefits associated with the proposed WEF will be associated with the Community Trust that will be established as part of the project. The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the challenges created by climate change, represents a positive social benefit for society as a whole.

The proposed WEF is also located in an area that has been disturbed by mining and is therefore well suited for the establishment of WEFs. It is therefore recommended that the facility as proposed be supported, subject to the implementation of the recommended mitigation measures and management actions contained in the report.

ACRONYMS

DEA&DP	Department of Environmental Affairs and Development Planning (Western Cape)
DEA	Department of Environmental Affairs (National)
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMI	Electromagnetic Interference
EMP	Environmental Management Plan
HD	Historically Disadvantaged
HGV	Heavy Goods Vehicle
IDP	Integrated Development Plan
IPP	Independent Power Producer
KLM	Kamiesberg Local Municipality
kV	Kilovolts
LED	Local Economic Development
LM	Local Municipality
MF	Management Forum
Mtoe	Million tonnes of oil equivalent
MW	Megawatt
NCP	Northern Cape Province
NDM	Namakwa District Municipality
SIA	Social Impact Assessment
WEF	Wind Energy Facility

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SECTION 1: INTRODUCTION

1.1 INTRODUCTION

Savannah Environmental (Pty) Ltd was appointed by Just Palm Tree Power as the lead consultants to manage the Basic Assessment (BA) process for the establishment of a wind energy facility (WEF) and associated infrastructure within the De Beers Mining Area near the small mining town of Koingnaas in the Northern Cape Province.

Tony Barbour Environmental Consulting was appointed by Savannah Environmental (Pty) Ltd to undertake a specialist Social Impact Assessment (SIA) as part of the BA process. The terms of reference for the study include a scoping level assessment followed by a detailed assessment of the social issues as part of the BA. This report contains the findings of the Draft SIA undertaken as part of the BA process.

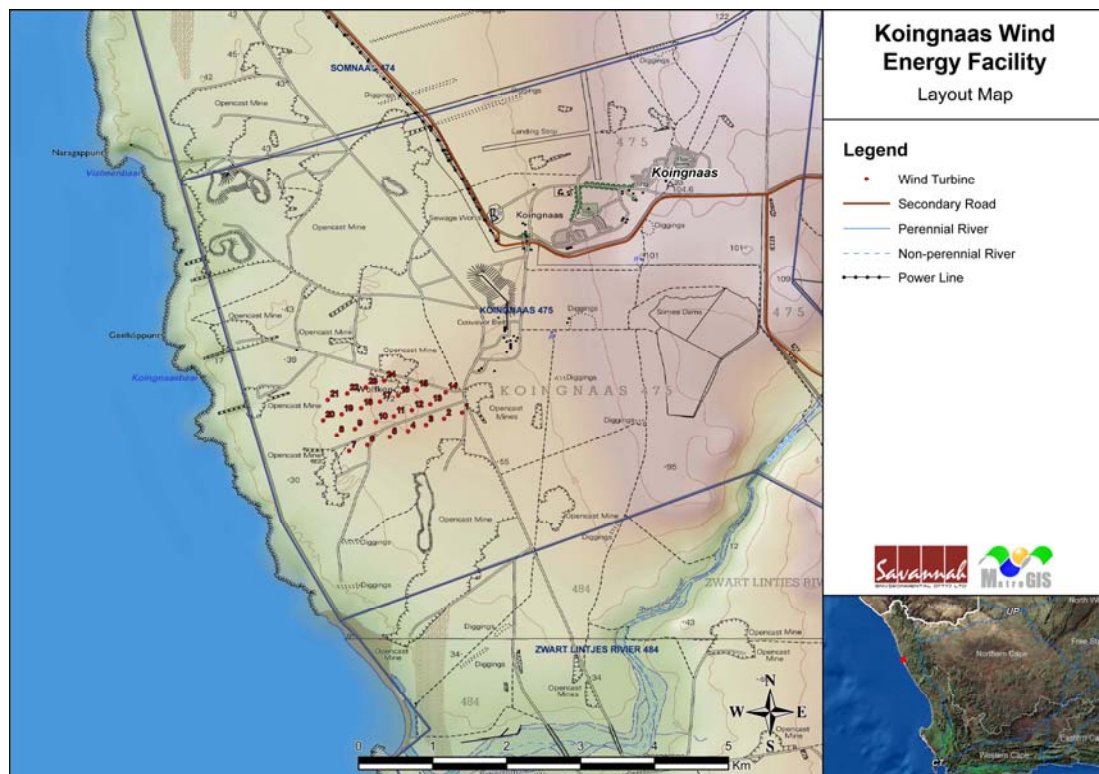


Figure 1.1: Location of the proposed Koingnaas WEF (MetroGIS, 2011).

1.2 TERMS OF REFERENCE

The terms of reference for the SIA require:

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

1.3 PROJECT LOCATION

The proposed site is located ~ 3 km southwest of the town of Koingnaas, 10 km north of Hondeklipbaai and ~104 northwest of Garies. Garies serves as the administrative centre of the Kamiesberg Local Municipality (NC064), which is one of seven B-Municipalities that make up the Namakwa District Municipality (NDM) (DC6). The administrative seat of the Namakwa DM is in Springbok. Garies is also the largest town (population ~1 500) in the Kamiesberg LM and is located on the N7 which connects Cape Town to Namibia. As well as being the administrative seat of the Kamiesberg LM, the town also serves as an agricultural and services centre to the local community.

The proposed WEF site is located within the De Beers mining area, and is constituted by Farm Koingnaas 745.

1.4 PROJECT DESCRIPTION

The site is located within the De Beers mining area and covers an area of ~ 100 hectares and will accommodate up to 24 appropriately spaced turbines with a generating capacity of up to 7.2 MW. A typical wind turbine consists of four primary components (Figure 1.2):

- The **foundation unit** (ca. 1 x 1 m) upon which the turbine is anchored to the ground;
- The **tower** (of varying heights depending on the design). The tower 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 **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 (of varying lengths depending on the design). 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 start generating power at wind speeds of between 10 - 15 km/hour, with speeds between 45 - 60 km/hour required for full power operation. In a situation where wind speeds are excessive, the turbine automatically shuts down to prevent damage.

The most suitable turbines (manufacturer and specifications) will be determined once the most suitable turbine footprints have been identified (i.e. based on the outcome of the current EIA process and on-site wind resource measurement).



Figure 1.2: Illustration of turbine type proposed for Koingnaas WEF

The basic infrastructure associated with the proposed Koingnaas WEF would include:

- Approximately 24 wind turbines;
- Cabling between the turbines, to be lain underground where practical, which will connect to the existing on-site substation);
- A switching yard 50m x 40m will be constructed to convert the current from 33 kV to 11kV
- A short power line to connect the facility to the De Beers mine's existing Koingnaas substation;
- Existing roads will be used as far as possible. However, where required, internal access roads of approximately 6m wide will be constructed between the turbines and the on-site substation;

- Workshop area for maintenance and storage purposes;
- A component laydown area of approximately 1250m² (50m x 25m) will be required next to each turbine location.

The proposed WEF would feed into the existing De Beers Koiningaas substation located. A short section of overhead power line would need to be constructed to link the WEF to the substation. Two alternatives are being assessed, viz. Alternative 2A, ~2.7 km in length, and Alternative 2B, ~3 km in length. Both alternatives would be located along existing roads for the most part. In addition, both alternatives essentially traverse an area which has been disturbed by mining activities, including a large spoil heap.

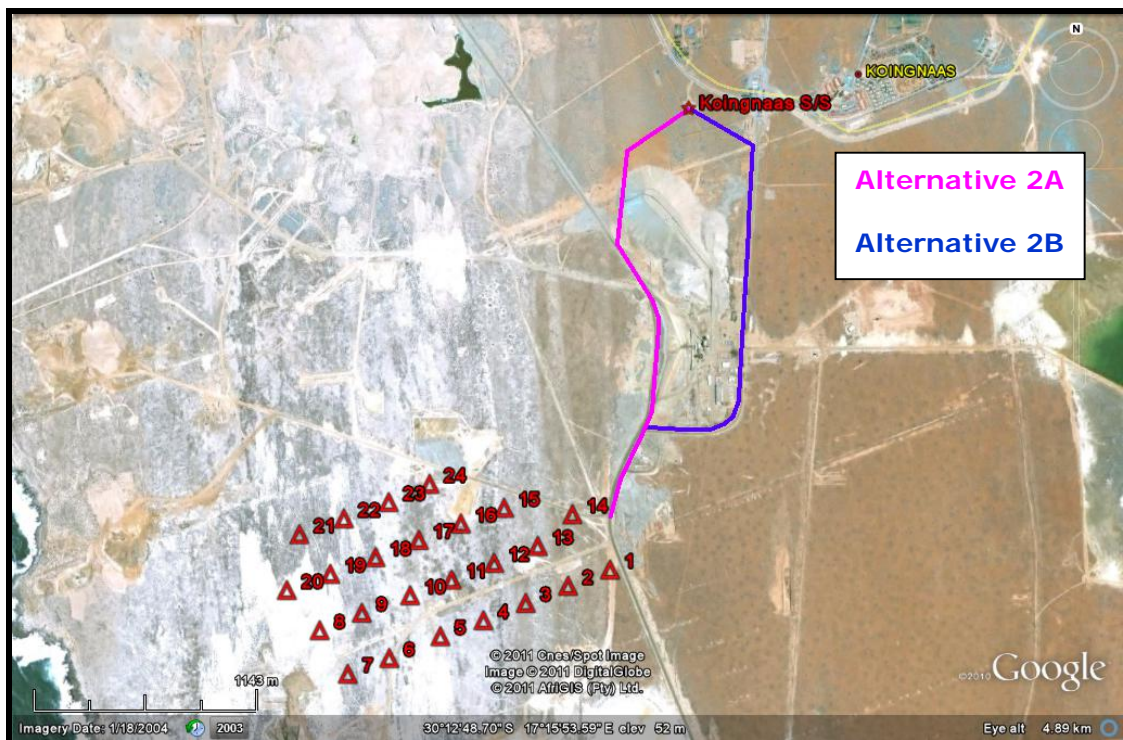


Figure 1.3: Proposed turbine locations and powerline alternatives

No site alternatives are assessed as part of the Basic Assessment.

Based on information provided by the developer the total estimated capital expenditure associated with the construction of ~24 wind turbines is anticipated to be in the region of R 143 million (2011 rand). The construction phase is expected to extend over a period of ~9 months and create approximately 83 employment opportunities (all skills levels). The estimated lifespan of the WEF is 20 years, and it would create approximately 10 permanent employment opportunities. The annual operational budget is estimated to be in the region of R 3 million (2011 rand).

Information provided by Just Palm Tree Power indicates that preferential use would be made of local labour during both the construction and operational phases, in as far as possible. In this regard, Just Palm Power has indicated that the recruitment

strategy would target the communities of Koingnaas, Kommagas, Hondeklip Bay, and Kleinsee.

Construction workers would be accommodated in the nearby towns (Koingnaas, Kleinsee, Hondeklipbaai, etc) and transported to and from site on a daily basis. Overnight on-site worker presence would be limited to security staff.

As the proposed WEF would be located within the De Beers mining area, construction and operational phase workers would need to undergo a safety induction by De Beers and have appropriate medicals to comply with relevant mining legislation.

1.5 APPROACH TO STUDY

The approach to the SIA study is based on current best practice. In that regard, the study approach is underpinned by 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 and have been endorsed by the Department of Environmental Affairs (DEA). The key activities in the SIA process embodied in the guidelines include:

- Describing and obtaining an understanding of the proposed intervention (type, scale, location), the communities likely to be affected and determining the need and scope of the SIA;
- Collecting baseline data on the current social environment and historical social trends;
- Identifying and collecting data on the Social Impact Assessment variables and social change processes related to the proposed intervention. This requires consultation with affected individuals and communities;
- Assessing and documenting the significance of social impacts associated with the proposed intervention;
- Identifying alternatives and mitigation measures.

In this regard the study involved:

- Review of demographic data from the 2001 Census Survey and other available sources (IDPs, etc);
- Review of relevant planning and policy frameworks for the area;
- Site specific information collected during the site visit to the area and interviews with key stakeholders;
- Review of information from similar projects;
- Identification of social issues associated with the proposed project.

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

1.5.1 Definition of social impacts

Social impacts can be defined as “The consequences to human populations of any public or private actions (these include policies, programmes, plans and/or projects) that alter the ways in which people live, work, play, relate to one another, organise to meet their needs and generally live and cope as members of society. These impacts are felt at various levels, including individual level, family or household level, community, organisation or society level. Some social impacts are felt by the body as a physical reality, while other social impacts are perceptual or emotional” (Vanclay, 2002).

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

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

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

1.5.2 Timing of social impacts

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

1.6 ASSUMPTIONS AND LIMITATIONS

1.6.1 Assumptions

Strategic importance of the project and no-go option

It is assumed that the strategic importance of promoting renewable energy, including wind energy, is supported by the national and provincial energy policies.

Technical suitability

It is assumed that the development site identified by Just Palm Tree Power represents a technically suitable site for the establishment of a wind energy facility.

1.6.2 Limitations

Demographic data

The demographic data used in the study is largely based on the 2001 Census¹. While this data does provide useful information on the demographic profile of the affected area, the data are dated and should be treated with care. Where possible reference is made to the latest demographic data contained in local Integrated Development Plans and other documents.

In addition, there is no longer any access to Census 2001 data at Ward level via the Municipal Demarcation Board. As such, the social baseline for the study area has been described at a District and Local Municipal level only.

1.7 SPECIALIST DETAILS

The lead author of this report is an independent specialist with 20 years' experience in the field of environmental management. His qualifications include a BSc, BEcon (Hons) and an MSc in Environmental Science. In terms of SIA experience Tony Barbour has undertaken in the region of 100 SIAs and is the author of the Guidelines for Social Impact Assessments for EIAs adopted by the Department of Environmental Affairs and Development Planning (DEA&DP) in the Western Cape in 2007. These guidelines are based on international best practice and have been used widely in South Africa. Tony Barbour has also undertaken specialist SIA studies for over 20 WEFs in South Africa.

Daniel Rogatschnig has an MSc in Environmental Science and has five years of experience as an environmental consultant. He has also worked on a number of SIAs with Tony Barbour.

¹ The last comprehensive national census was conducted in 2001. Census 2001 provided demographic and socio-economic data from National to Municipal Ward level. An interim Community Survey (sample based) was undertaken in 2007, but provided information only on provincial and district municipal levels. The next comprehensive national census is planned for later in 2011. It is unlikely that the compiled data would be publicly available before 2013.

1.8 DECLARATION OF INDEPENDENCE

This confirms that Tony Barbour and Daniel Rogatschnig, the specialist consultants responsible for undertaking the study and preparing the Draft SIA Report, are independent and do not have vested or financial interests in the proposed Koingnaas Bay WEF being either approved or rejected.

1.9 REPORT STRUCTURE

The report is divided into five sections, namely:

- Section 1: Introduction;
- Section 2: Overview of the study area;
- Section 3: Overview of key applicable policy and planning documents;
- Section 4: Identification and assessment of key social issues;
- Section 5: Summary of key findings and recommendations.

SECTION 2: DESCRIPTION OF STUDY AREA

2.1 INTRODUCTION

Section 2 provides an overview of:

- The provincial context;
- The district and local socio-economic environment;
- Surrounding land uses.

2.2 PROVINCIAL CONTEXT

The proposed Koingnaas WEF site is located in the Northern Cape Province (NCP). The NCP is the largest of the 9 provinces, and covers an area of ~361,830 km², constituting approximately 30% of the Republic of South Africa. The province is divided into 5 district municipalities (DMs), 26 Category B (i.e. Local) Municipalities, and five District Management Areas (DMAs).

The proposed Koingnaas site falls within the Kamiesberg Local Municipality (NC064), which has its administrative centre in Garies. The Kamiesberg Local Municipality (KLM) is one of seven B-Municipalities comprising the Namakwa District Municipality (NDM) (DC6). The NDM is bordered by the Siyanda and Pixley ka Seme Districts of the Northern Cape Province to the north-east and east, respectively, and by the Western Cape Province to the South (the West Coast, Cape Winelands and Central Karoo District Municipalities). The NDM is bounded to the west by the Atlantic Ocean, and the Gariiep River (Namibian border) to the north.

Population

Despite having the largest surface area, the Northern Cape has the smallest population of 822 727 (Census 2001) or 1.8% of the population of South Africa. The population has declined by 2.1% from 1996 (840 321) to 2001 (822 727), resulting in a decrease in the population density, of an already sparsely populated province, from 2.32 to 2.27 persons per km². The Namakwa DM is one of the less populous DMs in the NCP, and accommodated an estimated of 108 111 people in 2001.

The NCP population can be classified as a young population with 57.7% of the population being younger than 30 years old. The female proportion makes up approximately 51.2% of the total with males making up the remaining 48.8%. The 2001 Census data indicates a significant shift in the 20 – 24 cohort occurs, which can possibly be attributed to, amongst others, people in this age group moving to other provinces in search of better career and job opportunities and tertiary education. Research indicates that approximately 36% of the migrants from the Northern Cape moved to the Western Cape, while 19.4% moved to the North West (19.4%), 18.5% to Gauteng and 12.8% to the Free State (12.8%).

In addition, there has also been an increase in migration from the rural areas to the larger towns in the province over the last five years. This movement is in response to the improved access to opportunities and services within the larger urban centers. This trend is reflected in the increase in the proportion of people living in urban areas from 75.2% in 1996 to 82.7% in 2001.

Education

In terms of education levels 15.1% of the population had no education at all, while 71.3% have primary or secondary education. Those with a higher educational qualification accounted for 3.7% of the population (Figure 2.1). These figures indicate an increase in all categories since 1996, except for the no schooling category, which decreased by 4.9% indicating a higher percentage of people attending school.

The information contained in Figure 2.1, indicates that, in general, there has been an improvement in the educational qualifications of the labour force in the Northern Cape. There has also been an increase in the proportion of the labour force that has a secondary and tertiary education. This would appear to be the result of an increase in access to education since 1994, in particular, amongst new entrants to the labour force.

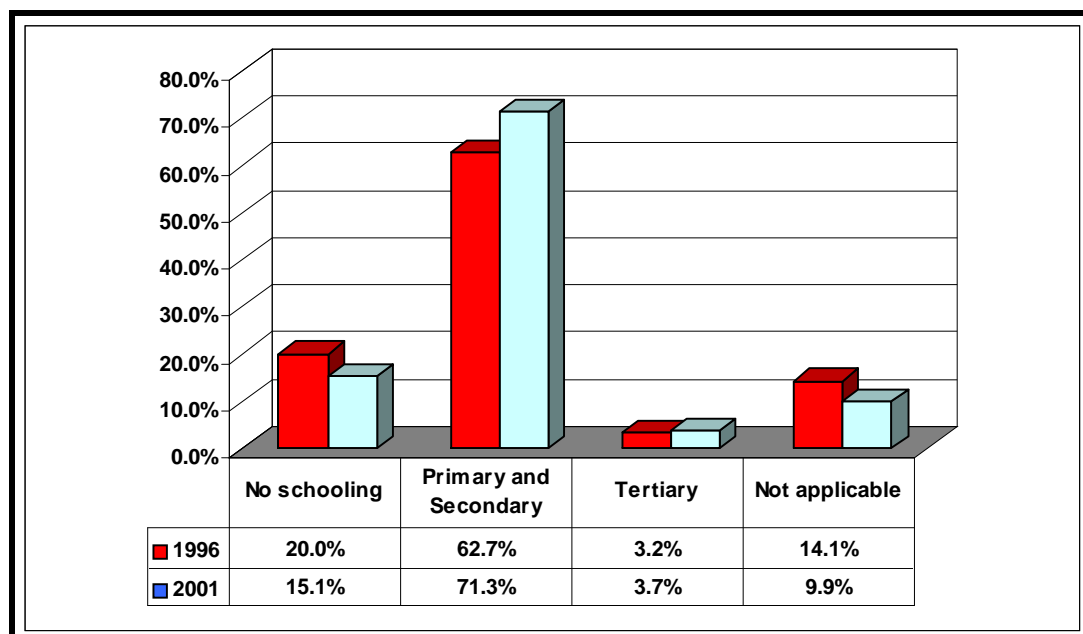


Figure 2.1: Percentage of people by level of education for 1996 and 2001
(Source: Northern Cape Province PGDS)

Economic development

The Human Development Index² (HDI) for the province, which covers four indexed factors – life expectancy, adult literacy, GDP per capita (adjusted for real income)

² The closer the HDI 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.

and education attainment, for the Northern Cape as a whole is 0.58, which is substantially below the South African figure of 0.72.

For the Northern Cape, the areas of lowest Human Development Index include the South Eastern region (Noupoort and Richmond) and the hinterland of Kimberley (Griekwastad, Campbell and Douglas) – for these areas the HDI varies between 0.47 to 0.51. Over the past 8 years there has been little to no variance in the HDI figures, indicating no increase or decrease in the overall standard of living. In contrast, the Kimberley and Springbok areas have the highest HDI of 0.63 to 0.62 respectively, primarily due to the broader economic opportunities and access to services such as infrastructure, schools, and health facilities. Similarly, there has been no significant change over the past 8 years.

The above 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.

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 used³. The poverty line indicates a lack of economic resources to meet basic food needs. Figure 2.2 indicates the percentage of household income below the poverty breadline of R800 in the Northern Cape Province, the highest being Karoo at 48% and the lowest being Namakwa at 36%.

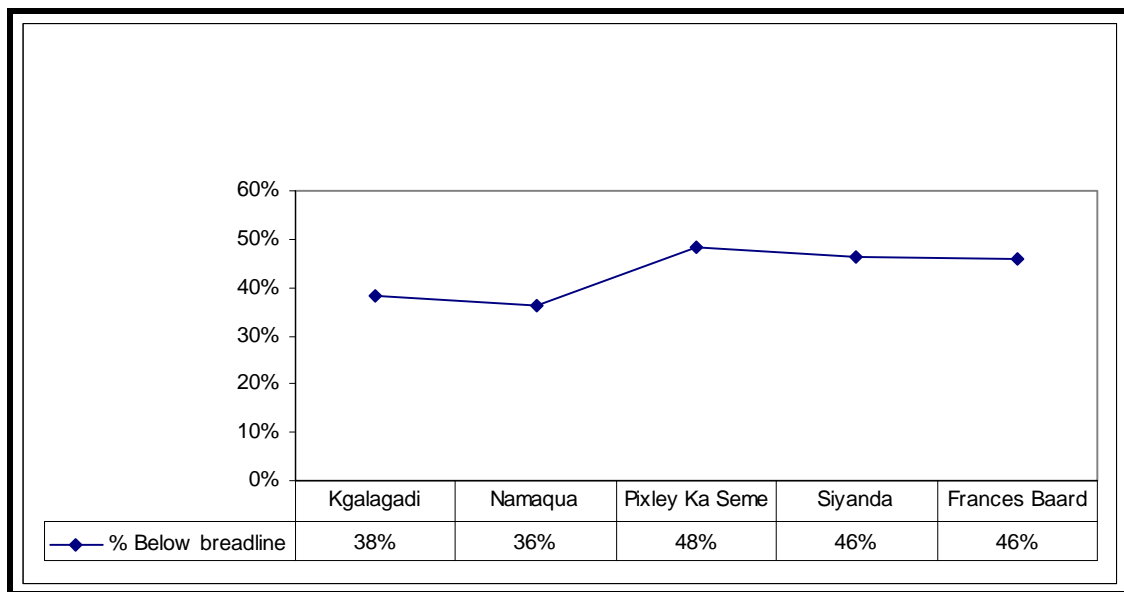


Figure 2.2: Percentage of household income below the poverty breadline by district (Source: Northern Cape PGDS)

³ 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.

Economic sectors

In terms of economic importance, the Northern Cape's share of the country's Gross Domestic Product (GDP) in 2002 was 2%, the lowest contribution of the nine provinces. However, although the Northern Cape Province has the smallest economy of the nine provinces, Gross Domestic Product of the Region (GDPR) per capita is higher than the national average. In terms of economic activities, the economy of Northern Cape is heavily dependent on the primary sectors of the economy, which in 2002 made up 31.0% of GDPR. The largest sector is mining which has declined in contribution to the GDPR from 25.8% in 1996 to 23.7% in 2002. Agriculture, on the other hand, increased in its contribution from 6.2% to 7.3%.

A worrying characteristic of the economy is the limited amount of processing of the primary commodity output in mining and agriculture that takes place in the Northern Cape. This is reflected in the fact that manufacturing contributes only 4.2% towards GDPR. All the industries in the secondary sector have decreased in their contribution to the GDPR, with electricity and water sector showing the greatest decrease of 0.7% and the construction industry making the lowest contribution of 1.9% to the GDPR of the Northern Cape. At the same time the contribution to regional GDPR by industries in the tertiary sector increased, with the exception of the wholesale and retail industry, which decreased by 1.1%. Table 2.3 above illustrates the percentage contribution of the various economic sectors to the GDPR of the Northern Cape Province.

Employment

Of the economically active population in the Northern Cape, 55.5% were employed while 26.1% could not find employment. This unemployment figure is lower than the national figure of 29.5%. Significant for this province, however, is that a third of the total population is younger than 15 years old and approximately 45% of the potential labour force is younger than 30 years. At the same time, unemployment is the highest among the youth with unemployment rates of 54% and 47% in the 15 - 19 and 20 - 24 year-old age groups. There has been an increase in the economically active population from 35.9% in 1996 to 38.1% in 2001. The unemployment rate for the same period has increased from 28.3% to 33.4%. In terms of employment there has been a decrease in the number of people that are formally employed from 196 219 in 1996 to 193 980 in 2001. The largest decrease was in the private household sector, showing a loss of 4 859 jobs.

Sectors	1996	1996 % of persons employed per sector	2001	2001 % of persons employed per sector
Primary				
Agriculture, hunting; forestry and fishing	48646	24.8	55016	28.4
Mining and quarrying	18556	9.5	15493	8.0
Secondary				
Manufacturing	8812	4.5	10598	5.5
Electricity; gas and water supply	2397	1.2	1385	0.7
Construction	10402	5.3	8971	4.6
Tertiary				
Wholesale and retail trade	23099	11.8	24671	12.7
Transport; storage and communication	9963	5.1	6366	3.3
Financial, insurance, real estate and business services	7733	3.9	10989	5.7
Community, social and personal services	39724	20.2	38463	19.8
Private Households	26887	13.7	22028	11.4
Total		196219		193980

Table 2.3: Formal employment by sector (Source: Northern Cape PGDS)

The most important sectors in terms of employment in 2002 were agriculture, hunting, forestry and fishing (28.4%), community, social and personal services (19.8%), wholesale and retail trade (12.7%) and private households (11.4%) (Table 2.3).

2.3 DISTRICT AND LOCAL SOCIO-ECONOMIC OVERVIEW

As indicated in Section 1.6.2 Limitations, it is no longer possible to access Census 2001 data at Ward level via the Municipal Demarcation Board. As a result it was not possible to obtain ward level data for the Kamiesberg Local Municipality (KLM) (NC064). The social baseline for this part of the study area is therefore described at District and Local Municipal level only.

2.3.1 Namakwa District and Kamiesberg Local Municipality

The Namakwa District Municipality (NDM)(DCO6) is the largest district municipality in South African and covers an area of 126 747km² in extent. The DM extends from Alexander Bay in the northwest to Sutherland and Fraserburg in the south and southeast respectively, a direct distance of approximately 700km. Two national roads cross the district, namely the N7, connecting the Western Cape with Namibia, and the N14 connecting Springbok with Upington and further eastwards.

Due to the vastness of the area, the NDM is made up of various geographic zones. In the west there is a coastal plain, which varies in distance from 20-50km from the sea. A steep escarpment rises to approximately 1 000m above sea-level, followed by a reasonably level inland plateau up to the eastern border of the district.

The Namakwa District Municipality (DCO6) comprises of seven local municipalities, namely:

- Richtersveld Municipality (NC061): Located in the north, bordering with Namibia along the Orange River, with a total population of 14 612 and an area of 9 607.93 km², this municipality is home to Diamond Mines, with Port Nolloth being the largest settlement.
- Nama Khoi Municipality (NC062): Includes the towns of Springbok, Okiep, Concordia, Nababeep, Bergsig, Fonteintjie, Carolusberg, Vioolsdrift, Rooiwal, Goodhouse, Matjieskloof, Buffelsrivier, Kleinzee, Bulletrap, Rooiwinkel, Henkries and Komaggas and is the "hub" of the Namakwa District both in terms of economic activity as well as population – with over 54 643 residents. The area covers 15 025.08 km²;
- Khai Ma Municipality (NC067): Covers around 8 331.94 km² and home to approximately 12 571 people, the main towns include Pofadder and Aggeneys.
- Kamiesberg Municipality (NC064): South of Nama Khoi, along the west coast, this area includes Hondeklip Bay, Garies and Kamieskroon as its major settlements. The total population is estimated at over 12 116, the majority of whom are not economically active. The area is sparsely populated, at about 1 person per square kilometre over the 11 742.47 km².
- Hantam Municipality (NC065): The Hantam Local Municipality has the second largest population of the District, with around 21 233 people. It includes the towns of Calvinia, Niewoudtsville and Loeriesfontein and covers 27 967.97 km².
- Karoo Hoogland Municipality (NC066): With a population of just over 10 419, this area is significant for science and technology, with Sutherland being the location of the SALT project. Other towns in this municipal area include Williston and Fraserburg. The majority of the population reside within these four towns. Vast rural and undeveloped areas exist. The total area covers 29 396.73 km²;
- DMA area (NCDMA06).

Population

The total population of the NDM is ~ 110 000 people. Given the large area the population density is less than 1 person/km², which is very low. The majority of the population are however urbanised. The urbanised population figure is reasonably high in all the municipalities (61%-83%) except in Kamiesberg (31%) and Nama Khoi (28%).

In terms of the local municipalities, the Nama Khoi LM has the highest population (~ 45 000), followed by the Hantam LM (~ 19 000), Karoo Hoogland LM and

Richtersveld (~ 12 000 each), Kamiesberg (~ 11 000), Khai-Ma (~ 9 000) and the DMA area (~ 1 500). The gender distribution for the district is approximately 50% males and 50% females with the figure more or less the same in the various municipalities.

In terms of population groups, the Coloured group make up ~ 90% of the population, followed by Whites (14%) and Black Africans (3%) (Table 2.4). The dominant language spoken in the district is Afrikaans with English and isiXhosa used to a lesser extent. In the Kamiesberg LM Coloureds make up 84% of the population, while Whites and Black Africans account for 11% and 2 % respectively.

	RICHTERS VELD	NAMA KHOI	KHAI- MA	KAMIES BERG	KAROO- HOOGLAND	HANTAM	DMA	TOTAL
POPULATION								
African	948	1 034	283	188	102	556	5	3 116
Coloured	8 584	38 440	7 764	9 178	9 643	15 318	1 155	90 082
Indian	20	33	3	3	2	21	3	85
White	2 115	4 827	1 263	1 230	2 233	3 038	297	15 003
Other	97	502	42	432	136	153	11	1 276
TOTAL	11 764	44 836	9 355	11 031	12 116	19 086	1 471	109 562

Table 2.4: Population distribution per group for Namakwa DM

The population growth rates for the period 1996–2001 in each of the local municipalities are in the region of 2%, which compares well with the national average. The growth rate for the Nama Khoi LM over the same period was negative. The projected growth rates for the period 2001 and 2010 for all of the municipalities expected to be in the region of 0. 1%. The population figures for the area are therefore unlikely to change considerably over the next 10 years. The composition of the population in respect of gender and age will change and there will be an older, economically active population will be established, and which will require care for the aged as well as job creation (NDM IDP, 2003).

The information of age distribution indicates that approximately 52% of the population falling within the 20 to 65 category which classifies as the economically active category. Approximately 30% fall within the 5-19 age group which can be classified as learners, while 10% fall within the 0-4 year pre-school age group. The elderly over 65 age group make up ~ 6% of the population. The corresponding figures for the Kamiesberg LM are similar, with ~50% (20-65 age group), 30% (5-19 age group), 10% (0-4 age group) and 8% (over 65 years of age).

Employment

The data contained in the NDM IDP indicates that 14% of the economically active population in the DM were unemployed in 2001. This was lower than the national average at the time. The figures for the Kamiesberg LM indicate that ~ 20% of the economically active population was unemployed in 2001.

Employment per sector

The key economic sectors in terms of employment in the NDM in 2001 were the Mining and Agricultural sectors (Table 2.5). These two sectors were also the most

important sectors in the Kamiesberg LM. Of concern were the low employment figures in the Manufacturing sector both at a DM and LM level.

	RICHTERS VELD	NAMA KHOI	KHAI- MA	KAMIES BERG	KAROO- HOOGLAND	HANTAM	DMA	TOTAL
INDUSTRY								
Farming	187	1 037	473	692	1 852	1 374	518	6 133
Mining	2 240	3 579	1 067	663	3	4	2	7 558
Manufacturing	135	319	105	26	47	202	66	900
Utilities	16	141	19	15	18	27	0	236
Construction	152	666	67	112	226	278	12	1 513
Trade	337	1 653	134	219	377	617	3	3 340
Transport	60	429	64	52	97	216	0	918
Business	69	428	58	55	92	154	5	861
Social services	500	2 078	368	483	545	851	10	4 835
Private household	311	1 266	163	241	632	693	25	3 331
Ex territorial	0	6	0	5	0	0	0	11
Diplomatic	0	0	0	0	0	0	0	0
NEC	221	606	118	181	136	676	4	1 942
NAI	7 463	31 497	6 389	7 681	7 461	12 870	818	7 4179
Institution	79	1 226	324	641	644	1 150	0	4 064

Table 2.5: Employment per economic sector

Household income

The data on household incomes indicates that the majority of households in the NDM fall within the R2 401-R 6 000 and R6 001-R12 000 annual income categories. This also applies to the Kamiesberg LM. The minimum monthly income in terms of the accepted definition of poverty in South Africa is R800 per month. This equates to an annual income of R 9 600.00. From this it is apparent that a large number of households in both the NDM and Kamiesberg LM fall below the poverty line.

2.4 HISTORY OF THE AREA

Namaqualand Mines is a complex of alluvial diamond mines owned and operated by De Beers Consolidated Mines Ltd. The mines are located on the west coast of Namaqualand and operate from two entirely Company owned towns, namely Kleinzee and Koingnaas. The establishment of Koingnaas and Kleinzee are therefore linked to the discovery of diamonds in Namaqualand by Jack Carstens on the farm Oubeep near Port Nolloth in 1925. A year later, diamonds were discovered on the farm Kleyne Zee, a freehold at the mouth of the Buffels River.

The diamonds in the area occur as a consequence of the break-up of the ancient super-continent of Gondwanaland, which split to form Africa and South America ~ 130 million years ago. As the two landmasses moved apart, numerous river systems along the southern African margin drained westward. These systems carried the diamonds weathered out from kimberlite deposits located in the hinterland hundreds of kilometres to the east. All of the diamonds found along the west coast are of gem

quality and were extracted by open-cast and surf zone mining. Approximately 31 million carats had been produced by the turn of the 20th century.

Following these discoveries small scale mining commenced in January 1927. This operation was incorporated into the Cape Coast Exploration Company (CCEC), under Chairmanship of Sir Ernest Oppenheimer, in 1928. The CCEC was, in turn, incorporated into De Beers in 1941. Due to the 1930 Government ban on further prospecting or mining for diamonds in Namaqualand, work was restricted to the farm Kleinzee. In 1957 the first Prospecting and Digging agreement was signed allowing additional prospecting and then mining. Mining on the adjacent farm Annex Kleinzee started in 1960. Systematic prospecting also commenced in 1960 and by 1970 some 280 kilometres of coastline, as well as selected inland farms, were covered. This led to the delineation of the three main mining areas, namely:

- The Koingnaas Complex between Mitchell's and Somnaas Bays;
- The Buffels Inland Complex on terraces of the Buffels River inland of Kleinzee;
- The Buffels Marine Complex on the raised beaches north of the mouth of the Buffels River.

Operations were put on hold between 1932 and 1937 due to a recession in the diamond market, and again from late 1938 till 1943, due to the Second World War. Apart from these short breaks mining has taken place at varying levels of production, from 1927 until 2009. The Namaqualand Mines have therefore been in operation for over 70 years and have played a central role in the economy and social structure of Namaqualand. The mine has produced many direct and indirect benefits for the region in the form of tax revenues for central and regional government, as the largest single employer in the region and through contributions to community development, services and education. In the past the mine employed ~ 2 200 people. Most employees were drawn from towns in Namaqualand; primarily Komaggas and Steinkopf. Through the De Beers Fund, numerous social upliftment initiatives have made a difference to the area. These include agricultural projects, small business development, and education and health care projects (De Beers Namaqualand Mines Environmental Management Programme Report (EMPR), September 2011).

Mr Kenny McDonald, the SHE Manager and a local resident in Koingnaas indicated that mining stopped at the Koingnaas Mine in June 2009 and more than 3 600 people retrenched. The mine now only employs ~90 permanent staff at the Koingnaas/Kleinsee operations and only 8 households still live in Koingnaas. The rest of the town is vacant. The town is in the process of being proclaimed and thereafter De Beers employees will have first choice in purchasing houses in Koingnaas. Mine should reopen in June 2012 when Transhex take over operations from De Beers. However, scale of mining will significantly smaller.

2.5 SURROUNDING LAND USES

As indicated above, the De Beers Namaqualand Mines operate from two entirely company owned towns, namely Kleinzee and Koingnaas (Photograph 2.1 and 2.2). These two small settlements are connected by 60 km privately owned tar road. The small size of the town of Koingnaas is illustrated in photograph 2.1. The closest major centre is Springbok, some 105 km east of Kleinzee by secondary gravel road.

Port Nolloth lies 60km to the north of Kleinzee and is the second largest centre in Namaqualand and has the Northern Cape provinces' only harbour facility. The nearest small towns are Komaggas, Soebatsfontein and Hondeklip Bay.

The WEF site is located within the De Beers diamond mining area. As with all diamond mining areas along the west coast of South Africa, access to the area is restricted. The surrounding farms are all under mining concessions held either by De Beers or Transhex. Apart from the town of Koingnass, which is located in close proximity to the mining area and proposed WEF site, and Hondeklipbaai (located ~10km south of the proposed WEF), there are no homesteads located in the vicinity of the site. However, a few farm homesteads are located adjacent to the N7-Hondeklipbaai access Road. These homesteads are however located ~ 30 km east of the site (Figure 2.1 and Photograph 2.3).



Photograph 2.1: View of Koingaas from private De Beers road between Koingnaas and Kleinzee



Photograph 2.2: Koingnaas town centre

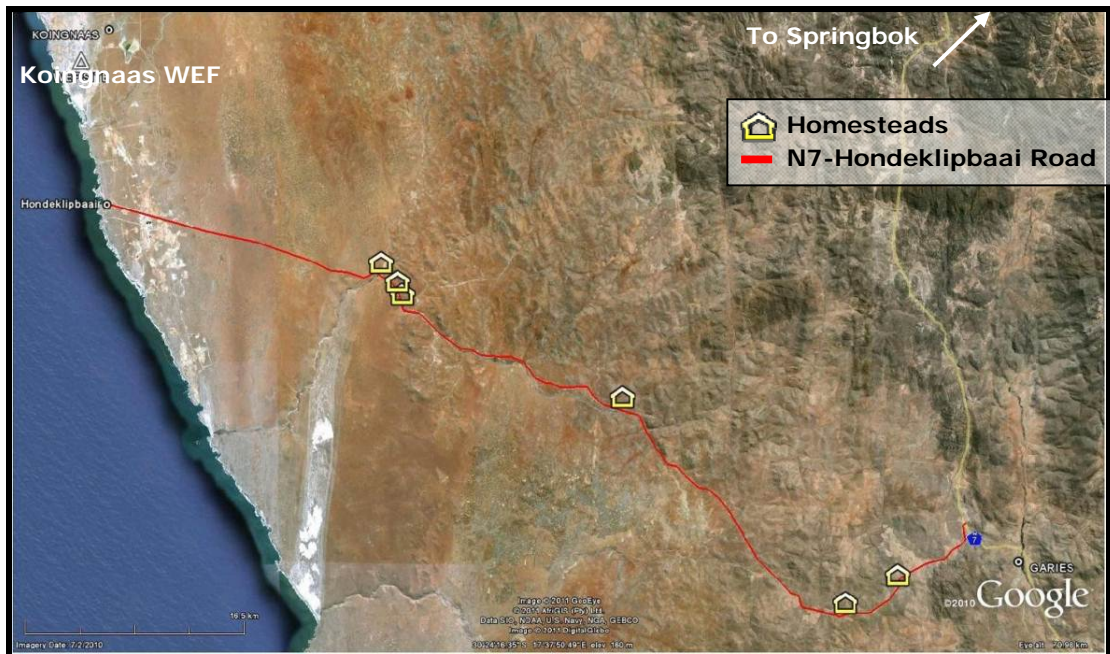


Figure 2.1: Relative location of farmsteads/labourers cottages with respect to the proposed WEF and primary access route



Photograph 2.3: Homesteads along N7-Hondeklipbaai access road

The proposed site is located on the sandy coastal lowlands (Sandveld) and consists of a gently undulating topography that slopes towards the Atlantic Ocean in the west. The natural topography has also been disturbed by overburden dumps associated with diamond mining (Photograph 2.2 and 2.3).



Figure Photograph 2.2: View across the site towards the west and the coast with monitoring mast in the foreground and overburden dumps in the background



Photograph 2.3: View across the site towards the west

Apart from diamond mining operations, economic activity is largely based on small stock farming (Photograph 2.3). Sheep and goats are the main breeds with some ostrich and game farming being carried out by Namaqualand Mines Farms Department. Due to the poor carrying capacity, economic farming units have to be large as a result of which the population is very sparse, and permanently occupied homesteads are widely spaced. Mining operations in the area ceased in 2009. Two kelp concessions are also located along the coast. Neither of these concession areas extends into the main mining areas (De Beers Namaqualand Mines Environmental Management Programme Report (EMPR), September 2011).

Road access to the proposed WEF site is from the N7 (between Cape Town and the Namibian border) via the N7-Hondeklipbaai Road (~10km northeast of Garies) and the Hondeklipbaai mine entrance and private mine access road. The N7 National road is a well-maintained tar road while the N7-Hondeklipbaai Road is a secondary gravel/dirt road that is utilised by the local sheep and cattle farmers, mining vehicles and tourists (Photograph 2.4). The N7-Hondeklipbaai road bisects the southwestern portion of the Namakwa National Park.



Photograph 2.4: Sheep farming in the vicinity of the site



Photograph 2.5: Intersection between N7 and Hondeklipbaai Road

SECTION 3: POLICY AND PLANNING CONTEXT

3.1 INTRODUCTION

Section 3 provides an overview of the policy and planning environment affecting the proposed Koingnaas wind energy facility (WEF). For the purposes of the meeting the objectives of the EIA the following policy and planning documents were reviewed, namely:

- The National Energy Act (2008);
- The White Paper on the Energy Policy of the Republic of South Africa (December 1998);
- The White Paper on Renewable Energy (November 2003);
- Integrated Resource Plan (IRP) for South Africa (2010-2030);
- Northern Cape Provincial Growth and Development Strategy (2004-2014);
- Namakwa District Municipality Integrated Development Plan (2006-2011).

Section 3 also provides a summary of some of the key issues relating to the siting of a WEF as identified in a document commissioned by the Department of Environmental Affairs and Development Planning (DEA&DP) of the Western Cape, titled: the Strategic Initiative to Introduce Commercial Land Based Wind Energy Development to the Western Cape. *Towards a Regional Methodology for Wind Energy Site Selection* (May 2006). This document includes some useful policy and methodology guidelines for site selection that may be also applicable to the Northern Cape Province and inform the SIA.

The section also provides a summary of some of the key social issues associated with wind farms based on international experience. The findings of the review concentrate on three documents, namely the National Wind Farm Development Guidelines produced by the Environment Protection and Heritage Council (EPHC) of Australia (Draft, July, 2010), recent 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'), and a review of the potential health impacts associated with wind farms undertaken by the Australian Health and Medical Research Council (July, 2010).

3.2 NATIONAL LEVEL ENERGY POLICY

3.2.1 National Energy Act (ACT No 34 OF 2008)

The National Energy Act was promulgated in 2008 (Act 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).

3.2.2 White Paper on the Energy Policy of the Republic of South Africa (1998)

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

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

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

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

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

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

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

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

- Minimal environmental impacts in operation in comparison with traditional supply technologies;
- 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.

3.2.3 White Paper on Renewable Energy

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

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

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

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

Government's long-term goal is the establishment of a renewable energy industry producing modern energy carriers that will offer in future years a sustainable, fully non-subsidised alternative to fossil fuels. The medium-term (10-year) target set in the White Paper is:

10 000 GWh (0.8 Mtoe) renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro. The renewable energy is to be utilised for power generation and non-electric technologies such as solar water heating and bio-fuels. This is approximately 4% (1667 MW) of the projected electricity demand for 2013 (41539 MW) (Executive Summary, ix).

3.2.4 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. 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 (275 million tons of carbon dioxide per year after 2024) was maintained;
- Energy efficiency demand-side management (EEDSM) measures were maintained at the level of the RBS.

The Policy-Adjusted IRP includes the same amount of coal and nuclear new builds as the RBS, while reflecting recent developments with respect to prices for renewables. In addition to all existing and committed power plants (including 10 GW committed coal), the plan includes 9,6 GW of nuclear; 6,3 GW of coal; 17,8 GW of renewables; and 8,9 GW of other generation sources. The Policy-Adjusted IRP has therefore resulted in an increase in the contribution from renewables from 11,4 GW to 17,8 GW.

Table 3.1 indicates the new capacities of the Policy commitment. The dates shown in Table 3.1 indicate the latest that the capacity is required in order to avoid security of supply concerns. The document notes that projects could be concluded earlier than indicated.

	New build options							
	Coal (PF, FBC, imports, own build)	Nuclear	Import hydro	Gas – CCGT	Peak – OCGT	Wind	CSP	Solar PV
	MW	MW	MW	MW	MW	MW	MW	MW
2010	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	300
2013	0	0	0	0	0	0	0	300
2014	500 ¹	0	0	0	0	400	0	300
2015	500 ¹	0	0	0	0	400	0	300
2016	0	0	0	0	0	400	100	300
2017	0	0	0	0	0	400	100	300
2018	0	0	0	0	0	400 ⁴	100 ⁴	300 ⁴
2019	250	0	0	237 ³	0	400 ⁴	100 ⁴	300 ⁴
2020	250	0	0	237 ³	0	400	100	300
2021	250	0	0	237 ³	0	400	100	300
2022	250	0	1 143 ²	0	805	400	100	300
2023	250	1 600	1 183 ²	0	805	400	100	300
2024	250	1 600	283 ²	0	0	800	100	300
2025	250	1 600	0	0	805	1 600	100	1 000
2026	1 000	1 600	0	0	0	400	0	500
2027	250	0	0	0	0	1 600	0	500
2028	1 000	1 600	0	474	690	0	0	500
2029	250	1 600	0	237	805	0	0	1 000
2030	1 000	0	0	948	0	0	0	1 000
Total	6 250	9 600	2 609	2 370	3 910	8 400	1 000	8 400

Firm commitment necessary now
 Final commitment in IRP 2012

1. Built, owned & operated by IPPs 2. Commitment necessary due to required high-voltage infrastructure, which has long lead time 3. Commitment necessary due to required gas infrastructure, which has long lead time 4. Possibly required grid upgrade has long lead time and thus makes commitment to power capacity necessary

Source: Integrated Resource Plan (IRP) for South Africa

Table 3.1: Commitments before next IRP

The key recommendations contained in the Policy-Adjusted IRP Final Report (March 2011) that have a bearing on the renewable energy sector include:

General

- The dark shaded projects in Table 3.1 need to be decided before the next IRP iteration, with the identified capacities thereafter assumed as “committed” projects;
- The light shaded options should be confirmed in the next IRP iteration;
- All non-shaded options could be replaced during the next, and subsequent, IRP iterations if IRP assumptions change and thus impact on the quantitative model results.

Wind Energy

- Wind 2014/15: As is the case with solar PV, it is necessary to make a firm commitment to the first post-REFIT wind installations in order to connect the wind farms to the grid by 2014. Furthermore, to provide the security of investment to ramp up a sustainable local industry cluster, the first two years from 2014 to 2015 need commitment;
- Wind 2016 to 2019: For the first wind installations until 2015, extensive grid extension is not necessary. For the additional units to come in 2016 to 2019, these extensions might become necessary. To trigger the associated feasibility studies, planning, and investments in a timely manner, the additional wind units

added from 2016 to 2019 should be decided on in the next round of the IRP at the latest;

Solar energy

- Solar PV programme 2012-2015: In order to facilitate the connection of the first solar PV units to the grid in 2012 a firm commitment to this capacity is necessary. Furthermore, to provide the security of investment to ramp up a sustainable local industry cluster, the first four years from 2012 to 2015 require firm commitment;
- Solar PV 2016 to 2019: As with wind, grid upgrades might become necessary for the second round of solar PV installations from 2016 to 2019, depending on their location. To trigger the associated tasks in a timely manner, a firm commitment to these capacities is necessary in the next round of the IRP at the latest. By then, the assumed cost decreases for solar PV will be confirmed;
- CSP 2016: The 100 MW of CSP power, planned for 2016, needs firm commitment because of the long lead time of these projects;
- CSP 2017 to 2019: Because of the long lead time for CSP plants, a commitment to the capacity planned for 2017 to 2019 is necessary in the next round of the IRP at the latest. By then, the cost and technical assumptions for CSP plants will also be grounded on more solid empirical data;

Conclusions

The key conclusions that are relevant to the renewable energy sector include:

- An accelerated roll-out of renewable energy options should be allowed in order to derive the benefits of localisation in these technologies;
- A solar PV programme as envisaged in the Policy-Adjusted IRP should be pursued (including decentralised generation).

3.3 PROVINCIAL AND LOCAL LEVEL POLICY AND PLANNING

3.3.1 Northern Cape Province Provincial Growth and Development Strategy (2004-2014)

The Northern Cape Provincial Growth and Development Strategy (PGDS) notes that **reduction of poverty** is the most significant challenge that the government and its partners in growth and development are confronted with, . All other societal challenges that the province faces emanate predominantly from the effects of poverty. The PGDS 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 PGDS 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 (renewable) energy sources ... 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 WEF 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, do not affect the tourism potential of the province.

The NCPGDS also notes that the Northern Cape Provincial Government will promote the preservation of agricultural biodiversity and the sustainable use of soil and water through the application of legislation and related regulations where this is necessary. In this regard the proposed WEF will consume relatively large volumes of water, which is a scarce resource in the area. The water required for the project may also impact on the provincial government's commitment to land reform through the allocation of water rights to emerging black farmers.

3.3.2 Namakwa District Municipality Integrated Development Plan (2006-2011)

The vision for the Namakwa DM as set out in the Namakwa District Municipality Integrated Development Plan 2006 – 2011 (Fourth revision 2011/2012) is for the “The establishment of a development-orientated and economically viable district through sustainable growth”.

In order to comply with the vision, the mission statement concentrates on certain key focus areas, namely: Promotion of the quality of life of the Namakwa community through purposeful and quality service, and the effective and optimal utilisation of resources, focussing especially on:

- Economic development;
- Development, upgrading and maintenance of basic infrastructure;
- Development of human resources;
- Sustainable management and optimal utilisation of operational and natural resources;
- Creating of a safe, healthy and investment-friendly environment;
- Development of opportunities for local entrepreneurs;
- Ensuring friendly, credible and transparent services and client satisfaction.

The Namakwa IDP also identifies a number of key performance areas (KPA). The KPA that is relevant to the proposed Koingnaas is KPA 3: Local Economic Development. A number of projects are listed under the Local Economic Development KPA of these the following are of specific relevance to the project;

- Project No. LE02 : Renewable Energy Cluster: The Development of a synergy between the energy resources within Namakwa Region;
- Project No. LE05: SMME Development Cluster: The development of a Management support system for SMME'S.

The objective of Project No: LEOs is to ensure the participation of the NDM in the development of a synergy between wind energy, natural gas, solar, bio-fuel and wave energy so that the energy sector can enhance competitive and comparative advantage of the Namakwa region. The performance indicators listed in the IDP include the facilitation of quarterly LED Forum meetings with stakeholders/future partners in wind (TPE), solar, wave and natural gas (Forest International) in order to exchange information before June 2012. The key outputs of the project listed in the IDP include:

- Establishment of wind farms with a capacity to generate 200 MW within 3 Municipal areas, including the Kamiesberg LM.

3.4 REGIONAL METHODOLOGY FOR WIND ENERGY SITE SELECTION

While no policy or methodology on wind energy site selection exists specifically for the Northern Cape Province, the 2006 report series “Towards A Regional Methodology For Wind Energy Site Selection” compiled by the Department of Environmental Affairs and Development Planning (DEA&DP) of the Western Cape, includes some useful policy and methodology guidelines for site selection that are applicable to the Eastern Cape Province.

Some of the key findings and recommendations that have a bearing on the study are briefly summarized below.

Cumulative Impact Issues

The experience in Europe is that the very high cumulative impact of wind farms has resulted due to a policy of permitting small (wind) energy schemes in relatively close proximity to each other (only 2.5km in Denmark).

As a result the document recommends that:

- Large installations should be located extremely far apart (30 – 50km), and;
- Smaller installations should be encouraged in urban/ brownfield areas.

In this regard, it should be noted that there are a number of other WEFs proposed in Kleinzee / Koingnass area. However, this area has been disturbed by mining and the landscape is dotted with large overburden dumps.

Recommended Disturbed Landscape Focus

The proposed methodology recommends focusing on existing disturbed rural landscapes, and in particular, those rural landscapes that have already been "vertically compromised" by the location, for example, of transmission lines, railway lines, and all phone towers. In this regard, the proposed Koingnass WEF site is located in an area where the natural landscape has been impacted upon by overburden dumps associated with diamond mining activities.

Protecting Rural Landscape Values (put after "Urban Emphasis")

The document notes that in Europe in the past, a great degree of emphasis was given to quantifying views from residential locations. This policy emphasis has effectively led to pushing WEF projects into more "remote" rural locations. The study notes that in the SA context this policy would effectively "penalising" rural areas, and compromising wilderness and touristic visual values. In this regard, the proposed Koingnass WEF site is located in an area that has been disturbed by mining.

3.5 INTERNATIONAL EXPERIENCE WITH WIND ENERGY FACILITIES

3.5.1 Introduction

This section summarises some of the key social issues associated with wind farms based on international experience. The findings of the review concentrate on three documents.

The first is the 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.

The second relates to recent 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. The key points raised in the article by Warren and Birnie that are relevant to South Africa are summarized below.

The third document is a review of the potential health impacts associated with wind farms undertaken by the Australian Health and Medical Research Council (July, 2010).

3.5.2 National Wind Farm Development Guidelines (Australia)

The Environment Protection and Heritage Council (EPHC) of Australia developed a set of guidelines for the establishment of Wind Farms (National Wind Farm Development Guidelines, DRAFT - July 2010). The section below summarises the key social issues listed in the guidelines.

Wind Turbine Noise

The guidelines note that excessive noise may cause annoyance, disturbance of activities such as watching TV, or sleep disturbance when received at a noise-sensitive location such as a dwelling. At higher levels, environmental noise has been linked to long-term health issues such as raised blood pressure and cardiovascular disease.

With regard to WEFs, the noise produced by wind turbines is associated with their internal operation and the movement of the turbine blades through the air. The noise levels associated with a WEF are dependent on a number of factors, including, the number of turbines operating, wind speed and direction. Noise levels diminish with distance from the wind farm. The guidelines also note that a unique characteristic of wind turbines is that while noise emission increase with increasing wind speed, this is also often, but not always, accompanied by an increase in the background noise environment. The background noise is associated with wind blowing past or through objects, such as trees or buildings. As a result, the background noise near a dwelling may be high enough to 'mask' the sound of the turbines.

Concerns have also been raised regarding the potential health impacts associated with low frequency noise (rumbling, thumping) and infrasound (noise below the normal frequency range of human hearing) from wind farms. The guidelines indicate that low frequency noise and infrasound levels generated by wind farms are normally at levels that are well below the uppermost levels required to cause any health effects. This issue is addressed in the review undertaken by the Australian Health and Medical Research Council (July, 2010).

Noise monitoring

With regards to monitoring, the guidelines recommend that the operational phase of the wind farm should include unattended post-construction noise monitoring for a sufficient period of time to demonstrate compliance with the noise criteria under expected worst-case conditions.

The Guidelines also recommend that a procedure should be developed, prior to construction activities commencing, to handle any complaints of construction noise. Similar procedures should concurrently be developed for implementation during operations and decommissioning stages. Complainants should be requested to keep a diary or sound log where they can note times of day and associated weather conditions when wind farm noise emission are found to be a problem. The sound log can also include a description of the type of sound heard. This information can then be used to help try and identify meteorological conditions, particularly wind speed and direction, where the wind farm noise emission is most problematic.

Landscape Impacts

The guidelines notes that due to the size and layout of wind turbine towers, the construction of WEFs will impact upon the landscape and its significance. Therefore, the significance of landscape values, and the extent of the impact, should be assessed. In this regard the impact of a wind farm on a landscape is not necessarily just visual – other ‘values’ can also be affected. Community values and perceptions of landscape may include associations, memories, knowledge and experiences or other cultural or natural values (National Wind Farm Development Guidelines, DRAFT - July 2010). Therefore, the assessment should consider the impact on landscape values in addition to considering the visual 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).

Shadow flicker

Shadow flicker is produced by wind turbine blades blocking the sun for short periods of time (less than 1 second) as the blades rotate causing a strobing effect. Since wind turbines are tall structures, shadow flicker can be observed at considerable distances but usually only occurs for brief times at any given location. The most common effect of shadow flicker is annoyance.

The likelihood of shadow flicker affecting people is dependent on the alignment of the wind turbine and the sun, and their distance from the wind turbine. The main risk associated with shadow flicker is the potential to disturb residents in the immediate vicinity. The Guidelines note that the investigations undertaken when developing the Guidelines indicated that the potential risk for epileptic seizures and distraction of drivers is negligible to people living, visiting or driving near a wind farm.

Mitigation measures

Where shadow flicker is an issue the following mitigation measures can be implemented.

- Create a buffer between the turbines and residential receptors;
- Plant screening vegetation between their property and the turbine(s);
- Install heavy blinds or shutters on affected windows.

The Guidelines also recommend that the issue of shadow flicker should be addressed in the design and layout of the wind farm.

Electromagnetic Interference (EMI)

Wind turbines can produce electromagnetic interference (EMI), in two ways. Firstly in the form of an electric and magnetic (electromagnetic) field that may interfere with radio communications services, and secondly, due to the obstruction of radio communications services by the physical structure of the wind turbines. Microwave, television, radar and radio transmissions are all examples of radio communication signals that may be impacted by the development of a wind farm.

Blade glint

Blade glint can be produced when the sun's light is reflected from the surface of wind turbine blades. Blade glint has potential to annoy people.

Cumulative impacts

The Guidelines note that the cumulative impact of multiple wind farm facilities in a region is likely to become an increasingly important issue for wind farm developments in Australia. This is also likely to be the case in South Africa. The assessment of cumulative impacts is also required for additional phases of existing or approved wind farms. The Scottish Natural Heritage (2005) describes a range of potential cumulative landscape impacts of wind farms on landscapes, including:

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

The Guidelines also note that the rapid expansion of wind energy sector also has the potential for consultation "fatigue", specifically in areas where more than one WEF is proposed. An abundance of community meetings, information sessions or materials about various developments, may result in community members tiring of attending local events or engaging in local discussions or activities.

Mitigation measures

The Guidelines indicate that mitigation measures for wind farms are very and therefore **general location** and **site selection** is of utmost importance.

3.5.3 Experience from Scotland and Europe

The information summarized below is based on research on wind farms undertaken by Warren, Charles R. and Birnie, Richard V published in the Scottish Geographical Journal in 2009.

Institutional capacity and strategic guidance

The research found that the rapid establishment of numerous large wind farms in Scotland has proved highly controversial. From around 2002, the potential negative impacts of wind farm developments have been the highest profile environmental issue in Scotland, generating extensive media coverage.

The experience in Scotland indicated that the speed of the wind power 'gold rush' took everyone by surprise – politicians, planners, scientists, land managers, conservationists and the public alike. As a result a severe burden was placed in officials and related planning and development control procedures. In addition, officials and planners had very few specific criteria for assessing proposals, notably because of the lack of overall strategic locational guidance. Basic data on most aspects of wind farm development, including environmental impacts, is limited and short term. As a result the debates regarding wind farms often degenerated into exchanges of claims and counter-claims that were typically long on assertion and short on evidence.

The potential for a similar situation to develop in South Africa is high. In addition, the lack of a National set of Guidelines for Wind Farms and spatial information on sensitive landscapes is a concern.

Landscape Impacts

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).

Impacts on Tourism

In addition to the loss of amenity for those who live and work nearby, the concern was that wind farms would damage the Scottish tourist industry. The paper notes that Scotland's image as a country of magnificent, varied, unspoilt scenery is a major reason why tourists come here. The concern raised is that wind farms will cause tourists to stay away by tarnishing that image. The same argument could be applied to South Africa. However, the paper notes that, "so far, however, there is no clear evidence to support this assertion". In this regard far more visitors appeared to associate wind farms with clean energy than with landscape damage, suggesting that they could help to promote Scotland's reputation as an environmentally friendly country as long as they are sensitively sited (NFO System Three, 2002). In addition, some tourists may choose to avoid areas with wind farms, but on current (albeit limited) evidence, wind farms seem unlikely to have more than small, localized impacts on tourism. However, the paper notes that this could change as more are built.

The key lesson for South Africa in this regard is that wind farms should be located in areas that minimize the potential impact on landscapes and as such also reduce the potential impact on tourism. This highlights the need for spatial information on sensitive landscapes.

Noise impacts

The study found that early wind turbines were criticized for being noisy, and this reputation has stuck. However, the research found that modern designs are remarkably quiet, allowing normal conversation underneath a working turbine. The paper notes that at a distance of 350 m, wind farms generate a noise level of 35–45 decibels (dB) (cf. a busy office: 60 dB; a quiet bedroom: 35 dB), and this is often difficult to detect above normal background sounds such as the noise of the wind (SDC, 2005). Research by Krohn and Damborg (1999) indicated that turbine noise affected very few people, however, for those few the impact can be significant.

Explaining public perceptions of wind farms

Research found that the media coverage in Scotland relating to wind farms gives the impression that the majority of the public are strongly opposed to this form of renewable energy. However, every survey of public attitudes, from the earliest days of wind power onwards, has found just the opposite. Both in the UK and across Europe, large majorities (often around 80%) support renewable energy generally and wind power specifically (Krohn & Damborg, 1999; Devine-Wright, 2005a; SDC, 2005; Wolsink, 2007b). The research therefore found that the strong, consistent support is at odds with the widespread local opposition.

The research also found temporal and spatial patterns in attitudes. In this regard, attitudes to wind farms often followed a U-shaped progression over a period of time (Gipe, 1995; Wolsink, 2007a). The initial positive support of the concept (when no nearby schemes are planned) became more critical when a local wind farm was proposed. This opposition then shifted towards more positive attitudes once locals had experienced the wind farm in operation. In this regard several studies found that the strongest support for wind farms is amongst those who have personal experience

of them (Fullilove, 2005) and/or those living closest to them (Braunholtz, 2003; Elliott, 2003; SEI, 2003). Some of the opposition arose from exaggerated perceptions of the likely negative impacts, fears which are often not realized (Elliott, 1994; Braunholtz, 2003).

However, the research found that over and above all these interacting influences, two factors are of particular importance in determining whether people support or oppose specific wind farm proposals. One is their perception and evaluation of the landscape impact, and the other is whether they and their community have a personal stake in the development. Both of these factors are relevant to the South African situation.

The Influence of landscape perceptions on attitudes

The paper notes that one of the few established empirical facts in the wind farm debate is that aesthetic perceptions, both positive and negative, are the strongest single influence on public attitudes (Pasqualetti et al., 2002; Warren et al., 2005; Wolsink, 2007b; Aitken et al., 2008). In addition, across Europe, the strength of anti-wind farm groups is strongly related to national attitudes to landscape protection; opposition is greatest in countries where landscapes are traditionally valued highly (Toke et al., 2008). In Scotland, the primary motivation of most opposition groups is the strong belief that wind farms despoil landscapes, whereas advocates of wind power typically perceive wind turbines as benign or positive features. 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 identifies two other factors that important in shaping people's perceptions of wind farms' landscape impacts. The first is the cumulative impact of increasing numbers of wind farms (Campbell, 2008). If people regard a region as having 'enough' wind farms already, then they may oppose new proposals. The second factor is the cultural context. Whereas in Scotland the landscape effects of wind farms are often described in negative terms, in places such as Denmark wind turbines have become an integral part of the cultural landscape. Despite the widely varying perceptions, one of the few areas of consensus in the Scottish debate is that landscape issues are central, and that if wind farms are to be built, sensitive siting in the landscape is critical.

The impact on landscapes is also likely to be a key issue in South Africa, specifically given South African's strong attachment to the land and the growing number of wind farm applications.

The Influence of ownership on attitudes

The research found that the second influential factor related to the issue of ownership. Experience across Europe indicated that wind power became more socially acceptable when local communities were directly involved in, and benefited from the developments. In Denmark, Germany, the Netherlands and Sweden, where wind farms have typically been funded and controlled by local cooperatives, there has long been widespread support for wind power (Redlinger et al., 2002; Meyer, 2007; Szarka, 2007). However, in Britain where the favored development approach

has been the private developer/public subsidy model, many proposals have faced stiff local opposition.

These findings have potentially important implications for the future development of the wind energy sector in South Africa and the support from locally affected communities.

In conclusion the paper notes that despite being very acrimonious, the wind farm debate has helped to reintroduce energy issues to the arena of public debate. This is a significant positive benefit. For many years, most people have used electricity with little or no regard for the environmental costs of energy production. The high profile debates over wind farms and the potential impact on the Scottish Highlands have highlighted the fact that societies energy needs do have environmental implications.

3.5.4 Potential health impacts from WEFs

This section summarises the key findings of a literature review undertaken by the Australian Health and Medical Research Council published in July 2010.

Effects of noise from wind turbines on human health

The health and well-being effects of noise on people can be classified into three broad categories:

- Subjective effects including annoyance, nuisance and dissatisfaction;
- Interference with activities such as speech, sleep and learning; and
- Physiological effects such as anxiety, tinnitus or hearing loss (Rogers, Manwell & Wright, 2006).

The findings of the literature review indicate that the measurement of health effects attributable to wind turbines is regarded as very complex. However, in summary the findings of the literature review indicated that:

- Sound from wind turbines does not pose a risk of hearing loss or any other adverse health effects in humans. Sub-audible, low frequency sounds and infrasound from wind turbines do not present a risk to human health (Colby, et al 2009).
- 'There is no reliable evidence that infra-sounds below the hearing threshold produce physiological or psychological effects' (Berglund & Lindvall 1995).
- Infrasound associated with modern wind turbines is not a source which will result in noise levels which may be injurious to the health of a wind farm neighbor (DTI, 2006);
- There is no peer-reviewed scientific evidence indicating that wind turbines have an adverse impact on human health (CanWEA, 2009).
- 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).

The overall conclusion of the review based on current evidence is that wind turbines do not pose a threat to health if planning guidelines are followed.

Effects of shadow flicker and blade glint on human health

The findings of the review found that the evidence on shadow flicker does not support a health concern (Chatham-Kent Public Health Unit, 2008) as the chance of conventional horizontal axis wind turbines causing an epileptic seizure for an individual experiencing shadow flicker is less than 1 in 10 million (EPHC, 2009). As with noise, the main impact associated with shadow flicker from wind turbines is annoyance.

With regard to blade glint, manufacturers of all major wind turbine blades coat their blades with a low reflectivity treatment, which prevents reflective glint from the surface of the blade. According to the Environment Protection and Heritage Council (EPHC) the risk of blade glint from modern wind turbines is considered to be very low (EPHC, 2009).

Effects of EMI from wind turbines on human health

Review found that Electromagnetic Fields (EMF) emanate from any wire carrying electricity and Australians are routinely exposed to these fields in their everyday lives. The same would apply to South Africans. In this regard the electromagnetic fields produced by the generation and export of electricity from a wind farm do not pose a threat to public health (Windrush Energy 2004). The closeness of the electrical cables between wind turbine generators to each other, and shielding with metal armor effectively eliminate any EMF (AusWEA, nd. b).

SECTION 4: ASSESSMENT OF KEY SOCIAL ISSUES

4.1 INTRODUCTION

Section 4 identifies the key social issues identified during the SIA study. The identification of social issues was based on:

- Review of project related information, including other specialist studies;
- Interviews with key interested and affected parties;
- Experience of the authors of the area and the local conditions;
- Experience with similar projects, including a number of WEFs.

In identifying the key issues the following assumption is made:

- The area identified for the proposed WEF meets the technical criteria required for such facilities.

4.2 IDENTIFICATION OF KEY SOCIAL ISSUES

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 proposed 33 kV on-site transmission line alternatives;
- Assessment of the “no development” alternative;
- Assessment of cumulative impacts.

The section also comments on the potential health impacts associated with WEFs. This issue is addressed under the operational phase.

4.3 POLICY AND PLANNING ISSUES/ “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.

“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. Thus, negatively expressed, should the findings of the SIA indicate that the proposed development, in its current proposed format, does not conform to

the developmental and spatial principles and guidelines contained in the relevant legislation and planning documents, and there are not any significant or unique opportunities created by the development, the development cannot be supported.

The review of the relevant planning and policy documents was undertaken as a part of the SIA. The key documents reviewed included:

- The National Energy Act (2008);
- The White Paper on the Energy Policy of the Republic of South Africa (December 1998);
- The White Paper on Renewable Energy (November 2003);
- Integrated Resource Plan (IRP) for South Africa (2010-2030);
- Northern Cape Provincial Growth and Development Strategy (2004-2014);
- Namakwa District Municipality Integrated Development Plan (2006-2011);
- Strategic Initiative to Introduce Commercial Land Based Wind Energy Development to the Western Cape. *Towards a Regional Methodology for Wind Energy Site Selection* (May 2006).

The findings of the review indicated that wind energy was 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;
- 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.

At a provincial level the NCPGDP notes that availability of inexpensive energy is a key requirement in order to promote economic growth in the Northern Cape. The NCGDS goes on to indicate that “the development of (renewable) energy sources (...) could be some of the means by which new economic opportunity and activity is generated in the Northern Cape”.

Based on this it is reasonable to assume that the establishment of WEFs is supported. However, the NCPGDS also states that the sustainable utilisation of the natural resource base on which agriculture depends is critical in the Northern Cape with its fragile ecosystems and vulnerability to climatic variation. The document also indicates that due to the Province’s exceptional natural and cultural attributes, it has the potential to become the preferred adventure and ecotourism destination in South Africa. Care therefore needs to be taken to ensure that the development of large renewable energy projects, such as the proposed solar energy facility, do not impact on the tourism potential of the Province.

At the local level the Namakwa DM IDP identifies the need for a Renewable Energy Cluster and sets a target of establishing wind farms with a capacity to generate 200 MW within 3 Municipal areas, including the Kamiesberg LM.

The findings of the review of the relevant policies and documents pertaining to the energy sector therefore indicate that wind energy and the establishment of appropriately sited WEFs are supported at a national, provincial and local level.

4.4 SOCIAL IMPACTS ASSOCIATED WITH THE CONSTRUCTION PHASE

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

Potential negative impacts

- Impacts associated with the presence of construction workers on site;
- Impact of heavy vehicles, including damage to roads, safety, noise and dust;

Annexure C contains the management plan for addressing social impacts.

4.4.1 Creation of employment and business opportunities

Based on the information provided by the proponent the construction phase is expected to extend over a period of 9 months and create approximately 83 employment opportunities. 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, services and power line.

Based on other renewable energy projects it is anticipated that approximately 53% (43) of the employment opportunities will be available to low-skilled workers (construction labourers, security staff etc.), 37% (30) for semi-skilled (drivers, equipment operators etc.) and 10% (8) to skilled personnel (engineers, land surveyors, project managers etc.). The majority of the low and semi-skilled employment opportunities are likely to be taken up by members from the local community. In this regard the majority of the beneficiaries are likely to be historically disadvantaged (HD) members of the community. The skilled positions are likely to be taken up by people from outside the area and be linked to the contractors appointed to construct the proposed WEF and associated infrastructure.

However, the low education and skills levels in the area have the impact on the potential opportunities for local communities. In this regard the proponents have indicated that training will be provided to ensure all work is undertaken to the specifications required for the wind farm. Given that wind turbines have very specific requirements related to both foundation construction and assembly, which most of the available labour will be unfamiliar with, training will be an important part of the process for most employees. The proponents have also indicated that further wind farms are planned for the area (at least 4) and these skills will therefore be in demand for a number of years to come.

Based on information provided by the proponent the capital expenditure is anticipated to be in the region of R 143 million (2011 rand). The wind turbines will also be manufactured in South Africa which will benefit the South African economy. However, given the technical nature of the project the potential opportunities for the local Kamiesberg economy and the towns of Koningnaas, Kleinzee and Garies are likely to be limited. Implementing the enhancement measures listed below can, however, assist to enhance these limited opportunities.

The implementation of the proposed enhancement measures listed below would enable the establishment of the proposed WEF to support co-operation between the public and private sectors in order for the economic development potential of the Northern Cape to be realised. In this regard the NCPGDS highlights the importance of enterprise development, and notes that the current levels of private sector development and investment in the Northern Cape are low. The proposed WEF therefore has the potential to create opportunities to promote private sector investment and the development of SMMEs in the Northern Cape Province.

The majority of construction workers are likely to be accommodated in Koingnaas and Kleinsee. The sector of the local economy that is therefore 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. However, these sectors do not appear to be well established or even present in Koingnaas and Kleinsee.

Based on information provided by the proponents the total wage bill for the 9 month construction phase will be in the region of R 3.125 million. Of this total 30% (R900 000) will accrue to low skilled workers, 30% (R900 000) to semi-skilled workers and 40% (R1.25 million) to skilled workers. The injection of income into the area in the form wages will represent a significant benefit, specifically given the limited income earning opportunities in the area since the closure of the mine in 2009.

A proportion of the total wage bill earned by construction workers over the 6-12 month construction phase is also likely to be spent in the regional and local economy which is benefit the local businesses in the area. However, as indicated above, the local business sector in Koingnaas and Kleinsee is not well established. The majority of the wage income earned by locals during the construction phase is therefore likely to be spent in towns such as Garies and Springbok. The benefits to the local economy will however be confined to the construction period (6-12 months).

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

Nature: Creation of employment and business opportunities during the construction phase		
	Without Mitigation	With Enhancement
Extent	Local – Regional (2) (Rated as 2 due to potential opportunities for local communities and businesses)	Local – Regional (3) (Rated as 3 due to potential opportunities for local communities and businesses)
Duration	Very Short Term (1)	Very Short Term (1)
Magnitude	Low (4)	Low (4)
Probability	Highly probable (4)	Highly probable (4)
Significance	Low (28)	Medium (32)
Status	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	N/A	N/A

Can impact be enhanced?	Yes	
Enhancement : See below		
Cumulative impacts: Opportunity to up-grade and improve skills levels in the area. However, due to relatively small number of local employment opportunities this benefit is likely to be limited.		
Residual impacts: Improved pool of skills and experience in the local area. However, due to relatively small number of local employment opportunities this benefit is likely to be limited.		

Assessment of No-Go option

There is no impact as it maintains the current status quo. The potential employment and economic benefits associated with the proposed WEF would therefore be forgone. The potential opportunity costs in terms of the capital expenditure, employment, skills development, and opportunities for local business are therefore regarded as a negative.

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, Just Palm Tree Power should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. However, due to the low skills levels in the area, the majority of skilled posts are likely to be filled by people from outside the area.
- Where feasible, efforts should be made to employ local contractors that are compliant with Black Economic Empowerment (BEE) criteria;
- Before the construction phase commences Just Palm Tree Power should meet with representatives from De Beers and the Kamiesberg Municipality to establish the existence of a skills database for the area. If such a database exists it should be made available to the contractors appointed for the construction phase.
- The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that Just Palm Tree Power intends following for the construction phase of the project.
- Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the construction phase.
- The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.

Business

- Just Palm Tree Power should seek to develop a database of local companies, specifically BEE 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, Just Palm Tree Power should assist local BEE companies to complete and submit the required tender forms and associated information.

- The Kamiesberg Municipality, in conjunction with the local Chamber of Commerce, 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.

4.4.2 Presence of construction workers in the area

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 the local community. In this regard the most significant negative impact is associated with the disruption of existing family structures and social networks. This risk is linked to the potential behaviour of male construction workers, including:

- An increase in alcohol and drug use
- An increase in crime levels
- The loss of girlfriends and or wives to construction workers
- An increase in teenage and unwanted pregnancies
- An increase in prostitution
- An increase in sexually transmitted diseases (STDs)

The findings of the SIA indicate that the potential risk posed by construction workers to local family structures and social networks is regarded as low. This is due to the relatively small number of construction workers (83), of which approximately 60-70 can be sourced from the local area. These workers will be from the local community and form part of the local family and social network and, as such, the potential impact will be low. Employing members from the local community to fill the low and semi-skilled job categories will therefore significantly reduce the risk and mitigate the potential impacts on the local communities. However, due to the potential mismatch of skills and low education levels, the potential employment opportunities for the members from these local communities may be low.

Table 4.2: Assessment of impact of construction workers on local communities

Nature: Potential impacts on family structures and social networks associated with the presence of construction workers		
	Without Mitigation	With Mitigation
Extent	Local (3) (Rated as 3 due to potential severity of impact on local communities)	Local (2) (Rated as 1 due to potential severity of impact on local communities)
Duration	Very Short term for community as a whole (1) Long term-permanent for individuals who may be affected by STD's etc (5)	Very Short term for community as a whole (1) Long term-permanent for individuals who may be affected by STD's etc (5)
Magnitude	Low for the community as a whole (4) High-Very High for specific individuals who may be affected by	Low for community as a whole (4) High-Very High for specific individuals who may be affected by STD's etc (10)

	STD's etc (10)	
Probability	Probable (3)	Probable (3)
Significance	Low for the community as a whole (24) Moderate-High for specific individuals who may be affected by STD's etc (57)	Low for the community as a whole (21) Moderate-High for specific individuals who may be affected by STD's etc (51)
Status	Negative	Negative
Reversibility	No in case of HIV and AIDS	No in case of HIV and AIDS
Irreplaceable loss of resources?	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods	
Can impact be mitigated?	Yes, to some degree. However, the risk cannot be eliminated	
Mitigation: See below		
Cumulative impacts: Impacts on family and community relations that may, in some cases, persist for a long period of time. Also in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.		
Residual impacts: See cumulative impacts.		

Assessment of No-Go option

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

Recommended mitigation measures

The potential risks associated with construction workers can be mitigated. The aspects that should be covered include:

- Where possible, Just Palm Tree Power should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically semi and low-skilled job categories. This will reduce the potential impact that this category of worker could have on local family and social networks;
- Just Palm Tree Power should consider the establishment of a Monitoring Forum (MF) for the construction phase which should be established before the construction phase commences and should include key stakeholders, including representatives from the local community, local councillors, De Beers and the contractor. The role of the MF would be to monitor the construction phase and the implementation of the recommended mitigation measures. The MF should also be briefed on the potential risks to the local community associated with construction workers;
- Just Palm Tree Power and the contractor should, in consultation with representatives from the MF, develop a Code of Conduct for the construction phase. The code should identify what types of behaviour and activities by construction workers are not permitted. Construction workers that breach the code of good conduct should be dismissed. All dismissals must comply with the South African labour legislation;

- Just Palm Tree Power and the contractor should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase;
- The movement of construction workers on and off the site should be closely managed and monitored by the contractors. In this regard the contractors should be responsible for making the necessary arrangements for transporting workers to and from site on a daily basis;
- The contractor should make the necessary arrangements for allowing workers from outside the area to return home over weekends and or on a regular basis during the 9 month construction phase. This would reduce the risk posed by construction workers to local family structures and social networks;
- The contractor should make the necessary arrangements to ensure that workers from outside the area leave the area on completion of the construction phase. This would reduce the risk posed by construction workers 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 overnight on the site. This will make it possible to manage the potential impacts effectively.

4.4.3 Impact of construction vehicles

The movement of heavy construction vehicles during the construction phase has the potential to damage roads and create noise, dust, and safety impacts for other road users and local communities in the area, specifically the residents living adjacent to the N7-Hondeklip Bay Road. However, the findings of the SIA indicate that the number of potentially affected households is low. In addition, the current road use frequency is low. The social impacts associated with the movement of construction related traffic are therefore likely to be low.

Table 4.3: Assessment of the impacts associated with construction vehicles

Nature: Potential noise, dust and safety impacts associated with movement of construction related traffic to and from the site		
	Without Mitigation	With Mitigation
Extent	Local (2)	Local (1)
Duration	Very Short Term (1)	Very Short Term (1)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Low (21)	Low (12)
Status	Negative	Negative
Reversibility	Yes	
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Mitigation: See below		
Cumulative impacts: If damage to roads is not repaired then this will affect the farming activities in the area and result in higher maintenance costs for vehicles of local farmers and other road users. The costs will be borne by road users who were no responsible for the		

damage.

Residual impacts: See cumulative impacts

Assessment of No-Go option

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

Recommended mitigation measures

The potential impacts associated with heavy vehicles and dust can be effectively mitigated. The aspects that should be covered include:

- The contractor must ensure that damage caused to roads by the construction related activities, including heavy vehicles, is repaired before the completion of the construction phase. The costs associated with the repair must be borne by the contractor;
- Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers;
- All vehicles must be road-worthy and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.

4.5 SOCIAL IMPACTS ASSOCIATED WITH OPERATIONAL PHASE

The key social issues affecting the operational phase include:

Potential positive impacts

- Creation of employment and business opportunities. The operational phase will also create opportunities for skills development and training;
- Establishment of a Community Trust and source of income for the local communities;
- The establishment of renewable energy infrastructure.

Potential negative impacts

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

Annexure C contains the management plan for the addressing social impacts.

4.5.1 Creation of employment and business opportunities

Based on information provided by the proponent the WEF would employ approximately 10 fulltime employees. Of this total 3 of the posts will low skilled, 5 semi-skilled and 2 skilled. The potential employment opportunities will therefore be limited. The proponent has indicated that they are committed to employing people from the local communities and implementing a training and skills development program for local community members. This would support the strategic goals of promoting local employment and skills development contained in the Northern Cape Growth and Development Plan.

Table 4.4: Impact assessment of employment and business creation opportunities

Nature: Creation of employment and business opportunities associated with the operational phase		
	Without Mitigation	With Enhancement
Extent	Local and Regional (2)	Local and Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Low (24)	Low (27)
Status	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
Enhancement: See below		
Cumulative impacts: Creation of permanent employment and skills and development opportunities for members from the local community and creation of additional business and economic opportunities in the area		
Residual impacts: See cumulative impacts		

Assessment of No-Go option

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

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:

- Just Palm Tree Power 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.

4.5.2 Establishment of a Community Trust

Just Palm Tree Power has indicated that they are committed to establishing a Community Trust as a part owner of the project. In terms of the agreement a percentage of the dividends from the project will accrue to the Community Trust. This revenue will in turn be used to fund and support local economic development. The Community Trust will own ~ 10% of the project. Project partner, Just Energy, is establishing similar trusts on its other wind projects around the country and has invested significant effort in ensuring that these trusts are well run and managed to

ensure that they are open, equitable and accountable in their use of funds. In terms of the funding model, a percentage of the ownership will be donated to the community, while the remainder will be funded via a loan sourced at a competitive interest rate. The dividends from the project will then be used to pay off the loan. Once the loan has been repaid all of the dividends will accrue to the Trust. This is likely to be after year 5-6 of the project. Although it's a relatively small project, these revenues will still provide a real and on-going support to local economic development activities. In an area that has been dependent upon mining and where there are limited employment opportunities this is regarded as a significant social benefit.

De Beers is the current land owner, but is in the process of disposing of the site. They are charging the project a market based lease which they have previously committed to donate to community projects as part of their Corporate Social Responsibility programme. If the site is donated to the community, the money from the lease will also benefit the community.

As indicated above, mining stopped at the Koingnaas Mine in June 2009 and more than 3 600 people retrenched. The mine now only employs ~90 permanent staff at the Koingnaas/Kleinsee operations and only 8 households still live in Koingnaas. The rest of the town is vacant. The mine should reopen in June 2012 when Transhex take over operations from De Beers. However, scale of mining will be significantly smaller. The establishment of the proposed WEF is therefore strongly supported (Kenny McDonald Mine SHE Manager, pers comm.)

Table 4.5: Impact assessment of establishment of a Community Trust

Nature: Creation of a Community Trust that can be used to fund development initiatives in the area		
	Without Mitigation	With Enhancement (Assumes establishment of well managed Community Trust)
Extent	Local and Regional (2)	Local and Regional (4)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Moderate (6)
Probability	Probable (3)	Definite (5)
Significance	Low (24)	High (70)
Status	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
Enhancement: See below		
Cumulative impacts: Generation of income that can be used to fund and support economic initiatives and projects in the area, which in turn can create employment, skills and development opportunities for members from the local community and creation of additional business and economic opportunities in the area		

Residual impacts: See cumulative impacts

Assessment of No-Go option

There is no impact as it maintains the current status quo. However, the potential opportunity costs in terms of the lost opportunity to generate funds to fund local economic initiatives would represent a negative impact, specifically in an area that has been negatively impacted by the recent closure of the mines.

Recommended enhancement measures

The key enhancement measure is the establishment of a well-managed Community Trust. The revenue for the Trust would be derived from the income generated from the sale of energy from the WEF. The Community Trust should be linked to funding and supporting local community projects and initiatives in the area.

4.5.3 Development of clean, renewable energy infrastructure

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 (19th) and Eskom, as an energy utility, has been identified as the world's second largest producer carbon emissions (Cape Times, 15 November 2007). The establishment of a clean, renewable energy facility will therefore reduce, albeit minimally, South Africa's reliance on coal-generated energy and the generation of carbon emissions into the atmosphere.

The overall contribution to South Africa's total energy requirements of the proposed WEF is relatively small. However, the 10 MW produced will help to offset the total carbon emissions associated with energy generation in South Africa. Given South Africa's reliance on Eskom as a power utility, the benefits associated with an IPP based on renewable energy are regarded as an important contribution.

The proposed establishment of the Koingnaas WEF also support the objective set out in the Namakwa DM of developing a Renewable Energy Cluster and establishing wind farms with a capacity to generate 200 MW within 3 Municipal areas, including the Kamiesberg LM.

Table 4.6: Development of clean, renewable energy infrastructure

Nature: Promotion of clean, renewable energy		
	Without Mitigation	With Mitigation (The provision of renewable energy infrastructure is in itself a mitigation measure)
Extent	Local, Regional and National (4)	Local, Regional and National (4)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	Medium (48)	Medium (48)
Status	Positive	Positive
Reversibility	Yes	

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

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.

Recommended mitigation measures

The establishment of the proposed facility is a mitigation measure in itself. In order to maximise the benefits of the proposed project Just Palm Tree Power should:

- Use the project to promote and increase the contribution of renewable energy to the national energy supply;
- 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 employed during the operational phase of the project.

4.5.4 Visual impact and impact on sense of place

The components associated with the proposed facility will have a visual impact and, in so doing, impact on the landscape and rural sense of the place of the area. As indicated previously, the NCPGDS does indicate that the province does have 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 not impact on visual character and sense of place of the landscape.

However, having said this, the proposed Koingnaas WEF is located in an area that has been disturbed by diamond mining over the last 70 years. In this regard the proposed site is compatible with a key consideration listed in the Western Cape Strategic Regional Methodology for Wind Energy Site Selection (May 2006). In this regard the strategy recommends focusing on existing disturbed rural landscapes, and in particular, those rural landscapes that have already been "vertically compromised" by the location, for example, of transmission lines, railway lines, and all phone towers. In this regard, the proposed Koingnaas WEF site is located in an area where the natural landscape has been impacted upon by overburden dumps associated with diamond mining activities.

In addition the proposed WEF will be screened from the houses in Koingnaas by the existing overburden dump. The site will however be visible from the N7-Hondeklip road that provides access to Koingnaas.

The key findings of the specialist visual impact assessment (VIA) (MetroGIS, September, 2011) are summarized below.

Potential visual impact on users of secondary roads in close proximity to the proposed facility

Visual impacts on secondary roads within a radius of 6km of the proposed facility are expected to be of **high** significance.

Potential visual impact on residents of small towns in close proximity to the proposed facility

The visual impact on the town of Koingnaas is expected to be of **high** significance.

Potential visual impact on sensitive visual receptors (users of roads and residents of small towns) within the region

The visual impact users of secondary roads and on small towns within the region (i.e. beyond the 6km radius), is expected to be of **moderate** significance

Potential visual impact on the Namaqua National Park

The visual impact on tourists and visitors to the Namaqua National Park is expected to be **low**. Of relevance is the location of the proposed WEF within this Park's *Viewshed Protection Zone*. However, it should also be noted that this area, which lies within a mining area, is already transformed by existing surface based mining.

Potential visual impact of the proposed facility on the visual character and sense of place of the region

Specific aspects contributing to the sense of place of this region include the rugged natural beauty of the west coast environment and the undeveloped, wide open spaces beyond. It should be noted, however, that this description of sense of place excludes the 5km wide strip along the coast line, where surface based mining is taking place. This zone has been significantly altered.

The anticipated visual impact of the facility on the regional visual character, and by implication, on the sense of place, is expected to be **moderate**

In conclusion the VIA notes that the anticipated visual impacts listed above (i.e. post mitigation impacts) are not considered to be fatal flaws from a visual perspective, considering the relatively contained area of potential visual exposure, the low occurrence of visual receptors and the already transformed nature of the mining areas.

Table 4.7: Visual impact and impact on sense of place

Nature: Visual impact associated with the proposed Wind Energy facility and the potential impact on the areas rural sense of place.		
	Without Mitigation	With Mitigation
Extent	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	Medium (40)	Medium (40)
Status	Negative	Negative
Reversibility	Yes, facility can be removed.	
Irreplaceable loss of resources?	No	
Can impact be mitigated?	Yes	
Mitigation: See below		
Cumulative impacts: Potential impact on current rural sense of place		
Residual impacts: See cumulative impacts		

Assessment of No-Go option

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

Recommended mitigation measures

The recommendations contained in the VIA should be implemented.

4.5.5 Impact on tourism

The NCPGDS notes that the sustainable utilisation of the natural resource base on which agriculture depends is critical in the Northern Cape with its fragile ecosystems and vulnerability to climatic variation. The document also indicates that due to the provinces exceptional natural and cultural attributes, it has the potential to become the preferred adventure and ecotourism destination in South Africa. Therefore caution must be taken to ensure that the development of large renewable energy projects, such as the proposed Koingnaas WEF, do not affect the tourism potential of the Province. However, based on the findings of the site visit, the proposed facility is not likely to impact on the tourism sector in the area or the Province. Due to the area's history and location the number of tourists visiting the area is limited. Tourism is, however, likely to be one of the only economic sectors that have the potential to support future economic development in the area. However, the landscape in the area has been disturbed by mining and is no longer in a pristine condition. The proposed Koingnaas WEF will therefore not impact on a pristine, undisturbed environment. The significance of this issue is therefore rated as low negative. In some instances the plant may also attract tourists to the area. However, the significance of this potential benefit is also rated as low positive. In addition, the potential negative impact on tourism would be off-set by the generation of revenue for the Community Trust (see above).

The findings of the VIA indicate that the anticipated visual impact of the facility on existing tourist routes, as well as on the tourism potential of the region, is expected to be **low**.

Table 4.8: Impact on tourism

Nature: Potential impact of the WEF on local tourism		
	Without Mitigation	With Enhancement / Mitigation
Extent	Local (2)	Local (3)
Duration	Long term (4)	Long term (4)
Magnitude	Low (2)	Low (2)
Probability	Probable (3)	Probable (3)
Significance	Low (24) (Applies to both – and +)	Low (27) (Applies to both – and +)
Status	Negative (Potential to distract from the tourist experience of the area) Positive (Potential to attract people to the area)	Negative (Potential to distract from the tourist experience of the area) Positive (Potential to attract people to the area)
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
Enhancement: See below		
Cumulative impacts: Potential negative and or positive impact on tourism in the Kamiesberg Municipality Area.		
Residual impacts: See cumulative impacts		

Assessment of No-Go option

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

Recommended enhancement measures

In terms of mitigating the visual impacts, it is virtually impossible to hide the facility. The impact on the sense of place of the area cannot therefore be effectively mitigated. In terms of efforts to enhance the proposed benefits to tourism:

- Just Palm Tree Power should liaise with representatives from the Kamiesberg Municipality and local tourism representatives to raise awareness of the proposed facility and the Community Trust;
- Just Palm Tree Power should investigate the option of establishing a renewable energy information board near the site. The information board should include information on the Community Trust.

4.6 ASSESSMENT POWER LINE OPTIONS

The proposed Koingnaas WEF will require a short power line to connect the facility to the De Beers mine's existing Koingnaas substation. Two alternatives have been identified, namely, Alternative 2A, ~2.7 km in length, and Alternative 2B, ~3 km in length. Both alternatives follow existing roads for the most part. Alternative 2A is however screened from the N7-Hondeklip Bay Road by an existing overburden dump for the majority of its length and is therefore the preferred option (Figure 1.3). However, the social impacts associated with both Alternative 2A and 2B are both regarded as low given the existing mining related disturbances.

The findings of the VIA indicate that the visual impacts associated with the power line alternatives is of **moderate** significance.

Table 4.9: Assessment of transmission line options

Nature: Potential visual impact and impact on sense of place associated with power lines		
	Without Mitigation	With Mitigation
Extent	Local (2)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Low (24)	Low (21)
Status	Negative	Negative
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impact be mitigated?	Yes	
Enhancement: See below		
Cumulative impacts: Limited visual and impact on sense of place		
Residual impacts: See cumulative impacts		

Assessment of No-Go option

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

Recommended mitigation measures

The recommendations contained in the VIA should be implemented. The measures listed above to address the potential impacts associated with the construction phase also apply to the construction of the power line.

4.7 POTENTIAL HEALTH IMPACTS

The potential health impacts typically associated with WEFs include, noise, shadow flicker and electromagnetic radiation. As indicated in Section 4.5.5, 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 Koingnaas WEF is of low significance.

4.8 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 (Cape Times, 15 November 2007).

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 would also result in a lost opportunity to generate much needed funding for local projects via the revenue paid into the Community Trust from the operation of the WEF. This also represents a negative social cost.

Table 4.10: Assessment of no-development option

Nature: The no-development option would result in the lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy and also lost opportunity to establish and fund a Community Trust		
	Without Mitigation	With Mitigation
Extent	Local-International (5)	Local-International (5)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	High (60)	High (60)
Status	Negative	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	Yes, impact of climate change on ecosystems	
Can impact be	Yes	

mitigated?		
Enhancement: See below		
Cumulative impacts: Reduce carbon emissions via the use of renewable energy and associated benefits in terms of global warming and climate change. Opportunity to support economic development in the area.		
Residual impacts: See cumulative impacts		

Recommended enhancement measures

The proposed facility should be developed and the mitigation and enhancement measures identified in the SIA and other specialist studies should be implemented, including the establishment of the Community Trust. However, the impact of other WEFs on the areas sense of place and landscape are issues need to be addressed in the location, design and layout of the proposed plant.

4.9 ASSESSMENT OF CUMULATIVE IMPACTS

The Australian Wind Farm Development Guidelines (Draft, July 2010) indicate that the cumulative impact of multiple wind farm facilities is likely to become an increasingly important issue for wind farm developments in Australia. This is also likely to be the case in South Africa. In terms of assessing cumulative impacts, the Scottish Natural Heritage (2005) describes a range of potential cumulative landscape impacts of wind farms on landscapes, including:

- 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 peoples perception and relationship with the landscape. In the South African context, the majority of South Africans have a strong connection with and affinity for the large, undisturbed open spaces that are characteristic of the South African landscape.

The impact of WEFs on the landscape is therefore likely to be a key issue in South Africa, specifically given South African's strong attachment to the land and the growing number of WEF applications. With regard to the area, a number of WEFs have been proposed for the area in and around Koingnaas and Kleinzee. However, these areas have been extensively disturbed by diamond mining and the landscape is dotted with both large and small overburden dumps. The proposed WEFs are therefore located in an area that is not pristine and is, in many regards, very well suited for the establishment of wind turbines. In addition the area is sparsely populated. The Northern Cape Environmental Authorities should nonetheless take into account the potential cumulative impacts when evaluating applications.

Table 4.11: Cumulative impacts on sense of place and the landscape

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

Assessment of No-Go option

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

Recommended mitigation measures

The establishment of a number of WEFs in the area does have the potential to have a negative cumulative impact on the areas sense of place and the landscape. However, these areas have been extensively disturbed by diamond mining and the landscape is

dotted with both large and small overburden dumps. The proposed WEFs are therefore located in an area that is not pristine and is in many regards very well suited for the establishment of wind turbines. In addition the area is sparsely populated. Despite this the environmental authorities should consider the overall cumulative impact on the rural character and the areas sense of place before a final decision is taken with regard to the optimal number of such plants in an area.

4.10 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 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.

In addition, the social impacts associated with final decommissioned are likely to be limited due to the relatively small number of permanent employees (10) affected. The potential impacts associated with the decommissioning phase can also be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be Low (negative).

Recommended mitigation measures

The following mitigation measures are recommended:

- Just Palm Tree Power should ensure that retrenchment packages are provided for all staff who stand to lose their jobs when the plant is decommissioned;
- All structures and infrastructure associated with the proposed facility should be dismantled and transported off-site on decommissioning;
- Just Palm Tree Power 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.

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

The section also comments on the potential health impacts associated with solar facilities.

5.2.1 Policy and planning issues

The key documents reviewed included:

- The National Energy Act (2008);
- The White Paper on the Energy Policy of the Republic of South Africa (December 1998);
- The White Paper on Renewable Energy (November 2003);
- Integrated Resource Plan (IRP) for South Africa (2010-2030);
- Northern Cape Provincial Growth and Development Strategy (2004-2014);
- Namakwa District Municipality Integrated Development Plan (2006-2011);
- Strategic Initiative to Introduce Commercial Land Based Wind Energy Development to the Western Cape. *Towards a Regional Methodology for Wind Energy Site Selection* (May 2006).

The findings of the review indicated that wind energy is strongly supported at a national, provincial, and local level. Based on this it is reasonable to assume that the establishment of the proposed Koinaas WEF is supported.

At a provincial level the NCPGDP notes that availability of inexpensive energy is a key requirement in order to promote economic growth in the Northern Cape. The NCGDS goes on to indicate that “the development of (renewable) energy sources (...) could be some of the means by which new economic opportunity and activity is generated in the Northern Cape”.

At the local level the Namakwa DM IDP identifies the need for a Renewable Energy Cluster and sets a target of establishing wind farms with a capacity to generate 200 MW within 3 Municipal areas, including the Kamiesberg LM, within which the proposed project is located.

5.2.2 Construction phase

The key social issues associated with the construction phase include:

Potential positive impacts

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

The construction phase is expected to extend over a period of 9 months and create approximately 83 employment opportunities. Approximately 53% (44) of the employment opportunities will be available to low-skilled workers (construction labourers, security staff etc.), 37% (30) for semi-skilled (drivers, equipment operators etc.) and 10% (8) to skilled personnel (engineers, land surveyors, project managers etc.). The majority of the low and semi-skilled employment opportunities are likely to be taken up by members from the local community. In this regard the majority of the beneficiaries are likely to be historically disadvantaged (HD) members of the community. The skilled positions are likely to be taken up by people from outside the area and be linked to the contactors appointed to construct the proposed WEF and associated infrastructure.

The total wage bill for the 9 month construction phase will be in the region of R 3.125 million. Of this total 30% (R900 000) will accrue to low skilled workers, 30% (R900 000) to semi-skilled workers and 40% (R1.25 million) to skilled workers. The injection of income into the area in the form of wages will represent a significant benefit, specifically given the limited income earning opportunities in the area since the closure of the mine in 2009.

The low education and skills levels in the area have the potential to impact on the potential opportunities for local communities. In this regard the proponents have indicated that training will be provided to ensure all work is undertaken to the specifications required for the wind farm.

The capital expenditure is anticipated to be in the region of R 143 million (2011 rand). The wind turbines for the project will be manufactured in South Africa and this will benefit the South African economy. However, given the technical nature of the turbines the potential opportunities for the local Kamiesberg economy and the towns of Koingnaas, Kleinsee and Garies are likely to be limited. Implementing the enhancement measures listed in the report can, however, assist to enhance these limited opportunities. The proposed WEF also has the potential to create opportunities to promote private sector investment and the development of SMMEs in the Northern Cape Province. In this regard the NCPGDS highlights the importance

of enterprise development, and notes that the current levels of private sector development and investment in the Northern Cape are low.

Potential negative impacts

- Influx of construction workers employed on the project;
- Impact of heavy vehicles, including damage to roads, safety, noise and dust;

The significance of the potential negative impacts with mitigation was assessed to be of Low significance. All of the potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented. However, the impact on individuals who are directly impacted on by construction workers and or job seekers (i.e. potential to contract HIV/ AIDS) was assessed to be of Medium-High negative significance. However, due to the relatively small size of the labour force (83) and the potential risk to local family structures and social networks is regarded as low. The majority of the low and semi-skilled employment opportunities will also be taken up by members from the local community which will also reduce the potential risks to local family structures and social networks. Potential opportunities also exist for skilled workers who used to be employed on the mine.

Table 5.1 summarises the significance of the impacts associated with the construction phase.

Table 5.1: Summary of social impacts during construction phase

Impact	Significance No Mitigation/ Enhancement	Significance With Mitigation/ Enhancement
Creation of employment and business opportunities	Low (Positive impact)	Medium (Positive impact)
Presence of construction workers and potential impacts on family structures and social networks	Low (Negative impact for community as a whole) Medium-High (Negative impact of individuals)	Low (Negative impact for community as a whole) Medium-High (Negative impact of individuals)
Impact of heavy vehicles and construction activities	Low (Negative impact)	Low (Negative impact)

5.2.3 Operational phase

The key social issues affecting the operational phase include:

Potential positive impacts

- Creation of employment and business opportunities. The operational phase will also create opportunities for skills development and training;
- Establishment of Community Trust;
- The establishment of infrastructure to generate renewable energy.

The proposed development will create 10 permanent employment opportunities. The potential employment opportunities will therefore be limited. The proponent has, however, indicated that they are committed to employing people from the local communities and implementing a training and skills development program for local

community members. This would support the strategic goals of promoting local employment and skills development contained in the Northern Cape Growth and Development Plan.

Just Palm Tree Power has also indicated that they are committed to establishing a Community Trust as a part owner of the project. In terms of the agreement a percentage of the dividends from the project will accrue to the Community Trust. This revenue will in turn be used to fund and support local economic development. The Community Trust will own ~ 10% of the project. In terms of the funding model, a percentage of the ownership will be donated to the community, while the remainder will be funded via a loan sourced at a competitive interest rate. The dividends from the project will then be used to pay off the loan. Once the loan has been repaid all of the dividends will accrue to the Trust. This is likely to be after year 5-6 of the project. Although it's a relatively small project, these revenues will still provide funding over a 20 year period that will be used to support local economic development activities. In an area that has been dependent upon mining and where there are limited employment opportunities this is regarded as a significant social benefit.

The proposed development also represents an investment in infrastructure for the generation of clean, renewable energy, which, given the challenges created by climate change, represents a positive High social benefit for society as a whole.

Potential negative impacts

- The visual impacts and associated impact on sense of place and the landscape;
- Impact on tourism.

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

However, having said this, the proposed Koingnaas WEF is located in an area that has been disturbed by diamond mining over the last 70 years. In this regard the proposed site is compatible with a key consideration listed in the Western Cape Strategic Regional Methodology for Wind Energy Site Selection (May 2006). The strategy recommends focusing on existing disturbed rural landscapes, and in particular, those rural landscapes that have already been "vertically compromised" by the location, for example, of transmission lines, railway lines, and all phone towers. In the case of the proposed Koingnaas WEF the site is located in an area where the natural landscape has been impacted upon by overburden dumps associated with diamond mining activities. The site is therefore located in an area that is well suited for the establishment of WEFs. In addition the WEF is relatively small in terms of both the total number of turbines (23) and the height (35 m).

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

Table 5.2: Summary of social impacts during operational phase

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

5.2.4 Assessment of cumulative impacts

6 The cumulative impacts associated with WEFs, such as the proposed Koingnaas WEF, are largely linked to the impact on sense of place and visual impacts. With regard to the area, a number of WEFs have been proposed for the area in and around Koingnaas and Kleinzee. However, these areas have been extensively disturbed by diamond mining and the landscape is dotted with both large and small overburden dumps and other mining infrastructure. The proposed WEFs are therefore located in an area that is not pristine and is, in many regards, very well suited for the establishment of wind turbines. In addition the area is sparsely populated. The significance of the potential cumulative social impacts, specifically the impact on the landscape, is therefore rated to be low.

7

8 However, it is recommended that the Department of Environmental Affairs consider the overall cumulative impact on the areas sense of place before a final decision is taken with regard to the optimal number of WEFs in the area.

8.1.1 Transmission line options

The findings of the SIA indicate that the impacts associated with the proposed overhead power line will be low. The preferred Alternative is 2A.

8.1.2 Potential health impacts

The potential health impacts typically associated with WEFs include, noise, shadow flicker and electromagnetic radiation. As indicated in Section 4.5.5, 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 Koingnaas WEF is of low significance.

8.1.3 Assessment of no-development option

The No-Development option would represent a lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy. Given South Africa's position as one of the highest per capita producer of carbon emissions in the world, this would represent a High negative social cost.

The no-development option also represents a lost opportunity in terms of the employment and business opportunities (construction and operational phase) and for the establishment of a Community Trust. This also represents a negative social cost. In addition, the opportunity to manufacture the wind turbines locally will also be lost.

8.1.4 Decommissioning phase

Typically, the major social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income. This has implications for the households who are directly affected, the communities within which they live, and the relevant local authorities. However, in the case of the 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 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.

In addition, the social impacts associated with final decommissioned are likely to be limited due to the relatively small number of permanent employees (10) affected. The potential impacts associated with the decommissioning phase can also be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be Low (negative).

Just Palm Tree Power should also 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 25-30 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.

8.2 CONCLUSIONS AND RECOMMENDATIONS

The findings of the SIA indicate that the Koingnaas WEF will create employment and business opportunities for locals during both the construction and operational phases of the project. While these opportunities are likely to be limited, the mitigation measures listed in the report should be implemented in order to enhance them. In addition, the proposed development will also create an opportunity to establish a Community Trust that will be funded from revenue generated by the WEF. The revenues will provide funding to support local economic development activities. In an area that has been dependent upon mining and where there are limited employment opportunities this is regarded as a significant social benefit. The mitigation measures listed in the report to address the potential negative impacts during the construction phase should also be implemented.

The findings of the SIA also indicate that the proposed WEF is located in an area that has been disturbed by diamond mining and is, in many regards, very well suited for the establishment of wind turbines. In addition the area is sparsely populated. The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the challenges created by climate change, represents a positive social benefit for society as a whole. The establishment of the proposed Koingnaas WEF is therefore supported by the findings of the SIA.

However, the potential impacts associated with WEFs on an area's sense of place and landscape cannot be ignored. These impacts are an issue that will need to be addressed by the relevant environmental authorities.

8.3 IMPACT STATEMENT

The findings of the SIA undertaken for the proposed Koingnaas WEF indicate that the development will create employment and business opportunities for locals during both the construction and operational phase of the project. During the operational phase the major benefits associated with the proposed WEF will be associated with the Community Trust that will be established as part of the project. The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the challenges created by climate change, represents a positive social benefit for society as a whole.

The proposed WEF is also located in an area that has been disturbed by mining and is therefore well suited for the establishment of WEFs. It is therefore recommended that the facility as proposed be supported, subject to the implementation of the recommended mitigation measures and management actions contained in the report.

ANNEXURE A

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ANNEXURE B

METHODOLOGY FOR THE ASSESSMENT OF POTENTIAL IMPACTS

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

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

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

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

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

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

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

ANNEXURE C

ENVIRONMENTAL MANAGEMENT PLAN: SIA

CONSTRUCTION PHASE

Creation of employment and business opportunities

OBJECTIVE: Maximise local employment and business opportunities associated with the construction phase.

Project component/s	Construction and establishment activities associated with the establishment of the WEF, including infrastructure etc.	
Potential Impact	The opportunities and benefits associated with the creation of local employment and business should be maximised.	
Activity/risk source	The employment of outside contractors to undertake the work and who make use of their own labour will reduce the employment and business opportunities for locals. Employment of local labour will maximise local employment opportunities.	
Mitigation: Target/Objective	Just Palm Tree Power, in discussions with the Kamiesberg Municipality, should aim to employ a minimum of 80% of the low-skilled workers from the local area. This should also be made a requirement for all contractors. Just Palm Tree Power should also develop a database of local BEE service providers	
Mitigation: Action/control	Responsibility	Timeframe
<ul style="list-style-type: none"> • Attempt to employ a minimum of 80% of the low-skilled workers are sourced from the local area; • Where required, implement appropriate training and skills development programmes prior to the initiation of the construction phase to ensure that 80% target is met. • Skills audit to be undertaken to determine training and skills development requirements; • Develop a database of local BEE service providers and ensure that they are informed of tenders and job 	<ul style="list-style-type: none"> • Just Palm Tree Power & contractors • Just Palm Tree Power • Just Palm Tree Power • Just Palm Tree Power 	<ul style="list-style-type: none"> • Employment and business policy document that sets out local employment targets to be in place before construction phase commences. • Where required, training and skills development programmes to be initiated prior to the initiation of the construction phase. • Skills audit to determine need for training and skills development programme undertaken within 1 month of commencement of construction phase commences. • Database of potential local

opportunities; • Identify opportunities for local businesses	potential for local	• Just Palm Tree Power	BEE services providers to be completed before construction phase commences.
Performance Indicator	<ul style="list-style-type: none"> • Employment and business policy document that sets out local employment and targets completed before construction phase commences; • 80% of semi and unskilled labour locally sourced. • Database of potential local BEE services providers in place before construction phase commences. • Skills audit to determine need for training and skills development programme undertaken within 1 month of commencement of construction phase. 		
Monitoring	<ul style="list-style-type: none"> • Just Palm Tree Power and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase. 		

Impact associated with presence of construction workers

OBJECTIVE: Avoid the potential impacts on family structures and social networks associated with presence of construction workers from outside the area

Project component/s	Construction and establishment activities associated with the establishment of the WEF, including infrastructure etc.		
Potential Impact	The presence of construction workers who live outside the area and who are housed in local towns can affect family structures and social networks.		
Activity/risk source	The presence of construction workers can impact negatively on family structures and social networks, especially in small, rural communities.		
Mitigation: Target/Objective	To avoid and or minimise the potential impact of construction workers on the local community. This can be achieved by maximising the number of locals employed during the construction phase and minimising the number of workers housed on the site.		
Mitigation: Action/control	Responsibility	Timeframe	
<ul style="list-style-type: none"> • Attempt to ensure that a minimum of 80% of the low-skilled workers are sourced from the local area. This should be included in the tender documents. Construction workers should be recruited from the local towns in the area. • Local construction workers should be able to provide proof of having lived in the area for five years or longer. 	<ul style="list-style-type: none"> • Just Palm Tree Power and contractors • Just Palm Tree Power 	<ul style="list-style-type: none"> • Identify suitable local contractors prior to the tender process for the construction phase. • Tender documents for contractors include conditions set out in SIA, including transport of workers home over weekends, transportation of workers home on completion of construction phase, 	

<ul style="list-style-type: none"> • Identify local contractors who are qualified to undertake the required work. • Consider establishing a Monitoring Forum (MF) consisting of representatives from the local community, local police, local farming community and the contractor prior to the commencement of the construction phase. • Develop a Code of Conduct to cover the activities of the construction workers housed on the site. • Ensure that construction workers housed attend a briefing session before they commence activities. The aim of the briefing session is to inform them of the rules and regulations governing activities on the site as set out in the Code of Conduct. • Ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct. • Ensure that construction workers who are found guilty of breaching the Code of Conduct are dismissed. All dismissals must be in accordance with South African labour legislation. • Provide opportunities for workers to go home over weekends. The cost of transporting workers home over weekends and back to the site should be borne by the contractors. • On completion of the construction phase all construction workers must be transported back to their place of origin within two days of their contract ending. The costs of 	<ul style="list-style-type: none"> • Just Palm Tree Power • Just Palm Tree Power • Just Palm Tree Power and contractors • Just Palm Tree Power and contractors • Contractors • Contractors • Contractors 	<p>establishment of MF etc,</p> <ul style="list-style-type: none"> • MF established before construction phase commences. • Code of Conduct drafted before construction phase commences. • Briefing session for construction workers held before they commence work on site.
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transportation must be borne by the contractor.		
Performance Indicator	<ul style="list-style-type: none"> • Employment policy and tender documents that sets out local employment and targets completed before construction phase commences; • 80% of semi and unskilled labour locally sourced; • Local construction workers employed have proof that they have lived in the area for five years or longer; • Tender documents for contractors include recommendations for construction camp; • MF set up prior to implementation of construction phase; • Code of Conduct drafted before commencement of construction phase; • Briefing session with construction workers held at outset of construction phase; 	
Monitoring	<ul style="list-style-type: none"> • Just Palm Tree Power and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase. 	

Impact of dust and noise due to heavy vehicles and damage to roads

OBJECTIVE: To avoid and or minimise the potential impacts of safety, noise and dust and damage to roads caused by construction vehicles during the construction phase.

Project component/s	Construction and establishment activities associated with the establishment of the WEF, including infrastructure etc.	
Potential Impact	Heavy vehicles can generate noise and dust impacts. Movement of heavy vehicles can also damage roads.	
Activity/risk source	The movement of heavy vehicles and their activities on the site can result in noise and dust impacts and damage roads.	
Mitigation: Target/Objective	To avoid and or minimise the potential noise and dust impacts associated with heavy vehicles, and minimise damage to roads.	
Mitigation: Action/control	Responsibility	Timeframe
<ul style="list-style-type: none"> • Implement dust suppression measures for heavy vehicles such as wetting roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. • Ensure that all vehicles are road-worthy, drivers are qualified and are made aware of the potential noise, dust and safety issues. 	<ul style="list-style-type: none"> • Contractors • Contractors 	<ul style="list-style-type: none"> • Ensure that these conditions are included in the Construction Phase EMP. • Ensure that dust suppression measures are implemented for all heavy vehicles that require such measures during the construction phase commences. • Ensure that drivers are made aware of the potential safety issues and enforcement of strict speed limits when they

<ul style="list-style-type: none"> • Ensure that drivers adhere to speed limits. Vehicles should be fitted with recorders to record when vehicles exceed the speed limit. • Ensure that damage to roads is repaired before completion of construction phase. 	<ul style="list-style-type: none"> • Contractors • Contractors 	<ul style="list-style-type: none"> • are employed. • Fit all heavy vehicles with speed monitors before they are used in the construction phase. • Assess road worthy status of heavy vehicles at the outset of the construction phase and on a monthly basis thereafter; • Ensure that damage to roads is repaired before completion of construction phase.
Performance Indicator	<ul style="list-style-type: none"> • Conditions included in the Construction Phase EMP. • Dust suppression measures implemented for all heavy vehicles that require such measures during the construction phase commences. • Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed. • All heavy vehicles equipped with speed monitors before they are used in the construction phase. • Road worthy certificates in place for all heavy vehicles at outset of construction phase and up-dated on a monthly basis. 	
Monitoring	<ul style="list-style-type: none"> • Just Palm Tree Power and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase. 	

OPERATIONAL PHASE

Creation of employment and business opportunities

OBJECTIVE: Maximise local employment and business opportunities associated with the operational phase.

Project component/s	Day to day operational activities associated with the WEF, including maintenance etc.		
Potential Impact	The opportunities and benefits associated with the creation of local employment and business should be maximised		
Activity/risk source	The operational phase of the WEF will create approximately 10 full time employment opportunities.		
Mitigation: Target/Objective	In the medium to long term employ as many locals as possible to fill the 10 full time employment opportunities.		
Mitigation: Action/control	Responsibility	Timeframe	
<ul style="list-style-type: none"> Just Palm Tree Power should commit to implementing a 5-year training and skills development and training programme. Identify local members of the community who are suitably qualified or who have the potential to be employed full time. 	<ul style="list-style-type: none"> Just Palm Tree Power Just Palm Tree Power 	<ul style="list-style-type: none"> Develop 5 year training and skills development programme during the construction phase Identify local members of the community who are suitably qualified or who have the potential to be employed full time during the construction phase. 	
Performance Indicator	<ul style="list-style-type: none"> 5 year training and skills development programme developed and designed before construction phase completed. Potential locals identified before construction phase completed. 		
Monitoring	<ul style="list-style-type: none"> Just Palm Tree Power must monitor indicators listed above to ensure that they have been met for the operational phase. 		

Establishment of a Community Trust

OBJECTIVE: Maximise creation of income generation opportunities associated with the proposed WEF and funding for community projects through the establishment of a Community Trust.

Project component/s	Generation of revenue from the sale of energy to the national grid
Potential Impact	Generation of income that can be used to fund and support local projects and community development
Activity/risk source	Generation of revenue from the sale of energy to the national grid
Mitigation: Target/Objective	Establish a Community Trust prior to the commencement of operations

Mitigation: Action/control	Responsibility	Timeframe
<ul style="list-style-type: none"> Just Palm Tree Power have committed to the establishment of a Community Trust 	<ul style="list-style-type: none"> Just Palm Tree Power 	<ul style="list-style-type: none"> Community Trust should be established and signed before operations commence.
Performance Indicator	<ul style="list-style-type: none"> Established Community Trust with elected Trustees that is audited on an annual basis 	
Monitoring	<ul style="list-style-type: none"> Community Trust audited on an annual basis 	

DECOMMISSIONING PHASE

Impact of decommissioning

OBJECTIVE: To avoid and or minimise the potential impacts associated with the decommissioning phase.

Project component/s	Decommissioning phase of the WEF	
Potential Impact	Decommissioning will result in job losses, which in turn can result in a number of social impacts, such as reduced quality of life, stress, depression etc. However, the number of people affected (10) is small. Decommissioning is also similar to the construction phase in that it will also create temporary employment opportunities.	
Activity/risk source	Decommissioning of the WEF	
Mitigation: Target/Objective	To avoid and or minimise the potential social impacts associated with decommissioning phase of the WEF.	
Mitigation: Action/control	Responsibility	Timeframe
<ul style="list-style-type: none"> Retrenchments should comply with South African Labour legislation of the day 	<ul style="list-style-type: none"> Just Palm Tree Power 	<ul style="list-style-type: none"> When WEF is decommissioned
Performance Indicator	<ul style="list-style-type: none"> South African Labour legislation relevant at the time 	
Monitoring	<ul style="list-style-type: none"> Just Palm Tree Power and Department of Labour 	