SOCIAL IMPACT ASSESSMENT

AMAKHALA EMOYENI WIND ENERGY FACILITY
EASTERN CAPE PROVINCE

OCOTOBER 2010

Prepared for

SAVANNAH ENVIRONMENTAL (Pty) Ltd

By

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EXECUTIVE SUMMARY

INTRODUCTION AND LOCATION

Savannah Environmental (Pty) Ltd were appointed by Windlab Developments South Africa (Pty) Ltd (hereafter referred to as Windlab) as the lead consultants to manage the Environmental Impact Assessment (EIA) process for the establishment of the proposed Amakhala Emoyeni wind energy facility (WEF) and associated infrastructure in the Eastern Cape Province of South Africa. The proposed project site is located within the Blue Crane Route Local Municipality (EC102) approximately 12 km and 7.2 km east and south west of the towns of Cookhouse and Bedford respectively.

The affected farms are portions 1, 2 and remainder of Farm 222, portion 3 of Farm 203 (Platt House), remainder of Farm 205 (Kop Leegte), portion 1 of Farm 206 (Normandale), remainder of Farm 168 (Stompstaart Fontein), remainder of Farm 224 (Taai Fontein), remainder of Farm 221 (Leeuw Fontein), portion 2 and remainder of Farm 223 (Paarde Kloof), remainder of Farm 227 (Wilgem Bush), remainder of Farm 225, portion 1, 2 and remainder of Farm 218 (Brakke Fonteyn), remainder of Farm 259, remainder of Farm 260, portion 5 of Farm 149 (Great Knoffel Fonteyn), remainder of Farm 242, portion 1 and remainder of Farm 220 (Brak Fontein), remainder of Farm 219 (Vogel Fonteyn), remainder of Farm 169 (Olive Woods Estate), portion 3 of Farm 141 (Brakfontein), portion 1 of Farm 187 (Kleine Knoffel Fonteyn).

Tony Barbour was appointed by Savannah Environmental (Pty) Ltd to undertake a specialist Social Impact Assessment (SIA) as part of the EIA process. The terms of reference for the study include a scoping level assessment to identify key social issues that would need to be addressed as part of the EIA. This report contains the findings of the Draft SIA undertaken as part of the EIA process.

DESCRIPTION OF THE PROPOSED WIND ENERGY FACILITY

The proposed facility will consist of up to 350 x 1.5-3 MW (capacity) turbines, yielding a total potential capacity of 525-1050 MW, as well as associated infrastructure including 3 inverter substations, access roads, underground cables and an overhead power lines that will link the wind energy facility to the Eskom electricity distribution network/grid via the 3 proposed substations. The proposed location of the turbines is illustrated in Figure 1.2.

The construction of the proposed WEF would include the following components:

- Up to 350 x 1.5 to 3 MW wind turbines with a total capacity of 525-1050 MW;
- Foundations (approximately 30m x 30m x 4m in size) to support the 80m-100m high turbine towers (including the nacelle, hub and rotor blades);
- Underground cable connecting the wind turbines to each other;
- Small offices and workshops; and
- An access road to the site from the main road/s within the area. In the case of the proposed Amakhala Emoyeni site, access is likely to be from the R350 (south of Bedford) and/ or the N10 (that runs through Cookhouse) via the Patryshoogte pass as well as existing gravel and access roads;

- Internal access roads (4m-6m in width) connecting the site to the main arterials and allowing road access within the WEF;
- Three substations, namely 2 x 33/132/kV substations (Substation 1 and 3) and 1 x 33/132/220/400/kV substation (Substation 2);
- 2 x overhead 132 kV distribution lines linking substation 3 to substation 2 and substation 1 to the existing Poseidon substation located to the north west of the site;
- 1 x 132/220/400 kV transmission line linking substation 2 to existing Poseidon substation located to the north west of the site.

In terms of layout, the turbines are likely to occupy the higher lying ground in order to maximize the exposure to the wind resource. The final infrastructure layout will be finalised once Eskom has confirmed connection arrangements, which in turn, will be informed by a detailed assessment of grid connection options.

The total estimated capital expenditure associated with the construction phase is estimated to be in the region of R15 billion. The construction phase is expected to extend over a period of 24-30 months and create approximately 200-220 temporary employment opportunities. The operational phase will create approximately 90 permanent employment opportunities for the 25-30 year lifespan of the WEF. The annual operating budget is estimated to be in the region of R 90-100 million.

Due to the unique requirements for the generation of wind energy, no alternative sites were identified within the area. As such, the EIA does not assess any additional site alternatives for the project. In addition the site traversed by existing transmission lines and is located in close proximity to Eskom's Poseidon substation, which has sufficient capacity to accommodate the proposed WEF.

APPROACH TO THE STUDY

The approach to the Social Impact Assessment (SIA) study is based on the Western Cape Department of Environmental Affairs and Development Planning Guidelines for Social Impact Assessment (February 2007). These guidelines are based on international best practice and have also been endorsed by DWEA. 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;
- 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.

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 study also considered the potential health impacts associated with WEFs.

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);
- Eastern Cape Provincial Growth and Development Plan (2004-2014);
- The Cacadu District Municipality Integrated Development Plan (IDP) (2007-2012);
- The Blue Crane Route Municipality Integrated Development Plan (IDP) (2007-2012);

The findings of the review indicated that wind energy was strongly supported at a national and local level. At a provincial level the PGDP does not specifically make reference to renewable energy, however, investment in energy infrastructure is identified as one of the key requirements. Based on this is it reasonable to assume that the establishment of WEFs is supported. At a local level the Cacadu District Municipality IDP identifies 7 key strategic priorities. The key priority that is relevant to the proposed WEF is:

- Sustainable Resource Management and Use; Specifically to investigate and validate renewable energy alternatives, promotion of energy efficiency and accreditation of carbon credits. ,

The Blue Crane Route Municipality IDP has identified alternative energy projects as a key driver for local economic development

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 WEFs are supported at a national, provincial and local level. It is therefore the opinion of the author that the establishment of a WEF on the proposed site is supported by national, provincial and local policy and planning guidelines.

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.

Based on the information from other WEF projects, the total capital expenditure during the construction phase will be in the region of R 15 billion. The construction phase is expected to extend over a period of 24-30 months and create approximately 200-220 temporary employment opportunities. The work associated with the construction phase will be undertaken by contractors and will include the establishment of the access roads, services and erection of the wind turbines.

It is anticipated that approximately 25% (or 55) of opportunities will be available to skilled personnel (engineers, technicians, management and supervisory), 35% (or 77) to semi-skilled personnel (drivers, equipment operators), and 40% (or 88) to low skilled personnel (construction labourers, security staff etc). The majority of the employment opportunities are likely to be associated with the contactors appointed to construct the WEF and associated infrastructure. In this regard the majority of contractors use their own staff and this will limit the potential for direct employment opportunities for locals during the construction phase.

In terms of business opportunities for local companies, the expenditure of R 15 billion during the construction phase will create business opportunities for the regional and local economy. However, given the technical nature of the project and high import content associated with wind turbines the opportunities for the local Cookhouse/Bedford/Somerset East economy are likely to be limited.

The sector of the local economy that is most likely to benefit from the proposed development is the local service industry. The potential opportunities for the local service sector would be linked to accommodation, catering, cleaning, transport and security, etc. The majority of the construction workers will be accommodated in the towns of Cookhouse, Bedford and Somerset East. This will create opportunities for local hotels, B&Bs, guest farms and people who want to rent out their houses. In addition, a proportion of the total wage bill earned by construction workers over the 24-30 month construction phase is also likely to be spent in the regional and local economy. The total wage bill for the four-year construction phase will be in the region of R 87.50 million. The injection of income into the area in the form of rental for accommodation and wages will create opportunities for local businesses in towns such as Cookhouse, Bedford and Somerset East. The benefits to the local economy will however be confined to the construction period (24-30 months).

Potential negative impacts
- Influx of construction workers employed on the project;
- Increased risk of stock theft, poaching and damage to farm infrastructure associated with construction workers;
- Increased risk of veld fires associated with construction related activities;
- Impact of heavy vehicles, including damage to roads, safety, noise and dust;
- Loss of agricultural land associated with construction related activities.

The significance of the potential negative impacts with mitigation was assessed to be of Low significance. The majority 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. contract HIV/ AIDS) was assessed to be of Medium-High negative significance. 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	Significance With Mitigation
Creation of employment and business opportunities	Medium (Positive impact)	Medium (Positive impact)
Presence of construction workers and potential impacts on family structures and social networks	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)
Risk of stock theft, poaching and damage to farm infrastructure	Medium (Negative impact)	Low (Negative impact)
Risk of veld fires	Medium (Negative impact)	Low (Negative impact)
Impact of heavy vehicles and construction activities	Low (Negative impact)	Low (Negative impact)
Loss of farmland	High (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;
- Impact on tourism and the creation of potential tourist opportunities (Impact on tourism may also be negative in some instances);
- The establishment of infrastructure to generate renewable energy and establishment of Cleaner Development Mechanism (CDM) project.

Based on information from similar studies, the proposed wind energy facility will employ approximately 90 full time employees over 25-year period. Approximately 25% of opportunities will be available to skilled personnel (forecasters, technicians, management and supervisory, etc), 35% to semi-skilled personnel (drivers, equipment operators), and 40% to low skilled personnel (road maintenance, security, etc). The proposed WEF will therefore create potential employment opportunities in the Eastern Cape Province and Blue Crane Municipality. However, given that the wind energy sector in South Africa is relatively new it may be necessary to import the required operational and maintenance skills from other parts of South Africa or even overseas. However, it will be possible to increase the number of local employment opportunities through the implementation of a skills development and training programme linked to the operational phase. Such a programme would support the

strategic goals of promoting local employment and skills development contained in the Blue Crane IDP.

Given the location of the proposed WEF the majority of permanent staff are likely to reside in Cookhouse and Bedford. In terms of accommodation options, a percentage of the permanent employees may purchase a house in one of these two towns, while others may decide to rent. Both options would represent a positive economic benefit for the region. In addition, a percentage of the monthly wage bill earned by permanent staff would be spent in the local economy. This will benefit local businesses in towns such as Cookhouse, Bedford and Somerset East. The benefits to the local economy will extend over the 25-30 year operational lifespan of the project.

The findings of the SIA also indicate that wind energy facility also has the potential to benefit local tourism by attracting people to the area to view the facility. However, the visual impacts associated with the proposed WEF may also impact negatively on certain tourist activities. 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

- Impact of the proposed wind energy facility on the current farming activities, specifically the potential loss of productive farm land;
- The visual impacts and associated impact on sense of place and the landscape.

With the exception of the visual impact and impact on sense of place, all of the negatives impacts are can be effectively mitigated to a significance of Low.

The visual and cumulative impacts on landscape character 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 wind farm applications. The research also found that if people regard a region as having 'enough' wind farms already, then they are more likely to oppose new proposals. The significance of the impacts associated with the operational phase are summarised in Table 2.

Table 2: Summary of social impacts during operational phase

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

Cumulative impacts

In addition to the proposed Amakhala Emonyeni WEF, two other WEFs are proposed in the area between Cookhouse and Bedford within the Blue Crane Route Municipality, namely the proposed African Clean Energy Developments (ACED) Cookhouse WEF and the Terrapower Cookhouse WEF. The ACED WEF has been authorised by DEA.

The cumulative impacts associated with the proposed WEFs relate largely to the impact on sense of place and visual impacts. In this regard the proposed WEFs will alter the areas sense of place and the landscape, which will be dominated by turbines. These impacts will be exacerbated by the large size of the proposed WEFs (in excess of 200 turbines each) and their location. The cumulative impact of the proposed WEFs has also been raised as a concern by the Blue Crane Development Agency (BCDA), specifically with regard to the potential impact on the areas hunting industry. However, the findings of the SIA also indicate that the majority of landowners directly affected by the Amakhala Emonyeni WEF felt the proposed WEF would have a positive impact on the area and that the revenue generated from the agreement with Windlab would assist them to continue farming. It is assumed that this also applies to the two other WEFs.

It is recommended that the environmental authorities 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 WEFs in the area. In addition, the siting and number of individual turbines on each of the WEF sites should be informed by findings of the relevant VIAs, specifically with respect to the visual impact on farmsteads and important roads in the area.

Substations and transmission lines

The findings of the SIA indicate that there are no significant social impacts associated with any of the substations and or the associated transmission line routes. In this regard the potential visual or sense of place issues associated with the proposed substations and transmission line alignments will not exacerbate the impacts associated with the wind turbines themselves. The location of the proposed substation and transmission line options are therefore regarded as acceptable from a social perspective.

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 Amakhala Emoyeni WEF are of low significance. In addition, none of the affected farmers interviewed identified health risks associated with the proposed WEF as an issue of concern.

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

The no-development option also represents a lost opportunity in terms of the employment and business opportunities (construction and operational phase) associated with the WEF. This also represents a negative social cost.

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 wind energy facility decommissioning phase is likely to involve the disassembly and replacement of the existing turbines with more modern technology. This is likely to take place in the 20-30 years post commissioning. All of the components of the wind turbine, with the exception of the turbine blades, can be reused or recycled. The decommissioning phase is therefore likely to create additional, construction type jobs, as opposed to the jobs losses typically associated with decommissioning.

When and if the wind turbine facility is finally decommissioned, the impacts are likely to be limited due to the relatively small number of permanent employees (90) 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).

Windlab should also establish 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.

RECOMMENDATIONS

Based on the findings of the SIA it would appear that none of the landowners who stand to be directly affected by the proposed wind energy facility are opposed to the development. The findings of the SIA also indicate that the development will create employment and business opportunities for locals during both the construction and operational phase of the project. In order to enhance the local employment and business opportunities the mitigation measures listed in the report should be implemented. Windlab, in consultation with the relevant stakeholders, should also investigate the opportunities for establishing a community trust. The revenue for the trust would be derived from the income generated from the sale of energy from the WEF. The establishment of a Community Trust does not only create potential benefits for local communities, but also addresses the issue of impact equity. In the case of the majority of renewable energy facilities, such as the Amakhala WEF, the directly affected landowner is compensated for the loss of land, while the adjacent landowners and communities bear the external costs associated with the visual impacts on the sense of place and the landscape character of the area.

The mitigation measures listed in the report to address the potential negative impacts during the construction phase should also be implemented.

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 WEF near Cookhouse is therefore supported by the findings of the SIA.

However, the cumulative impacts associated with the three, large proposed WEFs on the areas sense of place and landscape cannot be ignored. The cumulative impact of WEFs on the rural landscapes is an issue that will need to be addressed by the relevant environmental authorities, specifically given the large number of applications for WEFs that have been submitted over the last 12 months.

IMPACT STATEMENT

The findings of the SIA undertaken for the proposed Amakhala-Emoyeni WEF indicate that the development will create employment and business opportunities for locals during both the construction and operational phase 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. However, the visual impacts associated with facility will impact on the areas rural sense of place and landscape character. This impact will be for the entire operational lifespan (approximately 30 years) of the facility. The potential for cumulative impacts also exists due to the proximity of the proposed African Clean Energy Developments (ACED) Cookhouse WEF and the Terrapower Cookhouse WEF. The ACED WEF has been authorised by DEA. These potential cumulative impacts do not, however, constitute a fatal flaw. However, it is recommended that the environmental authorities 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 WEFs in the area. 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.

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SECTION 1: INTRODUCTION

1.1 INTRODUCTION

Savannah Environmental (Pty) Ltd were appointed by Windlab Developments South Africa (Pty) Ltd (hereafter referred to as Windlab) as the lead consultants to manage the Environmental Impact Assessment (EIA) process for the establishment of the proposed Amakhala Emoyeni wind energy facility (WEF) and associated infrastructure to the east and south east of the town of Cookhouse in the Eastern Cape Province of South Africa (Figure 1.1).

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

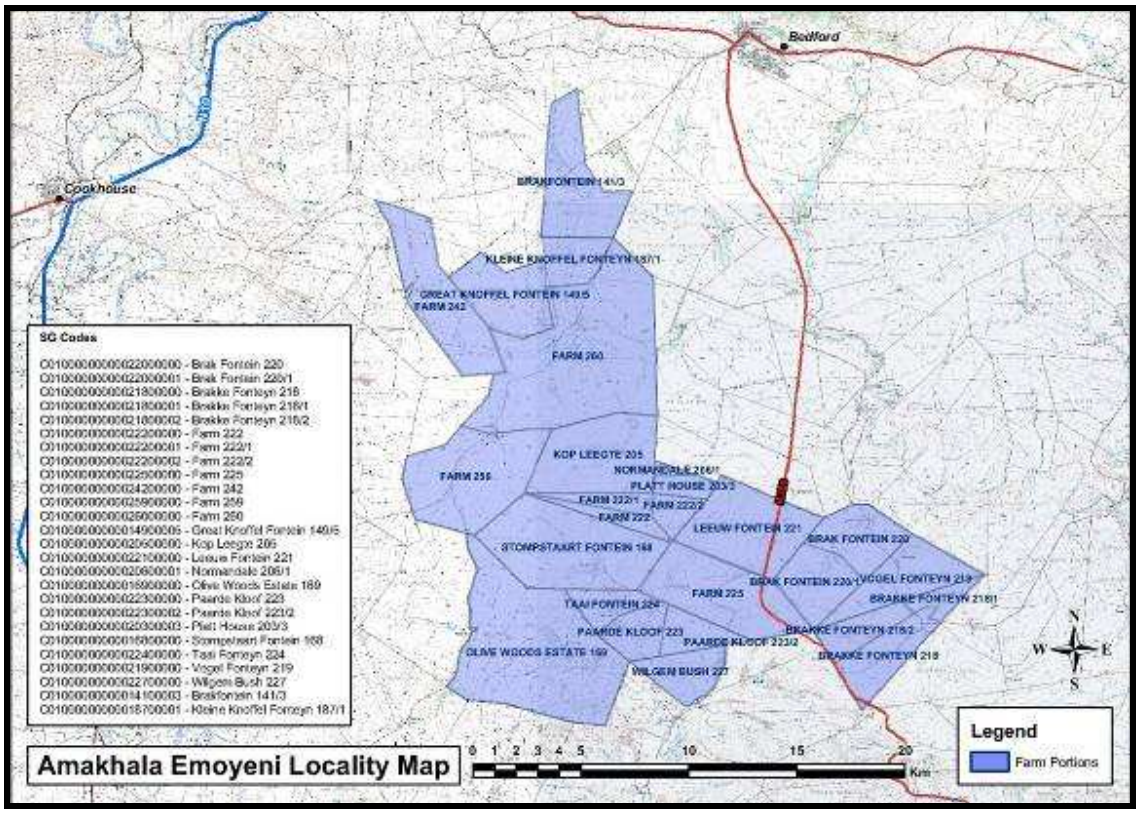


Figure 1.1: Location of proposed Amakhala Emoyeni Wind Energy Facility

1.2 TERMS OF REFERENCE

The terms of reference for the SIA require:

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

1.3 PROJECT LOCATION

The proposed project site is located within the Blue Crane Route Local Municipality (EC102) approximately 12 km east of the town of Cookhouse, 7.2 km south-west of the town of Bedford (Figure 1.1) and approximately 38.2 km east of the Blue Crane Route Local Municipality administrative centre of Somerset East. The Blue Crane Route Local Municipality is one of 10 municipalities that fall within the greater Cacadu District Municipality (DC10). The turbines are located between the N10 to the west and the R350 to the east. The south-eastern portion of the WEF extends across the R350.

The affected farms are portions 1, 2 and remainder of Farm 222, portion 3 of Farm 203 (Platt House), remainder of Farm 205 (Kop Leegte), portion 1 of Farm 206 (Normandale), remainder of Farm 168 (Stompstaart Fontein), remainder of Farm 224 (Taai Fontein), remainder of Farm 221 (Leeuw Fontein), portion 2 and remainder of Farm 223 (Paarde Kloof), remainder of Farm 227 (Wilgem Bush), remainder of Farm 225, portion 1, 2 and remainder of Farm 218 (Brakke Fonteyn), remainder of Farm 259, remainder of Farm 260, portion 5 of Farm 149 (Great Knoffel Fonteyn), remainder of Farm 242, portion 1 and remainder of Farm 220 (Brak Fontein), remainder of Farm 219 (Vogel Fonteyn), remainder of Farm 169 (Olive Woods Estate), portion 3 of Farm 141 (Brakfontein), portion 1 of Farm 187 (Kleine Knoffel Fonteyn).

1.4 PROJECT DESCRIPTION

The proposed facility will consist of up to 350 x 1.5-3 MW (capacity) turbines, yielding a total potential capacity of 525-1050 MW, as well as associated infrastructure including three substations, access roads, underground cables and overhead distribution lines that will link the wind energy facility to the existing Eskom Poseidon substation and the electricity distribution network/grid. The proposed location of the turbines, substations and transmission lines are illustrated in Figure 1.2.

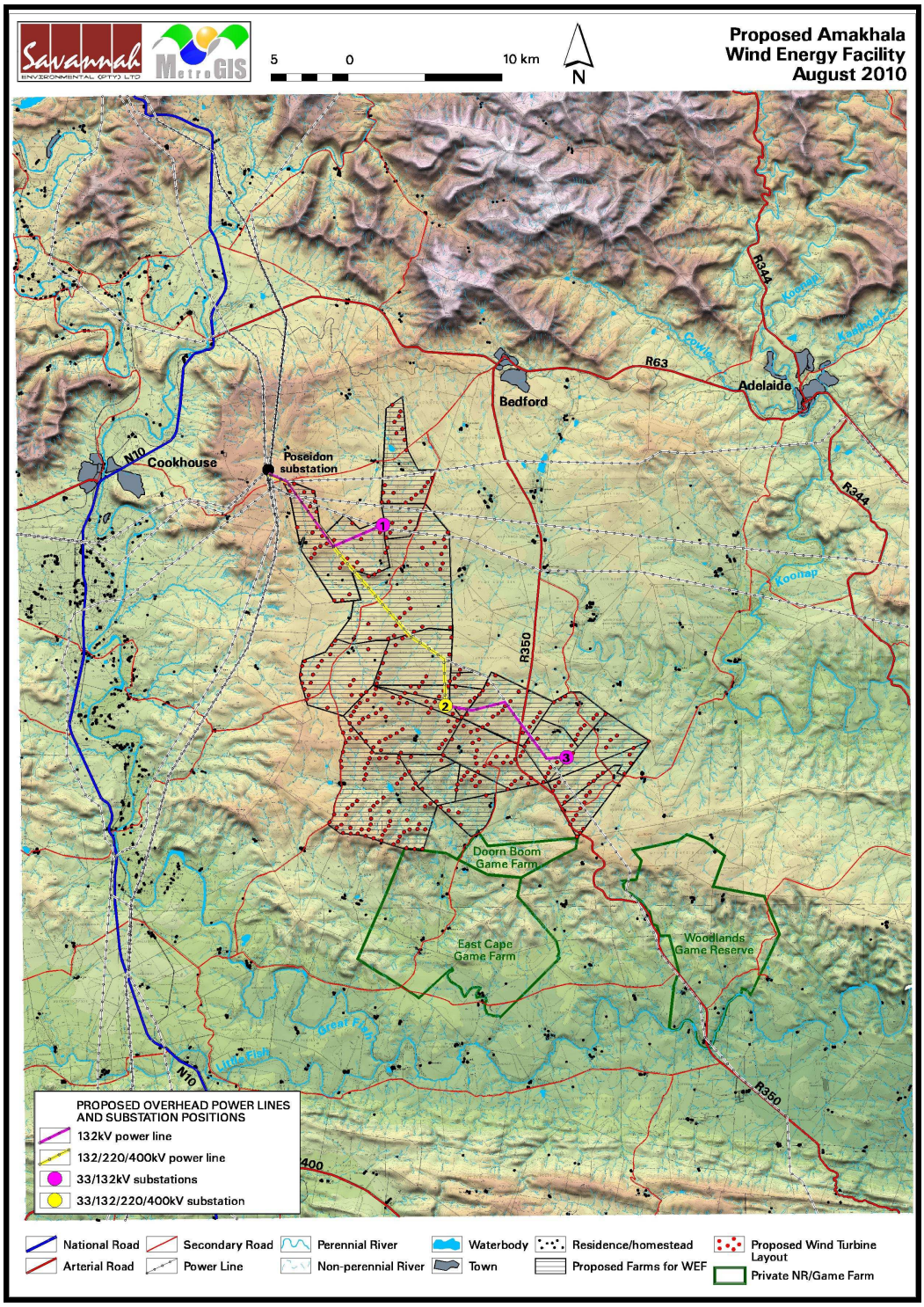


Figure 1.2: Proposed location of turbines, substations and power lines for Amakhala Emoyeni WEF

A typical wind turbine consists of four primary components (Figure 1.3):

- The **foundation unit** upon which the turbine is anchored to the ground. The area and depth of the concrete foundation are the region of 225 m² (footprint) x 4m (depth);
- The **tower** which typically between 80m and 100m in heightThe 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 (each up to 60 m in length). 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).

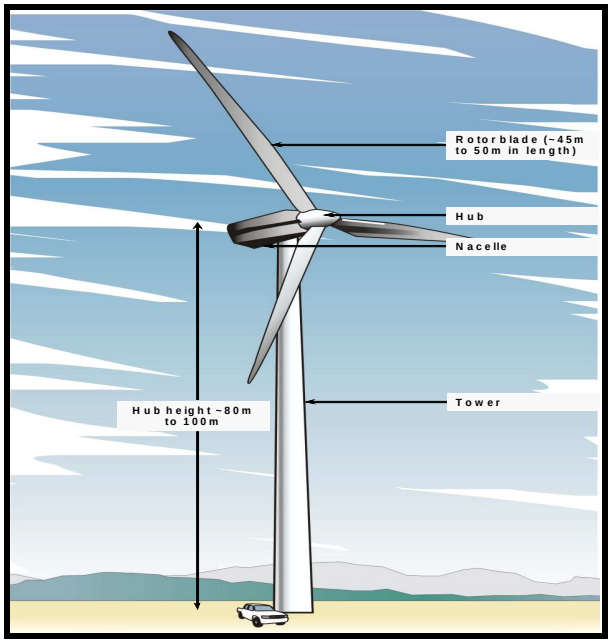


Figure 1.3: Typical turbine structure and components

Based on information from other WEF projects the total estimated capital expenditure associated with the construction of 350 wind turbines and the assocaited infrastructure is estimated to be in the region of 15 billion. The construction phase is expected to extend over a period of 24-30 months and create in the region of 200-220 temporary employment opportunities. It is anticipated that approximately 25% (or 55) of opportunities will be available to skilled personnel (engineers, technicians, management and supervisory), 35% (or 77) to semi-skilled personnel (drivers, equipment operators), and 40% (or 88) to low skilled personnel (construction labourers, security staff). The wage bill associated with the construction phase is estimated at R35 million per annum (current value). The total wage bill for the four-year construction phase will therefore be in the region of R 87.50 million. The lifespan of a typical WEF is 20-25 years and the annual operational budget is estimated to be in the region of R 90-100 million.

The basic infrastructure associated with the establishment of the proposed WEF would include:

- An access road to the site from the main road/s within the area. In the case of the proposed Amakhala Emoyeni site, access is likely to be from the R350 (south of Bedford) and/ or the N10 (that runs through Cookhouse) via the Patryshoogte pass as well as existing gravel and access roads;
- An internal access road/s that link the wind turbines on the site. The road is likely to be approximately 4-6 m wide;
- Three substations, namely 2 x 33/132/kV substations (Substation 1 and 3, Figure 1.2) and 1 x 33/132/220/400/kV substation (Substation 2, Figure 1.2);
- 2 x overhead power lines linking substation 3 to substation 2 and substation 1 to the existing Poseidon substation located to the north west of the site (Figure 1.2);
- 1 x 132/220/400 kV power line, linking substation 2 to existing Poseidon substation located to the north west of the site (Figure 1.2).

Due to the unique requirements for the generation of wind energy, no alternative sites were identified within the area. As such, the EIA does not assess any additional site alternatives for the project. In addition the site traversed by existing transmission lines and is located in close proximity to Eskom's Poseidon substation, which has sufficient capacity to accommodate the power output from the proposed WEF.

1.5 APPROACH TO STUDY

The approach to the Social Impact Assessment (SIA) study is based on the Western Cape Department of Environmental Affairs and Development Planning Guidelines for Social Impact Assessment (February 2007). These guidelines are based on international best practice and have also been endorsed by the Department of Environment and Water Affairs (DEWA). 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 settlements and communities likely to be affected by the proposed project;
- Collecting baseline data on the current social and economic environment;

- Identifying the key potential social issues associated with the proposed project. This requires a site visit to the area and consultation with affected individuals and communities. As part of the process a basic information document was prepared and made available to key interested and affected parties. The aim of the document was to inform the affected parties of the nature and activities associated with the construction and operation of the proposed development so as to enable them to better understand and comment on the potential social issues and impacts;
- Assessing and documenting the significance of social impacts associated with the proposed intervention;
- Identifying alternatives and mitigation measures.

In this regard the study involved:

- Review of demographic data from the 2001 Census Survey;
- Review of relevant planning and policy frameworks for the area;
- Site specific information collected during the site visit to the area and interviews with interested and affected parties;
- Review of information from similar studies, including the EIAs undertaken for the Darling Wind Farm, Eskom West Coast Wind Energy Facility and Hopefield Wind Energy Facility in the Western Cape and the Cookhouse WEF located in the Eastern Cape Province;
- Identification and assessment of the 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. Annex A contains a list of the secondary information reviewed and interviews conducted. Annex B contains a copy of the background information document made available to interested and affected parties. Annex C 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, ethic, religious, gender, and educational backgrounds etc view the world. This is referred to as the "social construct of reality". The social construct of reality informs people's worldview and the way in which they react to changes.

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 Windlab represents a technically suitable site for the establishment of a wind energy facility.

Fit with planning and policy requirements
Legislation and policies reflect societal norms and values. The legislative and policy context therefore plays an important role in identifying and assessing the potential social impacts associated with a proposed development. In this regard a key component of the SIA process is to assess the proposed development in terms of its fit with key planning and policy documents. As such, if the findings of the study indicate that the proposed development in its current format does not conform to the spatial principles and guidelines contained in the relevant legislation and planning

documents, and there are no significant or unique opportunities created by the development, the development cannot be supported.

However, the study recognises the strategic importance of wind energy and the technical, spatial and land use constraints required for wind energy facilities.

1.6.2 Limitations

Demographic data
The demographic data used in the study is largely based on the 2001 Census. 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.

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 have also been endorsed by DWEA.

Tony Barbour has also undertaken specialist SIA studies a number of WEFs in South Africa, including the Darling Wind Farm (Western Cape), West Coast WEF (Western Cape, Hopefield Wind Farm (Western Cape), Cookhouse, ABs and Dorper WEFs (Eastern Cape).

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 Wind Energy Facility 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: Summary of key policy and planning documents relating to wind energy and the area in question
- 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 and overview of:

- The provincial context;
- The policy and planning environment affecting the proposed wind energy facility;
- The local socio-economic environment;
- Surrounding land uses.

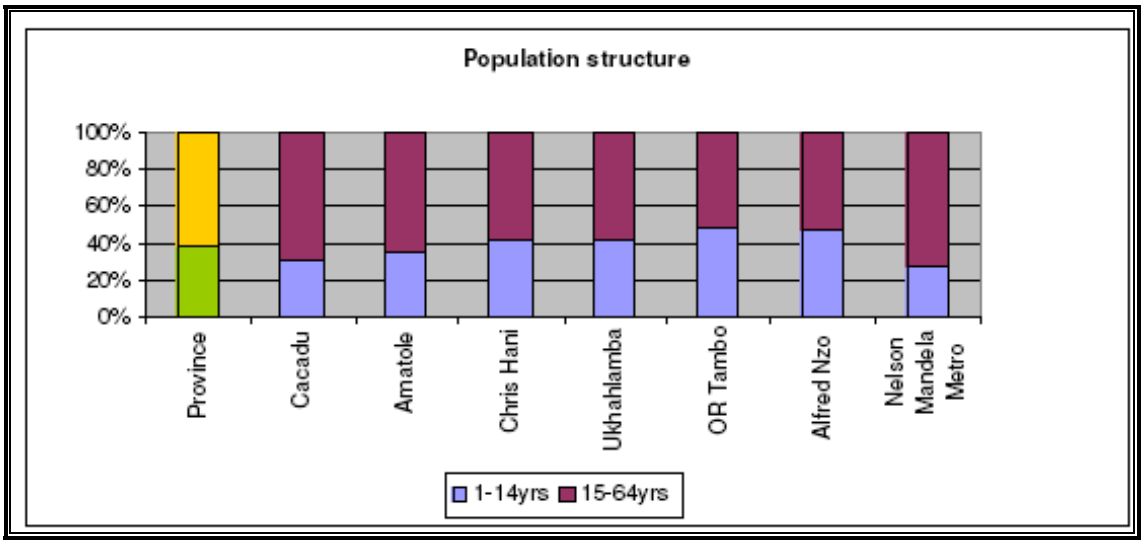
2.2 PROVINCIAL CONTEXT

The proposed Amakhala Emoyeni WEF is located within the Cacadu District Municipality of the Eastern Cape Province of South Africa. The Eastern Cape Province is the second largest province in terms of land area in South Africa (169 580 km^2) and makes up 13.9% of South Africa's total land area. The province contributes 7.5 % to the countries total GDP and with 14.1 % of South Africa's population it is the countries third most populous province. Of this total almost 40% are under the age of 14 years. In the case of the Alfred Nzo and OR Tambo (Oliver Tambo) districts, this proportion exceeds 45% (Figure 2.1).

The high proportion of children is reflective of Eastern Cape's historic role as a major source of migrant labour (Austrian Development Agency, 2005). Migration from the Eastern Cape to other provinces, specifically the Western Cape, still continues today. Life expectancy in the province has dropped over the past decade from 60 years in 1995 to 50 years in 2003 (Austrian Development Agency, 2005). There are two major urban centers within the Province, the Nelson Mandela Metropolitan Area and Buffalo City Municipality (BCM). With the exception of the Nelson Mandela Metro and Buffalo City, the province is predominantly rural in character.

The Eastern Cape is also the poorest province in South Africa, with seven of the poorest Local Municipalities in the country located in province, namely Umzimvubu (Alfred Nzo DM), Ntabankulu (OR Tambo DM), Mbizana (OR Tambo DM), Mbhashe (Amatole DM), Ngqushwa (Amatole DM), Elundini (Ukhahlamba DM) and Intsika Yethu (Chris Hani DM). The high levels of poverty in the province are linked to the inclusion of the two former apartheid era Bantustan areas, namely the Transkei and Ciskei, into the Eastern Cape (Austrian Development Agency, 2005).

Figure 2.1: Age distribution with the Eastern Cape Province

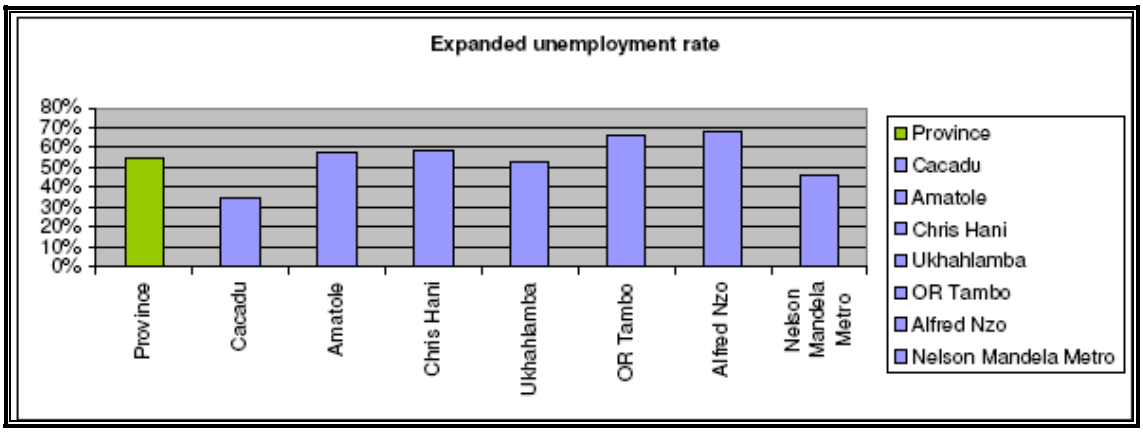


Source: Austrian Development Agency (2005)

Although the Eastern Cape is the poorest province in the country, there is a distinct variation in both the distribution and severity of poverty within the province. In this regard a distinction can be made between those areas that were formerly part of the Ciskei and the Transkei (in particular OR Tambo, Alfred Nzo, but also large parts of Ukhahlamba, Amatole and Chris Hani), and those areas that were administered by the former white South Africa (in particular Cacadu) (Austrian Development Agency, 2005).

In terms of unemployment rates, the OR Tambo and Alfred Nzo Districts have the highest rates, followed by Chris Hani and Amatole. All of these districts have unemployment rates higher than the provincial average (Figure 2.2).

Figure 2.2: Expanded unemployment rate for the Eastern Cape Province

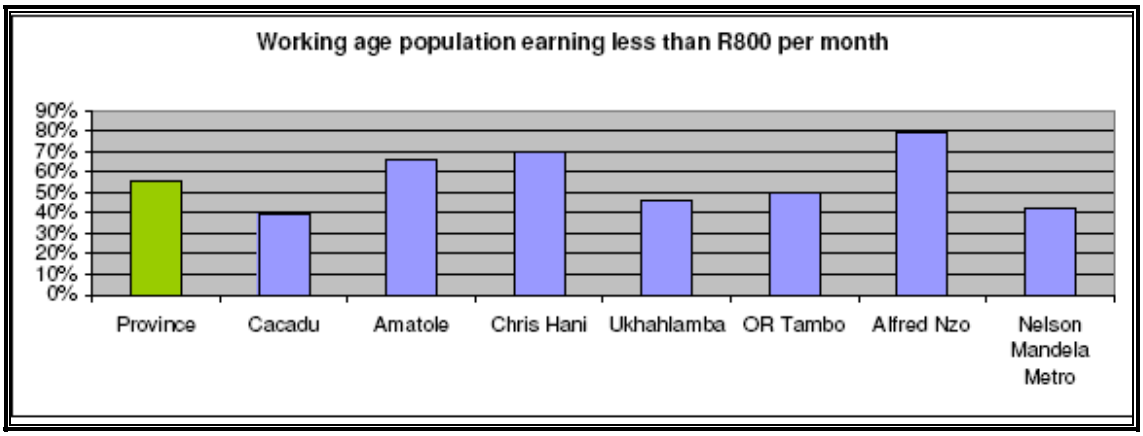


Source: Austrian Development Agency (2005)

In addition to the high unemployment levels, income levels are also low. A large proportion of those that are employed therefore earn less than R800 per month. In

the case of Alfred Nzo, Chris Hani and Amatole districts, over 60% of those employed earn less than R800 per month (Figure 2.3).

Figure 2.3: Percentage of working age population earning less than R800 per month



Source: Austrian Development Agency (2005)

In addition to the high unemployment rates and low-income levels, there has also been an increase in inequality as measured by the Gini coefficient[1] since 1995. In 1995 the figure stood at 0.61. By 2001 the coefficient had increased to 0.66. Similarly, in relation to human development indices, the situation has also deteriorated (Austrian Development Agency, 2005).

In response to these challenges, the Eastern Cape Province has been earmarked by the ANC as a priority for growth and economic development. To facilitate development, two spatial development initiatives (SDIs), the Fish River SDI and the Wild Coast SDI, two Industrial Development Zones (IDZs), the Coega IDZ near the Nelson Mandela Metropole (Port Elizabeth) and the West Bank IDZ near East London, and numerous substructure and structure plans have been initiated. The IDZ initiatives are linked to two of the province's three harbours (i.e. Coega and East London). In addition the province has three airports offering direct flights to the main centres, and a well developed road infrastructure. In terms of context the proposed Cookhouse WEF is located approximately 160 km north of the Nelson Mandela Metropole and Coega IDZ. The facility is therefore well placed to supplement the future energy needs of these two large consumers. The location of the site will also significantly reduce the transmission losses experienced by Eskom in the transmission of electricity from Gauteng and Mpumalanga to the Eastern Cape.

[1] The Gini coefficient is a measure of statistical dispersion most prominently used as a measure of inequality of income distribution or inequality of wealth distribution. It is defined as a ratio with values between 0 and 1: A low Gini coefficient indicates more equal income or wealth distribution, while a high Gini coefficient indicates more unequal distribution (Source, Wikipedia.org)

2.3 SOCIO-ECONOMIC OVERVIEW OF THE PROPOSED PROJECT AREA

2.3.1 Blue Crane Route Municipality

The proposed project site (Figure 2.1) is located approximately 14.4 km east of the town of Cookhouse, within the Blue Crane Route Local Municipality (EC102), and 8.2 km south-west of the town of Bedford (within the Nxuba Local Municipality).

The Blue Crane Route Municipality (category-B Municipality[2]), which forms part of the greater Cacadu District Municipality (DC10, category-C Municipality), is located in the western half of the Eastern Cape approximately 100km north of the Nelson Mandela Metropolitan area (Port Elizabeth). The municipality is bordered in the west by Ikwezi Municipality, in the south by the Sundays River Municipality, in the north by the Inxuba Yethemba Municipality (part of the Chris Hani District Municipality) and the east by the Nxuba Municipality (part of the Amatole District Municipality) and Makana Municipality.

The largest towns within the Municipality are Cookhouse, Somerset East, and Pearston. The municipality is divided into seven administrative wards, with the administrative centre located in Somerset East. The settlement pattern of the Blue Crane Route is characterised by three prominent urban settlements, namely Cookhouse, Somerset East, and Pearston, which lie 175km, 180km and 231km from Port Elizabeth respectively. The urban areas are typical of the spatial patterns of towns throughout South Africa, namely they are segregated by economic classes and reside in clusters.

The municipality is approximately 9 836 km^2 in size (~17% of the greater Cacadu District Municipality) and is bordered in the in the north by the Inxuba Yethemba Municipality (part of the Chris Hani District Municipality), in the east by the Nxuba Municipality (part of the Amatole District Municipality) and Makana Municipality, in the south by the Sundays River Municipality and in the west by the Ikwezi Municipality.

The population the Blue Crane Route Municipality is estimated at 36 798 (based on a household survey conducted by the Cacadu District Municipality in 2005). The population constitutes approximately 7.21% of the greater Cacadu District. The average population growth is estimated at 1.7%, which will translate to a total population of 39 956 in 2010. Almost a third of the population (~26%) lives in rural villages, homesteads and settlements while the remaining population resides in the three main urban nodes of Cookhouse, Somerset East and Pearston. Given the size of the Municipality and the relatively small total population size, the population density within the Municipality is low.

The age profile of the population reveals that approximately 64.2% of the population is potentially economically active falling between the 15 to 65 year old age bracket.

[2] A category-B municipality is defined as a municipality that shares executive and legislative authority in its area with a category- C municipality within whose area it falls

The dependency ratio[3], however is 1.78 which means that every working individual must support almost 2 non-working/unemployed individuals

The population is largely Black African (59.6%), followed by Coloured (32.9%), White (7.44%) and Asian (0.06%). These demographics are reflected in the dominant languages within the Municipality with 57,4% of the population speaking isiXhosa speaking, 40,5% speaking Afrikaans, 1.63% speaking English and the remainder speaking other indigenous African languages.

Broadly, the level of education within the Municipality is low, with under 20% of the population (1 in 5) having had no schooling, while less than half of those with a Standard 10/Grade 12 certificate (~11%) progress to obtain education at University/Technikon level (~5%).

Economically, the Blue Crane Route Municipality contributed approximately 17% of the greater district's local economy in 2004. The largest sectors within the municipality in 2004 were Transport & Communication (~26%), General Government Services (~18%) and Manufacturing (~13%), Business Services (~12%), Agriculture, Forestry & Fishing sector (~11%), Trade (~10%) and relatively smaller contribution from Community Service (~8%), Construction (~2%) and Electricity and Water (~1%). The tourism sector is small but well established and dominated by the hospitality industry in the form of guesthouses and hotels. The hunting and fishing industries are also active in the area, particularly around Somerset East.

While the agriculture and fishing sector contribute only ~11% of the Grosse Geographic Product (GGP) it employs 36% of the employed population within the Municipality. This is largely a consequence of widespread subsistence farming in the area. Community Services employs approximately 22% of the employed population followed by General Government Services (~13%), Manufacturing (~8%), Trade (~7%), Construction (~4%) and Business Services (~5%). The Transport and Communications sector, while contributing ~26% to GGP only employs less than 1% of the employed population.

Unemployment within the Municipality is estimated at 26.3%, which in below the Eastern Cape average of ~32%, while 41.8% of the population is not economically active. The latter are made up of made up of scholars/students (19%), homemakers/housewives (9%), pensioners (10%), the medically unfit (7%), seasonal workers not currently employed (1%), those who choose not to work (3%) and those that could not find work (50%).

[3] The dependency ratio is calculated as the number of 0 to 14-year olds, plus the number of 65-year olds and older, divided by the number of people in the 15 to 64-year old age cohort. This is to give a rough indication of dependency.

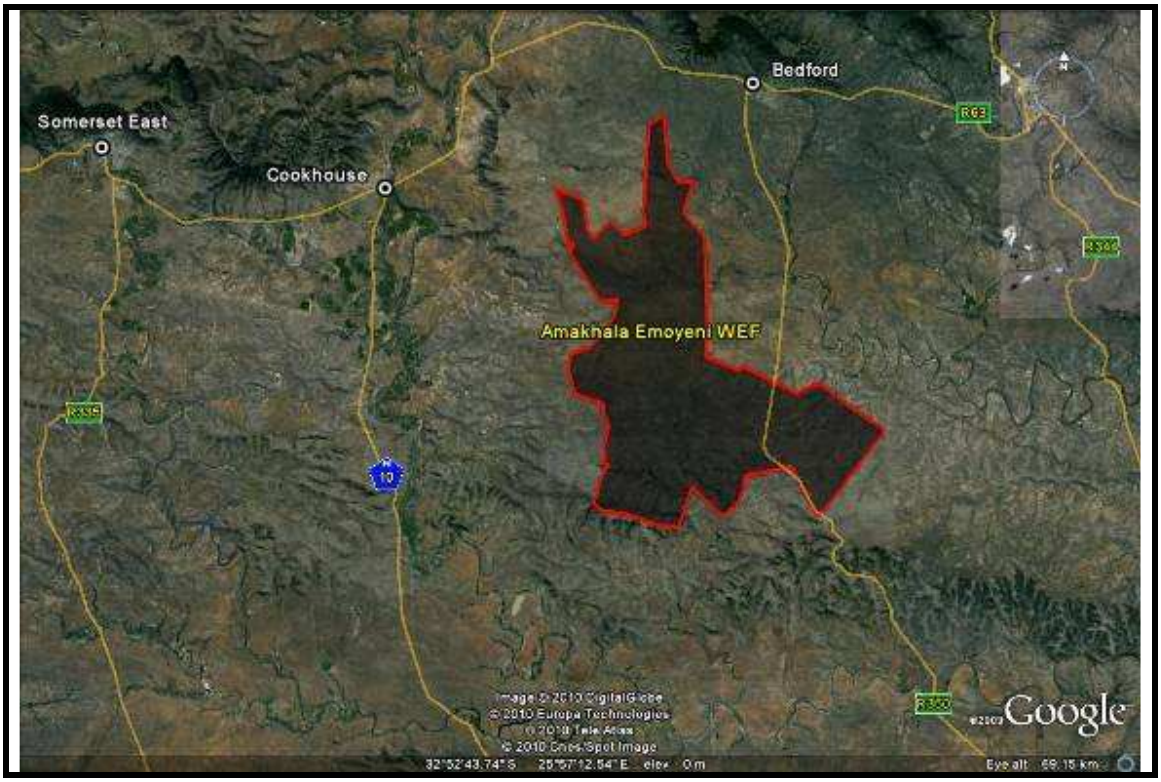


Figure 2.1: Proposed Project Location (source: Google Earth)

The population of the Blue Crane Route Municipality is estimated at 36 798 (based on a household survey conducted by the Cacadu District Municipality in 2005). The population constitutes approximately 7.21% of the greater Cacadu District. The average population growth is estimated at 1.7% which will translate in a total population of 39 956 in 2010. Almost a third of the population (~26%) live in rural villages, homesteads and settlements while the remaining population resides in the three urban nodes. Given the size of the Municipality and the relatively small total population size, the population density within the Municipality is low.

The age profile of the population reveals that approximately 64.2% of the population is potentially economically active falling between the 15 to 65 year old age bracket.

2.3.2 Ward 1 - Cookhouse and Surrounds

The proposed project is located within Ward 1 of the Blue Crane Route Municipality. This ward constitutes ~20% (1999 km^2) of the total area of the Municipality (9836 km^2) and is largely rural and agricultural in nature. As such, there are no major settlements within its boundary. The largest nearby town within the municipality is Cookhouse (population – 5369 [2001]), which falls within the neighbouring Ward.

Population

According to Census 2001 data, the total population of Ward 1 was 7 737, and that of Ward 16 was 6849. More recent data population statistics could not be sourced, but it is assumed that the population within the ward would increase given the municipal population growth rate of 1.7% per year.

Table 2.1: Ward 1 Population

Population Group	Ward 1	
	Number	%
Black African	5936	76.7
Coloured	1464	18.9
Indian or Asian	3	0.04
White	334	4.32
Total	7737	100

Source: Census 2001

Table 2.1 above indicates that the black African (~77%) population group was dominant in Ward 1 followed by Coloured (~19%) and White (~4%). As such, isiXhosa was the dominant language spoken in the area, with 75% of the population having isiXhosa as their first language. Twenty four (24%) percent of the population spoke Afrikaans, while 1.1% spoke English. It is assumed that these percentages have remained proportionally the same since 2001.

Age distribution

Table 2.2 below shows that the youth cohort (<15 years) in both Ward 1 is moderately high at ~30%. The post retirement cohort (>64) is low to moderate at ~5% of the ward population. The dependency ratio[4] within the ward is low is 0.14 in which means that ~7 working individual support 1 non-working/unemployed individual within the area.

Table 2.2. Ward 1 Age Distribution

Age Group	Ward 1
0-4	716
5-9	775
10-14	799
[Youthful dependents]	[2290]
15-19	785
20-24	731
25-29	707
30-34	580
35-39	563

[4] The dependency ratio is calculated as the number of 0 to 14-year olds, plus the number of 65-year olds and older, divided by the number of people in the 15 to 64-year old age cohort. This is to give a rough indication of dependency.

Age Group	Ward 1
40-44	504
45-49	436
50-54	306
55-59	231
60-64	228
65-69	129
70-74	95
75-79	74
80 and over	77

Source: Census 2001

Education levels

Table 2.3 below shows that according to 2001 Census data, approximately 33% (corresponding to an absolute total of 2 554 people) of the population of Ward 1 aged 15 and older were estimated to be functionally illiterate/ innumerate in 2001. Given the strong correlation between education and skills levels, it may be assumed that a significant portion of the study area's working age population have only sufficient skills for elementary jobs.

Table 2.3: Ward 1 Education Levels

Description	Ward 1
No schooling	870
Some primary	1684
[% functional illiteracy/ innumeracy][5]	33% [2554]
Complete primary	468
Some secondary	1171
Std 10/Grade 12	335
Higher	135

Source: Census 2001

Employment levels

The employment statistics presented in Table 2.4 below indicate that in 2001 approximately 34% of the Ward 1 population was employed in 2001. The unemployment rate was relatively high, estimated at ~30%. This is still slightly below the Cacadu District Eastern Cape average of `31% (Eastern Cape Provincial Government website) and 32% (State of the Environment Report 2004) respectively.

According to the 2009-2013 Blue Crane Route IDP, the unemployment levels have worsened since 2001 as employment levels have declined by an average of 2% per annum within the broader municipality.

[5] In the South African context, having obtained a primary qualification (i.e. having successfully passed Grade 7) is generally held as the absolute minimum requirement for functional literacy/ numeracy. The National Department of Education's ABET (Adult Basic Education and Training) programme provides education and training up to the equivalent of Grade 9. In this more onerous definition, Grade 9 is required as the minimum qualification for having obtained a basic education (www.abet.co.za).

Table 2.4: Ward 1 Employment Levels (15 – 64 age groups)

Description	Ward 1 %
Employed[6]	34.28
Unemployed	29.80
Not Economically Active[7]	35.92

Source: Census 2001

Household income

According to the 2001 Census, the vast majority of households in Ward 1 were living on less than the R1 600/ month minimum subsistence level. Significantly, the 'no formal income' category was the most pronounced at ~62% while only 3% of household heads were earning an income clustered in the R800-R3200/ month range (see Table 2.5).

Table 2.5: Ward 1 Household Income (by head of household)

Income per month	Ward 1 %
No formal income	61.69
R 1 – R 400	14.39
R 401 – R 800	17.71
R 801 - R 1 600	3.00
[% households below minimum subsistence level]	96.78
R1 601 - R 3 200	1.64
R 3 201 – R 6 400	0.71
R 6 401 – R 12 800	0.39
R 12 801 – R 25 600	0.18
R 25 601 and higher	0.30

Source: Census 2001

Sectoral employment

Table 2.6 below provides an overview of proportional employment per economic sector by head of household for ward 1 within the Blue Crane Route Local Municipality.

The largest employer in Ward 1 in 2001 was the Agricultural sector which provides ~51% of the formal employment in the area. This sector was followed by the Private Households sector that employed ~15% of the employed population and the Community and Social Services sector, that provided ~6% of the employment in the Ward. The other moderately significant formal employment sectors were the

[6] Census 2001 official definition of *an unemployed person*: "A person between the ages of 15 and 65 with responses as follows: 'No, did not have work'; 'Could not find work'; 'Have taken active steps to find employment'; 'Could start within one week, if offered work'." (www.statssa.gov.za).

[7] The term "not economically active" refers to people of working age not actively participating in the economy, such as early retirees, students, the disabled and home-makers.

Manufacturing (~4.5%), the Construction (~4%) and the Wholesale/Retail trade (~4%) sectors that together account for 12.5% of employment.

Table 2.6: Ward 1 Sectoral contribution to employment

Description	Ward 1 %
Agriculture, hunting, forestry and fishing	51.31
Mining and quarrying	0.00
Manufacturing	5.49
Electricity, gas and water supply	0.17
Construction	4.29
Wholesale and retail trade	4.11
Transport. Storage and communication	0.97
Fin., real estate and bus. Services	1.37
Community, social and personal services	6.17
Other and not adequately defined	10.97
Private households[8]	15.14

Source: Derived from Census 2001

2.4 SURROUNDING LAND USES

The proposed site falls largely on agricultural land between the N10 (to the west) and R350 (in the east). The lower south east portion of the proposed site straddles the R5350 for approximately 7km. Road access to the proposed WEF site is mainly from the R350 (south of Bedford) via a secondary dirt road linking Bedford to Cookhouse via the Patryshoogte. From the Patryshoogte road, that runs roughly southwest to northeast in the direction of Bedford, there is secondary road junction ~8km from Bedford. At this junction, there is a secondary road that bisects the WEF from the northeast to the south west of the site. The Patryshoogte road can also be accessed from the N10 that runs through Cookhouse.

As indicated above, the affected farms are portions 1, 2 and remainder of Farm 222, portion 3 of Farm 203 (Platt House), remainder of Farm 205 (Kop Leegte), portion 1 of Farm 206 (Normandale), remainder of Farm 168 (Stompstaart Fontein), remainder of Farm 224 (Taai Fontein), remainder of Farm 221 (Leeuw Fontein), portion 2 and remainder of Farm 223 (Paarde Kloof), remainder of Farm 227 (Wilgem Bush), remainder of Farm 225, portion 1, 2 and remainder of Farm 218 (Brakke Fonteyn), remainder of Farm 259, remainder of Farm 260, portion 5 of Farm 149 (Great Knoffel Fonteyn), remainder of Farm 242, portion 1 and remainder of Farm 220 (Brak Fontein), remainder of Farm 219 (Vogel Fonteyn), remainder of Farm 169 (Olive Woods Estate), portion 3 of Farm 141 (Brakfontein), portion 1 of Farm 187 (Kleine Knoffel Fonteyn).

The topography of the area consists of gently undulating grassy hills, between Suurkop, the Patryshoogte and the Baviaansrivierberge (Photograph 2.1 and 2.2) in the north and the Ariesberg in the southwest. The dominant land use activity in the

[8] This category mainly comprises domestic workers and gardeners.

area is farming, specifically livestock farming (sheep, cattle and dairy farming). Game farming is also an increasingly important activity.

The south-eastern portion of the proposed WEF located to the east of the R350 forms part of the Smaldeel Conservancy. The Conservancy is made up of a number of farms and is approximately 78 000 ha in size. The land is used for hunting, eco-tourism and photographic safaris (Eskom, 2005).

A number of farmsteads are located within and around the WEF site. Figure 2.3 illustrates the location of the farmsteads (⌂) with respect to the proposed turbine layout. The families of the respective landowners have farmed the farms affected by the proposed WEF for over 100 years. Peter Barker (Leeufontein, Farmstead Geluk) indicated that his family had been farming in the area since 1822 (Personal communication, July 2010).

The site is also traversed by existing transmission lines that link the Bedford area with Adelaide in the west, Alicedale in the south and Somerset East in the west. The large Poseidon substation (Photograph 2.3) is located just north of the northern extent of the proposed WEF site.

Photograph 2.1: View of the proposed WEF site along access road (Patryshoogte) towards the south across Farm Albertvale (Bramfontein)

Photograph 2.2: View of the proposed WEF site along access road (Patryshoogte) towards the north with the Baviaansrivierberge in the background across Farm knoffelfontein (Farm 260)

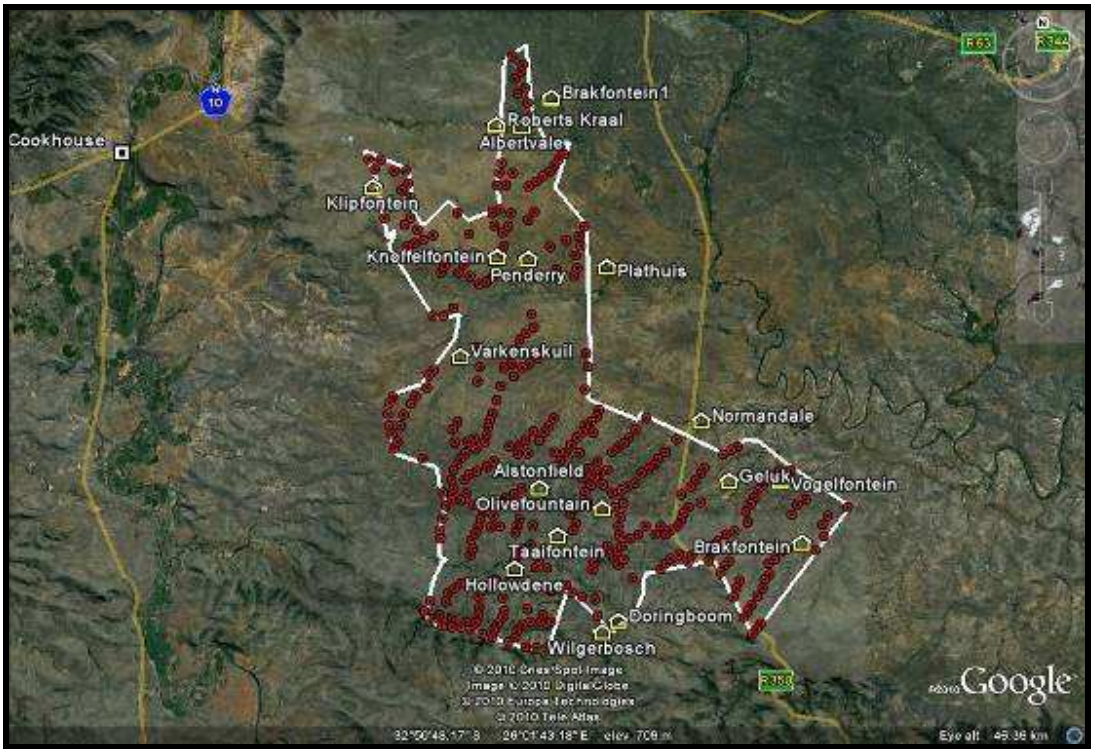


Figure 2.3: Relative location of farmsteads/labourers cottages with respect to the proposed turbine layout

Photograph 2.3: Poseidon substation and associated transmission lines viewed from the west on the Patryshoogte road

SECTION 3: POLICY AND PLANNING CONTEXT

3.1 INTRODUCTION

Section 3 provides and overview of the policy and planning environment affecting the proposed wind energy facility. 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);
- Eastern Cape Provincial Growth and Development Plan (2004-2014);
- The Cacadu District Municipality Integrated Development Plan (IDP) (2007-2012);
- The Blue Crane Route Municipality Integrated Development Plan (IDP) (2007-2012);

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 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

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

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

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

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

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

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

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

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

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

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).

3.3 PROVINCIAL AND LOCAL LEVEL POLICY AND PLANNING

3.3.1 Eastern Cape Provincial Growth And Development Programme

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

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

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

Section 5 of the PGDP (2004-2014) identifies six strategic objective areas of the PGDP. Of these the infrastructure programme is of relevance to the study. The report notes that development of infrastructure, especially in the former homelands, is a necessary condition to eradicate poverty through:

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

Infrastructure development, in turn, will have strong growth promotion effects on the agriculture, manufacturing and tourism sectors by improving market access and by "crowding in" private investment. Poverty alleviation should also be promoted through labour-intensive and community based construction methods.

The PGDP indicates that the programmes have been selected for their potential in leveraging significant resources, creating a large multiplier effect, and providing a foundation for accelerated economic growth. Of specific relevance is the Strategic Infrastructure Programme. This programme indicates that enabling economic and logistics infrastructure – energy, roads, rail, ports, and air transport among others – is a necessary condition for economic growth and development. Specific reference is therefore made to energy infrastructure.

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

The high-level objectives of the Strategic Infrastructure Programme include consolidating and building upon the strengths of the Province's globally-competitive industrial sector through the development of world-class infrastructure and logistics capability in the East London and Coega IDZs. A reliable energy supply will be critical to achieving these objectives. The proposed WEF will contribute to the future energy requirements of the Eastern Cape, and it proximity to the Coega and East London IDZs will also benefit these key initiatives.

3.3.2 Cacadu District Municipality Integrated Development Plan

The Cacadu District Municipality Integrated Development Plan (IDP) (2007-2012) identifies 7 key strategic priorities based on the Medium Term Strategic Framework (MTSF) published by the National Minister of Planning as a directive to all spheres of government in July 2009. The strategic priories that are relevant to the SIA are listed:

- Identification of Economic Opportunities - Efforts are to be undertaken to identify and enhance existing economic opportunities in the interests of work creation and sustainable livelihoods;
- Provision and Maintenance of Infrastructure - Promote an infrastructure investment program aimed at expanding and improving social and economic infrastructure, transportation, energy, water, sanitation and information and communications infrastructure;
- Enhancement of Skills and Education Systems - Investment in quality education for all people and in skills development including information and communications technology (ICT, artisan and agricultural skills development to improve food security and land-based livelihoods;
- Sustainable Resource Management and Use - Investigate and validate renewable energy alternatives, promotion of energy efficiency and accreditation of carbon credits, adopt waste reduction practices, enforce zero tolerance of illegal and

unsustainable exploitation of resources, support sustainable water use and the provision of quality drinking water and enhance biodiversity and the preservation of natural habitats.

These strategic priorities form the framework for the District analysis of the status quo across numerous sectors within the District. The District analysis, in turn, informs the development priorities for the municipality.

The IDP development priorities highlighted in the Cacadu IDP are as follows:

- Priority 1: Infrastructure Investment - "Without appropriate infrastructure development and appropriate infrastructure maintenance the sustainability of local municipalities will be severely compromised as its existing and future tax base is dependant on appropriately maintained infrastructure. In addition, appropriate infrastructure at appropriate locations can create an environment conducive to economic development"
- Priority 2: Capacity Building and Support to Local Municipalities – "*Local municipalities within the District are required by the Constitution to 1) provide democratic and accountable government for local communities; 2) provide services to the communities in an equitable and sustainable manner; 3) promote social and economic development; and 4) promote a safe and healthy environment. Although obligated to perform those duties as listed above, local municipalities are often overwhelmed in terms of available resources and capacity to adequately deliver on the above. The Cacadu District Municipality therefore has an obligation to support and provide capacity to those local municipalities within the District.*"
- Priority 3: Economic Development – "*Existing resources need to be properly leveraged in order to benefit the community at large while taking into account the total resources available within the municipality. In achieving the above the following principles must be applied:*
  - *Sustainability;*
  - *SMME development;*
  - *Impact assessment; and*
  - *Good municipal governance.*"
- Priority 4: Community Development – "*The Cacadu District Municipality is responsible for the overall planning and co-ordination of service delivery within the boundaries of the District Municipality. Due to the vastness of the geographical area and the diversity within the boundaries, there are numerous and unique situations being encountered in terms of the provision of a range of services, in particular "community services", i.e. Health, disaster management, etc.*"

The applicable objectives and strategies with respect to the development priorities outlined above form the basis of the draft District Service Delivery & Budget Implementation Plan (SDBIP). Within the SDBIP, these strategies and objectives utilise existing economic strengths and opportunities to inform the establishment of workable programmes and projects. These programmes and projects tend to reduce the current threats, and strengthen the weaknesses in the local economic environment.

The Cacadu IDP identifies the promotion and utilization of renewable energy as core initiative that influences its policies, objectives, strategies and projects. As such, the

proposed WEF could play an important role in the District realising some of its key IDP objectives.

3.3.3 Blue Crane Route Municipality Integrated Development Plan

The Blue Crane Route Local Municipality Integrated Development Plan (IDP) (2007-2012) identifies 5 key development strategy priorities. These priorities address the outcome of an analysis of the status quo across numerous sectors within the BCRM and, in turn, inform the development objectives and strategies for the municipality.

These priorities aim at utilising existing economic strengths and opportunities by transferring these into workable programmes and projects. These programmes and projects tend to reduce the current threats, and strengthen the weaknesses in the local economic environment. The IDP priorities that are relevant to the proposed wind energy facility include:

- Priority 1: Infrastructure – Objective 1.2 states "Reliable and affordable electricity will be available to 80% of consumers by 2012."
- Priority 2: Community Services – Objective 2.1 states "Sufficient land will be available in Blue Crane Route Local Municipality for development purposes by 2010."
- Priority 3: Local Economic Development – Objective 3.1 states " Institutional arrangements to promote Local Economic Development (LED) in the Blue Crane Route Local Municipality will be consolidated and strengthened"

The IDP has identified alternative energy projects as a key driver for local economic development

3.4 INTERNATIONAL EXPERIENCE WITH WIND FARMS

3.4.1 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).

3.4.2 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 dependant 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 be 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 dependant 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.

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

3.4.3 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, localised impacts on tourism. However, the paper notes that this could change as more are built.

The key lesson for South Africa is 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 criticised 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 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 realised (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 favoured development approach has been the private developer/public subsidy model, many proposals have faced stiff local opposition (distinction should be made against the model in South Africa: where it is private developer footing the development with REFIT tariff power purchase agreement with public entity. "Public subsidy" as such is not an issue in this context).

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.

3.4.4 Health impacts of wind farms

This section summarizes 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. Subaudible, 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 infrasounds 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 neighbour (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 Electromagnetic Radiation and Interference 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 armour 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:

- The Social Scoping Report prepared for the Scoping Report (Tony Barbour, March, 2010);
- 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 WEF projects, including the Cookhouse WEF;

In identifying the key issues the following assumption is made:

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

4.2 IDENTIFICATION OF KEY SOCIAL ISSUES

The key social issues identified during the SIA can be divided into:

- The policy and planning related issues;
- Local, site-specific issues.

The local site-specific issues can in turn be divided into construction and operational related issues. These issues are discussed and assessed below. The potential impacts associated with the power line routes are also assessed.

4.3 POLICY AND PLANNING ISSUES

As indicated in Section 1.6, legislative and policy context plays an important role in identifying and assessing the potential social impacts associated with a proposed development. In this regard a key component of the SIA process is to assess the proposed development in terms of its fit with key planning and policy documents.

The 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);
- Eastern Cape Provincial Growth and Development Plan (2004-2014);

- The Cacadu District Municipality Integrated Development Plan (IDP) (2007-2012);
- The Blue Crane Route Municipality Integrated Development Plan (IDP) (2007-2012);

The findings of the review indicated that wind energy was strongly supported at a national and local level. At a national level the While 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 PGDP does not make specific reference to renewable energy, however, investment in energy infrastructure is identified as one of the key requirements. Based on this is it reasonable to assume that the establishment of WEF is supported. At a local level the Cacadu District Municipality IDP identifies 7 key strategic priorities. The key priority that is relevant to the proposed WEF is:

- Sustainable Resource Management and Use; specifically to investigate and validate renewable energy alternatives, promotion of energy efficiency and accreditation of carbon credits. ,

The Blue Crane Route Municipality IDP has identified alternative energy projects as a key driver for local economic development.

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 WEFs are supported at a national, provincial and local level. It is therefore the opinion of the authors that the establishment of a WEF on the proposed site is supported by national, provincial and local policies and planning guidelines.

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 employed on the project;
- Increased risk of stock theft, poaching and damage to farm infrastructure associated with presence of construction workers on the site;
- Increased risk of veld fires associated with construction related activities;
- Threat to safety and security of farmers associated with the presence of construction workers on the site;

- Impact of heavy vehicles, including damage to roads, safety, noise and dust;
- Loss of agricultural land associated with construction related activities.

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

4.4.1 Creation of employment and business opportunities

Based on the information from other WEF projects, the total capital expenditure during the construction phase will be in the region of R 15 billion. The construction phase is expected to extend over a period of 24-30 months and create approximately 200-220 temporary employment opportunities. The work associated with the construction phase will be undertaken by contractors and will include the establishment of the access roads and services and the erection of the wind turbines, substations and power lines.

It is anticipated that approximately 25% (or 55) of opportunities will be available to skilled personnel (engineers, technicians, management and supervisory), 35% (or 77) to semi-skilled personnel (drivers, equipment operators), and 40% (or 88) to low skilled personnel (construction labourers, security staff etc). Due to the low education and skills levels in the area, the majority of opportunities for residents in the local towns of Cookhouse, Bedford and Somerset East are likely to be limited to the low skilled category. The majority of the employment opportunities are likely to be associated with the contactors appointed to construct the WEF and associated infrastructure. In this regard the majority of contractors use their own staff and this will limit the potential for direct employment opportunities for locals during the construction phase.

The proposed development will create an opportunity to provide on-site training and increase skills levels. However, the majority of these opportunities are likely to benefit the workers employed by the contractors and not locals from the area. Due to the low education and skills levels in the area the opportunities for skills development and training of locals are likely to be limited. Mr. Chris Wilken and Rob Beach of the Blue Crane Development Agency (BCDA) indicated that the proposed WEF would attract skilled professionals to the area who could potentially settle and add value to the area in terms of access to expertise etc. This was seen as a positive impact.

In terms of business opportunities for local companies, the expenditure of R 15 billion during the construction phase will create business opportunities for the regional and local economy. However, given the technical nature of the project and the high import content associated with wind turbines the opportunities for the local Cookhouse/Bedford/Somerset East economy are likely to be limited. The sector of the local economy that is most likely to benefit from the proposed development is therefore the local service industry. The potential opportunities for the local service sector would be linked to accommodation, catering, cleaning, transport and security, etc. As indicated above, the majority of the construction workers will be accommodated in the towns of Cookhouse, Bedford and Somerset East. This will create opportunities for local hotels, B&Bs, guest farms and people who want to rent out their houses. In addition, a proportion of the total wage bill earned by construction workers over the 24-30 month construction phase will be spent in the regional and local economy. The wage bill associated with the construction phase is estimated at R35 million per annum (current value). The total wage bill for the four-year construction phase will therefore be in the region of R 87.50 million. The

injection of income into the area in the form of rental for accommodation and wages will create opportunities for local businesses in towns such as Cookhouse, Bedford and Somerset East. The benefits to the local economy will however be confined to the construction period (24-30 months).

The local hospitality industry in Cookhouse, Bedford and Somerset East is also likely to benefit during the construction phase. These benefits are associated with accommodation and meals for professionals (engineers, quantity surveyors, project managers, product representatives etc.) and other personnel involved on the project. Experience from other large construction projects indicates that the potential opportunities are not limited to onsite construction workers but also to consultants and product representatives associated with the project (PPC's Dwaalboom Cement Factory, 2007).

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 (4) (Rated as 4 due to potential opportunities for local communities and businesses)
Duration	Short term (2)	Short term (2)
Magnitude	Low (4)	Low (4)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (32)	Medium (48)
Status	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	N/A	N/A
Can impact be enhanced?	Yes	
Mitigation: 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 wind energy facility would therefore be foregone. 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 possible, Windlab should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically 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;
- Before the construction phase commences Windlab should meet with representatives from the Blue Crane Municipality to establish the existence of a skills database for the area. If such as database exists it should be made available to the contractors appointed for the construction phase;
- The local authorities, community representatives and organisations on the interested and affected party database should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that Windlab 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

- Windlab should develop a database of local companies, specifically Historically Disadvantaged (HD) companies, that 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, Windlab should assist local HD companies to complete and submit the required tender forms and associated information.
- The Blue Crane Municipality in conjunction with the local Chamber of Commerce and representatives from the local hospitality industry should identify strategies aimed at maximising the potential benefits associated with the project.

Note that while preference to local employees and companies is recommended, it is recognised that a competitive tender process may not guarantee the employment of local labour for the construction phase.

4.4.2 Presence of construction workers in the area

Based on the findings of the SIA the area can be described as a rural area that is "safe and secure". In terms of affected farmsteads, there are a relatively small number of farmsteads that will be affected by the proposed project. However, there are a number of potentially vulnerable farming activities, specifically sheep and cattle farming. The potential threat to farming activities is discussed below. In addition, the presence of construction workers also poses a potential risk to family structures and social networks in the area (both on farms and in the local towns of Cookhouse and Bedford). 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 potential risk to local family structures and social networks is, however, likely to be low. This finding is based on the relatively small number of construction workers associated with the construction phase, namely 200-220. In addition, the potential impact will be reduced if the majority of low skilled workers are sourced from the local community. These workers will form part of the local family and social network and, as such the potential impact will be low. The use of local residents to fill the low skilled job categories will also reduce the need to house construction workers on the site. This will reduce the potential impact on vulnerable farm labourers and their families. Initial indications are that the majority of the construction workers will be accommodated in the towns of Cookhouse and Bedford. However, local farmer, Mr. Peter Bowker, indicated that Windlab had informed him that workers would be housed on site during the construction phase.

The majority of construction workers fall within the skilled category and are likely to be housed in the nearby towns of Cookhouse, Bedford and Somerset East where they will be accommodated in local B&Bs and houses.

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

Nature: Potential impacts on family structures and social networks associated with the presence of construction workers		
	Without Mitigation	**With Mitigation**
Extent	Local (2) (Rated as 2 due to potential severity of impact on local communities)	Local (1) (Rated as 1 due to potential severity of impact on local communities)
Duration	Short term for community as a whole (1) Long term-permanent for individuals who may be affected by STDs etc (5)	Short term for community as a whole (1) Long term-permanent for individuals who may be affected by STDs etc (5)
Magnitude	Low for the community as a whole (4) High-Very High for specific individuals who may be affected by STDs etc (10)	Low for community as a whole (4) High-Very High for specific individuals who may be affected by STDs etc (10)
Probability	Probable (3)	Probable (3)
Significance	Low for the community as a whole (21) Moderate-High for specific individuals who may be affected by STDs etc (51)	Low for the community as a whole (18) Moderate-High for specific individuals who may be affected by STDs etc (48)
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 the presence of construction workers in the area can be mitigated. The detailed mitigation measures should be outlined in the Environmental Management Plan (EMP) for the Construction Phase. The aspects that should be covered include:

- Where possible, Windlab 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;
- Windlab should consider the establishment of a Monitoring Forum (MF) for the construction phase. The Forum should be established before the construction phase commences and include key stakeholders, including representatives from the local community, local councillors, farmers and the contractor. The role of the Forum 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;
- Windlab and the contractor should, in consultation with representatives from the MF, develop a code of good 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;
- Windlab 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 24-30 month 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 over night on the site. However, should the need arise to house construction workers on the site the total number is likely to be relatively low (less than 100). This will make it possible to manage the potential impacts effectively.

4.4.3 Increased risk of stock theft, poaching and damage to farm infrastructure

The presence of construction workers on the site increases the potential risk of stock theft and poaching. The movement of construction workers on and off the site also poses a potential threat to farm infrastructure, such as fences and gates, which may also be damaged. Stock and game losses may also result from gates being left open and/or fences being damaged. Based on comments from some farmers it would appear that Windlab have entered into an agreement with the affected landowners whereby the company will compensate farmers for damages to farm property and disruptions to farming activities. It is assumed that this includes losses associated with stock theft and damage to property etc.

Table 4.3: Assessment of impact of stock theft and damage to farm infrastructure

Nature: Potential loss of livestock, poaching and damage to farm infrastructure associated with the presence of construction workers on site		
	Without Mitigation	**With Mitigation**
Extent	Local (4) (Rated as 4 due to potential severity of impact on local farmers)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6) (Due to reliance on agriculture and livestock for maintaining livelihoods)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (36)	Low (24)
Status	Negative	Negative
Reversibility	Yes, compensation paid for stock losses etc	Yes, compensation paid for stock losses etc
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	Yes
Mitigation: See below		
Cumulative impacts: No**,** provided losses are compensated for.		
Residual impacts: See cumulative impacts.		

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

Recommended mitigation measures
As indicated above, Windlab have entered into an agreement with the affected landowners whereby the company will compensate for damages. In addition, the detailed mitigation measures should be outlined in the Environmental Management Plan (EMP) for the construction and operation phases. The mitigation measures that can be considered to address the potential impact on livestock, game and farm infrastructure include:

- Windlab should establish a Monitoring forum (see above) that includes local farmers and develop a Code of Conduct for construction workers. This committee should be established prior to commencement of the construction phase. The Code of Conduct should be signed by Windlab and the contractors before the contractors move onto site;
- Windlab should hold contractors liable for compensating farmers and communities in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. This should be contained in the Code of Conduct to be signed between Windlab, the contractors and neighbouring landowners. The agreement should also cover loses and costs associated with fires caused by construction workers or construction related activities (see below);
- The EMP must outline procedures for managing and storing waste on site, specifically plastic waste that poses a threat to livestock if ingested;
- Contractors appointed by Windlab must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms.
- Contractors appointed by Windlab must ensure that construction workers who are found guilty of stealing livestock, poaching and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation;
- The housing of construction workers on the site should be limited to security personnel. However, should the need arise to house construction workers on the site the relatively low number of construction workers that will need to be housed on site (less than 100) will make it possible to manage the potential impacts effectively.

4.4.4 Increased risk of veld fires

The presence of construction workers and construction-related activities on the site poses an increased risk of veld fires that in turn pose a threat to the livestock, wildlife and farmsteads in the area. In the process, farm infrastructure may also be damaged or destroyed and human lives threatened.

- The potential risk of veld fires is heightened by the windy conditions in the area, specifically during the dry, winter months.
- All of the farms farm sheep or cattle and, as such, their livelihoods are dependent on grazing on their farms. Any loss of grazing due to a fire would therefore impact negatively on the affected farmers livelihoods;
- The risk of fire related damage is exacerbated by the distance to fire-fighting vehicles located in the nearest towns of Cookhouse, Bedford and Somerset East.

Table 4.4: Assessment of impact of increased risk of veld fires

Nature: Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of veld fires		
	Without Mitigation	**With Mitigation**
Extent	Local (4) (Rated as 4 due to potential severity of impact on local farmers)	Local (2) (Rated as 2 due to potential severity of impact on local farmers)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate-High due to reliance on livestock for maintaining livelihoods (8)	Low-Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	Medium (42)	Low (30)
Status	Negative	Negative
Reversibility	Yes, compensation paid for stock and crop losses etc	
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	
Mitigation: See below		
Cumulative impacts: No, provided losses are compensated for.		
Residual impacts: See cumulative impacts.		

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

Recommended mitigation measures
As indicated above, Windlab have entered into an agreement with the affected landowners whereby the company will compensate for damages. It is assumed that this includes losses associated veld fires. In addition, the potential increased risk of veld fires can be effectively mitigated. The detailed mitigation measures should be outlined in the Environmental Management Plan (EMP) for the construction and operation phases. The aspects that should be covered include:

- Contractor to ensure that open fires on the site for cooking or heating are not allowed except in designated areas;
- Contractor to ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced. Measures to reduce the risk of fires include avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high risk dry, windy summer months;
- Contractor to provide adequate fire fighting equipment on-site;
- Contractor to provide fire-fighting training to selected construction staff;
- As per the conditions of the Code of Good Conduct, in the advent of a fire being caused by construction workers and or construction activities, the appointed

contractors must compensate farmers for any damage caused to their farms. The contractor should also compensate the fire fighting costs borne by farmers and local authorities.

4.4.5 Impact of construction vehicles

Road access to the proposed WEF site is mainly from the R350 (south of Bedford) via a secondary dirt road linking Bedford to Cookhouse via Patryshoogte. The movement of heavy construction vehicles during the construction phase will damage roads and create noise, dust and safety impacts for other road users.

Based on information from other WEFs approximately 5 abnormal heavy load trips are associated with the transport of a single turbine onto site. These include loads associated with 40-55 m rigid turbine blades, as well as abnormally heavy loads associated with the 80-ton nacelles. The total number of trips associated with the proposed WEF is therefore in the region of 1 800. In addition, a crawler crane (~ 750 t) and assembly cranes will also need to be transported onto and off the site. Other heavy equipment will include normal civil engineering construction equipment such as graders, excavators, cement trucks, etc.

The damage to gravel roads by heavy equipment can result in a number of potential negative impacts, including increased wear on vehicles owned by local farmers, impact on ease of access (e.g. time delays, detours) to stock posts, between neighbours and members of the farming community, as well as access to local towns (services, retail, socialising). While a relatively large number of properties are affected for a significant period of time, the current road use frequency is low.

The findings of the SIA indicate that the issues related to the movement of heavy vehicle traffic during the construction phase can also be effectively mitigated. These issues are therefore not regarded as significant concerns.

Table 4.5: **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 (3) (Rated as 2 due to potential severity of impact on local farmers)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Low (27)	Low (18)
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 impact on the farming activities in the area and also result in higher maintenance costs for vehicles of local farmers and other road users. The costs will be borne by road users who were not responsible for the damage.
Residual impacts: See cumulative impacts

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

Recommended mitigation measures
As indicated above, Windlab have entered into an agreement with the affected landowners whereby the company will compensate for damages. It is assumed that this includes losses associated with damage to local internal farm roads. In addition, the potential impacts associated with heavy vehicles and dust can be effectively mitigated. The detailed mitigation measures should be outlined in the Environmental Management Plan (EMP) for the construction and operation phases. 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.

4.4.6 Damage to and loss of farmland

The activities associated with the construction phase, such as establishment of access roads and the construction camp, movement of heavy vehicles and preparation of foundations for the wind turbines, substations and power lines will damage farmlands and result in a loss of farmlands for future farming activities. This is an issue that has been raised as a concern by the local farmers interviewed during the SIA. In the case of WEFs loss of farmland is generally negligible, with all infrastructure accounting for 2% to 5% of the land of the farms where the turbines will be located.

The significance of the impacts is to some extent mitigated by the fact that the farming activities in the area are confined to stock farming as opposed to crops. Windlab have also entered into an agreement with the affected landowners whereby the company will compensate for damages. It is assumed that this includes the loss of productive farmland. In addition, the experience with wind energy facility developments elsewhere is that livestock farming is not significantly affected by WEFs. The final footprint of disturbance associated with a WEF is also small and is linked to the foundation of the individual wind turbines, services roads, substations and power lines. The impact on farmland associated with the construction phase can therefore be mitigated by minimising the footprint of the construction related activities and ensuring that disturbed areas are fully rehabilitated on completion of the construction phase. Recommended mitigation measures are outlined below.

Table 4.6: Assessment of impact on farmland due to construction related activities

Nature: The activities associated with the construction phase, such as establishment of access roads and the construction camp, movement of heavy vehicles and preparation of foundations for the wind turbines, sub stations and power lines will damage farmlands and result in a loss of farmlands for future farming activities.		
	Without Mitigation	**With Mitigation**
Extent	Local (3)	Local (1)
Duration	Long term-permanent if disturbed areas are not rehabilitated (5)	Short term if damaged areas are rehabilitated (1)
Magnitude	Moderate, due to importance of farming in terms of local livelihoods (4)	Minor (2)
Probability	Definite (5)	Highly Probable (4)
Significance	High (60)	Low (16)
Status	Negative	Negative
Reversibility	No, in case of footprint associated with the WEF	No, in case of footprint associated with the WEF
Irreplaceable loss of resources?	Yes, loss of farmland. However, disturbed areas can be rehabilitated	Yes, loss of farmland. However, disturbed areas can be rehabilitated
Can impact be mitigated?	Yes, however, loss of farmland cannot be avoided	Yes, however, loss of farmland cannot be avoided
Mitigation: See below		
Cumulative impacts: Overall loss of farmland could impact on the livelihoods of the affected farmers, their families and the workers on the farms and their families. However, disturbed areas can be rehabilitated.		
Residual impacts: See cumulative impacts.		

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

Recommended mitigation measures
As indicated above, Windlab have entered into an agreement with the affected landowners whereby the company will compensate for damages. It is assumed that this includes loss of productive farmland. The potential impacts associated with damage to and loss of farmland can be effectively mitigated. The detailed mitigation measures should be outlined in the Environmental Management Plan (EMP) for the construction and operation phases. The aspects that should be covered include:

- The footprint associated with the construction related activities (access roads, turning circles, construction platforms, workshop etc) should be minimised;
- An Environmental Control Officer (ECO) should be appointed to monitor the establishment phase of the construction phase;
- All areas disturbed by construction related activities, such as access roads, construction platforms, workshop area etc, should be rehabilitated at the end of the construction phase;

- The implementation of a rehabilitation programme should be included in the terms of reference for the contractor/s appointed to establish the WEF. The specifications for the rehabilitation programme should be drawn up the botanical specialist appointed as part of the EIA process;
- The implementation of the Rehabilitation Programme should be monitored by the ECO;
- Windlab should compensate farmers that suffer a permanent loss of land due to the establishment of the WEF. The findings of the SIA indicate that the farmers affected by the proposed WEF are being compensated for the loss of land. In addition they are being compensated for participating in the project.

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;
- Impact on tourism and the creation of potential tourist opportunities (This can also be regarded as a negative impact);
- The establishment of renewable energy infrastructure and establishment of Cleaner Development Mechanism (CDM) project.

Potential negative impacts
- Impact of the proposed wind energy facility on the current farming activities, specifically the potential loss of productive farm land;
- The visual impacts and associated impact on sense of place.

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

4.5.1 Creation of employment and business opportunities

Based on information from similar studies, the proposed wind energy facility will employ approximately 90 full time employees over 25-year period. Approximately 25% of opportunities will be available to skilled personnel (forecasters, technicians, management and supervisory, etc), 35% to semi-skilled personnel (drivers, equipment operators), and 40% to low skilled personnel (road maintenance, security, etc). The proposed WEF will therefore create potential employment opportunities in the Eastern Cape Province and Blue Crane Municipality. However, given that the wind energy sector in South Africa is relatively new it may be necessary to import the required operational and maintenance skills from other parts of South Africa or even overseas. However, it will be possible to increase the number of local employment opportunities through the implementation of a skills development and training programme linked to the operational phase. Such a programme would support the strategic goals of promoting local employment and skills development contained in the Blue Crane IDP and LED programmes.

Representatives from the Blue Crane Development Agency (BCDA) indicated that the proposed WEF had the potential to attract skilled professionals to the area who, in turn, may settle and add value to the area in terms of access to expertise etc. However, the BCDA also indicated that they would only support WEF developments that a) are located in isolated areas and developed to minimise visual impacts, b)

benefit the community (Beford and Cookhouse) through community trusts that are managed through BCDA. The importance of addressing community benefits is highlighted in the research undertaken by Warren and Birnie (2009), which found that wind farms in Europe 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 been widespread support for wind power. However, in Britain where the favoured development approach has been the private developer/public subsidy model, many proposals have faced stiff local opposition. This is an issue that should be addressed in the South African context.

Given the location of the proposed WEF the majority of permanent staff are likely to reside in Cookhouse and Bedford. In terms of accommodation options, a percentage of the permanent employees may purchase houses in one of these two towns, while others may decide to rent. Both options would represent a positive economic benefit for the region. In addition, a percentage of the monthly wage bill earned by permanent staff would be spent in the regional and local economy. This will benefit local businesses in towns such as Cookhouse, Bedford and Somerset East. The benefits to the local economy will extend over the 25-year operational lifespan of the project.

The local hospitality industry in Cookhouse, Bedford and Somerset East is also likely to benefit from the operational phase. These benefits are associated with site visits by company staff members and other professionals (engineers, technicians etc) who are involved in the company and the project but who are not linked to the day-to-day operations.

Table 4.7: 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	Low (4)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	Medium (30)	Medium (39)
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. This would also represent a negative impact.

Recommended enhancement measures
The enhancement measures listed in Section 3.2.1, i.e. to enhance local employment and business opportunities during the construction phase, also apply to the operational phase.

In addition:

- Windlab 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;
- Windlab, in consultation with the BCDA, should investigate the opportunities for establishing a community trust. The revenue for the trust should be derived from the income generated from the sale of energy from the WEF. The establishment of a Community Trust does not only create potential benefits for local communities, but also addresses the issue of impact equity. In the case of the majority of renewable energy facilities, such as the Amakhala-Emoyeni WEF, the directly affected landowner is compensated for the loss of land, while the adjacent landowners and communities bear the external costs associated with the visual impacts on the sense of place and the landscape character of the area.

4.5.2 Impact on tourism

This issue relates to the potential benefit to local tourism in the Blue Crane Municipality by creating a potential tourist attraction. A number of interested and affected parties interviewed indicated that the current tourism opportunities and attractions in the area were limited and that the establishment of the proposed WEF could create an attraction and in so doing benefit local tourism in the area. The IDP Manager for the Blue Crane Route LM, Mr. Andile Ntshudu, indicated that the LM felt that the proposed WEF would be positive for the broader area. However, he said there was debate around how exactly the Municipality would benefit from such developments.

However, a number of concerns were also raised. In this regard Ms. Ros Turner (Blue Crane Tourism) indicated that while she thought the WEF development would be good for the area, there were concerns about noise and the impact the turbines would have on birds as bird watching is a popular tourist activity in the area. Concerns were also raised by the BCDA regarding the visual impact of the proposed WEF and the fact that the entire area had been identified for the development of WEFs, and the potential impact that this could have on the hunting the area and the perception of hunters.

The findings of the VIA (MetroGIS, September, 2010) indicate that the area acts as a major gateway for many tourists en-route to coastal holiday destinations as well as National Parks such as the Addo Elephant National Park. The facility would thus

visually impact on various sensitive visual receptors that should ideally not be exposed to industrial style structures.

The VIA also indicates that there are limited recommendations with regard to mitigation of the visual impact of the core facility, as there is no opportunity to place the wind turbines on lower ground, and no amount of vegetation screening or landscaping would be able to hide structures of these dimensions. The potential land use conflict between the proposed WEF and private nature reserves in the area are also highlighted.

With regard to the potential impact on private nature reserves, comments were received from Mr Charles Price (Doorn Boom and East Cape Game Reserve) and Keith Gladwell (Woodlands Game Reserve). Mr Price indicated that the farm is currently used for hunting safaris, and that the visual and noise impacts associated with the proposed WEF would have a negative impact on the current activities and future eco-tourism opportunities. However, he did acknowledge that alternative energy was the way of the future and sacrifices did need to be made when it can to promoting renewable energy. The potential impact on his operations was, however, a concern.

Mr Keith Gladwell indicated that he was very supportive of alternate energy and accepted that it was the way of the future. In this regard he would be very happy if a wind turbine could be sited on his farm to provide energy for his operations. The potential visual impacts are, however, a concern. In this regard the farm is traversed by a 135kv and 25kv and additional visual impacts associated with a WEF would ideally not be desirable. However, Mr Gladwell did indicate that the benefits associated with WEFs outweighed the negatives, with the exception of the visual impacts.

Table 4.8: Impact on tourism

Nature: Potential impact of the wind energy facility 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	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) Negative (Potential to distract from the tourist experience of the area)
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impact be	Yes	

enhanced?		
Enhancement: See below		
Cumulative impacts: Potential benefit for tourism in the Blue Crane Municipal Area.		
Residual impacts: See cumulative impacts		

Assessment of No-Go option
The No-Development option would represent a lost opportunity to create a facility that has the potential to attract visitors to the area. This would represent a negative opportunity cost.

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:

- Windlab should liaise with representatives from the Blue Crane Municipality and local tourism representatives to raise awareness of the proposed wind energy facility;
- Windlab should establish a renewable energy interpretation centre at the site. The centre should include covered viewing area where passing visitors can stop and view the site. A similar system is employed at Eskom's demonstration facility at Klipheuwel near Durbanville in the Western Cape. The viewing site should be equipped with information boards that provide visitors with information on the project and other relevant information;
- In order to maximise the benefits of the information board to the broader community it is recommended that the information be presented in the two main languages of the Eastern Cape, namely English and Xhosa.

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 producer 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 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 wind energy facility is relatively small. However, the 525-1050 MW produced will 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 significant.

Table 4.9: Development of clean, renewable energy infrastructure

Nature: Promotion of clean, renewable energy		
	Without Mitigation	**With Mitigation**
Extent	Local, Regional and National (4)	Local, Regional and National (4)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Very High (10)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	High (64)	High (72)
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 is current energy needs with clean, renewable energy. This would represent a negative opportunity cost.

Recommended mitigation measures
The establishment of the WEF is a mitigation measure in itself. In order to maximise the benefits of the proposed project Windlab should:

- Use the project to promote and increase the contribution of renewable energy to the national energy supply;
- Maximise the public's exposure to the project via an extensive communication and advertising programme;
- 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;
- Investigate the opportunities for establishing a community trust. The revenue for the trust should be derived from the income generated from the sale of energy from the WEF.

4.5.4 Impact on farming activities

This issue relates to the potential long-term impact of the WEF on existing farming activities, specifically the loss of grazing available for sheep and other livestock. However, as indicated above, the significance of the impacts is mitigated by the fact

that the farming activities in the area are confined to stock farming as opposed to crops. The experience with WEF is that livestock farming is not affected by operational WEF. The final footprint of disturbance associated with WEF also tend to be small and is linked to the foundation of the individual wind turbines, services roads, sub-stations and power lines. The impact on farmland associated with the construction phase can also be mitigated by minimising the footprint of the construction related activities and ensuring that disturbed areas are fully rehabilitated on completion of the construction phase. The potential impact on farming activities is therefore not regarded as a significant issue.

Table 4.10: Impact associated with loss of productive agricultural land

Nature: Loss of productive agricultural land due to the establishment of a wind energy facility and the impact on farmers livelihoods		
	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	Neutral
Reversibility	Yes. Land that is lost to footprint associated with wind energy facility (roads, turbines etc) can be restored to farmland over time if rehabilitated.	
Irreplaceable loss of resources?	No	
Can impact be mitigated?	Yes	
Enhancement: See below		
Cumulative impacts: Potential minor loss of agricultural employment opportunities associated with loss of land.		
Residual impacts: See cumulative impacts		

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

Recommendations:
As indicated above, Windlab have entered into an agreement with the affected landowners whereby the company will compensate for damages. It is assumed that this includes loss of productive farmland. Mitigation measures outlined in Section 3.4.6 apply.

4.5.5 Visual impact and impact on sense of place

The turbines associated with the proposed WEF will have a visual impact and, in so doing, impact on the landscape and rural sense of the place of the area. While the

majority of landowners interviewed indicated that this was not regarded as significant issue, a number of landowners did feel that the proposed development would impact on the character of the area and would in all likelihood have a negative impact on the natural landscape. However, they felt that the revenue that they would receive and the generation of clean, renewable energy would offset this impact. Some of the farmers who were opposed to the development indicated that since they were surrounded by WEFs they may as well benefit from the projects and allow turbines on their properties (Mr and Mrs Hobson, Farm Penderry).

The BCDA also raised concerns regarding the visual impact of the proposed WEF and the impact on the sense of place of the area. In this regard the BCDA supported the development of WEFs in principle, however, they voiced concerns that the area has been earmarked for WEF development by a number of different developers. This would have a significant cumulative visual impact on the area, which in turn could impact on the hunting industry.

Ros Turner (Blue Crane Tourism) indicated that while she thought the WEF development would be good for the area, there were concerns about noise and the impact the turbines would have on birds as bird watching is a popular tourist activity in the area. Experience from other WEFs is that the proposed WEF may also attract people to an area and thus have a positive impact.

The issue of visual impact on landscape character is highlighted in research undertaken by Warren and Birnie (2009). 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 areas that also have high 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).

The key findings of the specialist VIA (MetroGIS, September, 2010) are summarised below:

Potential visual impact on users of Arterial and secondary roads in close proximity of the WEF
Visual impacts on Arterial and secondary roads are expected to be very high within a 5km radius of the proposed development. Anticipated visual impacts on these roads between 5km and 10km of the proposed development are expected to be very high and high.

Potential visual impact on residents of towns, settlements and homesteads in close proximity to the proposed WEF
The visual impact on the towns of Adelaide, Bedford and Cookhouse is expected to be low to negligible and is not reflected in the table below.
The potential visual impact on residents of homesteads within a 5km radius of the proposed WEF is expected to be high and very high, while the visual impact on residents between the 5km and 10km radii will be high.

Potential visual impact on scenic natural features, on tourist destinations and on tourists travelling through the area

The potential visual impact on tourist destinations and tourist routes is expected to be very high within a 10km radius of the WEF.

Potential visual impact on private nature reserves and conservancies in close proximity to the proposed WEF
Visual impact on the Game Farms and Game Reserves (Doorn Boom, Eastern Cape and Woodlands) will be high within 5km of the WEF, and moderate and moderate to high to very high within 5km of the proposed facility.

In conclusion the VIA notes that the construction and operation of the Amakhala Emoyeni Wind Energy Facility and its associated infrastructure, adjacent to the Cookhouse WEF (authorised) will have a visual impact on the natural scenic resources and rural character of this region. The rural and relatively unspoiled wide-open vistas surrounding the WEF will be transformed for the entire operational lifespan (approximately 30 years) of the plant.

Additional to this, one must consider the impact that the Cookhouse WEF will have and moreover, what the combined cumulative impacts of both the Cookhouse and Amakhala Emoyeni facilities will have on the receiving environment

The VIA also notes that the facility would be visible for a large area that is generally seen as having a special landscape and tourism value. This area acts as a major gateway for many tourists en-route to coastal holiday destinations as well as National Parks such as the Addo Elephant National Park. The facility would thus visually impact on various sensitive visual receptors that should ideally not be exposed to industrial style structures.

The VIA also notes that the combination of the Cookhouse WEF visual impact footprint with the Amakhala Emoyeni WEF is expected to form a stark and noticeable contrast within this predominantly rural to natural region. However, the VIA also points out that due to the impact of the Cookhouse WEF (authorisation granted), the landscape surrounding the proposed Amakhala Emoyeni WEF will be visually altered. The impact on visual character of the landscape associated with the Cookhouse WEF should be seen as an ameliorating factor with respect to the potential visual impact of the proposed Amakhala Emoyeni facility, as potential negative visual impacts will be localised within a constrained and defined geographical area. In this regard the VIA is of the opinion that it is considered preferable from a visual perspective to position new activities near to an existing visual intrusion rather than within a new, 'visual impact free' area. This statement does however conflict with the Western Cape Regional Guidelines for siting WEFs that note that large WEFs should not be located within 50 km of each other.

The VIA also indicates that there limited recommendations with regard to mitigation of the visual impact of the core facility, as there is no opportunity to place the wind turbines on lower ground, and no amount of vegetation screening or landscaping would be able to hide structures of these dimensions. The potential land use conflict between the proposed WEF and private nature reserves in the area are also highlighted.

Table 4.11: Visual impact and impact on sense of place

Nature: Visual impact associated with the proposed wind turbines and the potential impact on the areas rural sense of place.

	Without Mitigation	With Mitigation
Extent	Local (3)	Local (3)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	Medium (56)	Medium (56)
Status	Negative	Negative
Reversibility	Yes. Wind turbines can be removed.	
Irreplaceable loss of resources?	No	
Can impact be mitigated?	Yes	
Enhancement: 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.

4.6 ASSESSMENT OF SUBSTATION AND TRANSMISSION LINES OPTIONS

Three substation sites have been identified, namely:

- 2 x 33/132/kV substations (Substation 1 and 3, Figure 1.2);
- 1 x 33/132/220/400/kV substation (Substation 2, Figure 1.2).

The transmission lines associated with the proposed WEF include:

- 2 x overhead 132 kV distribution lines linking substation 3 to substation 2 and substation 1 to the existing Poseidon substation located to the north west of the site (Figure 1.2);
- 1 x 132/220/400 kV transmission line linking substation 2 to existing Poseidon substation located to the north west of the site (Figure 1.2).

Based on the findings of the SIA there are no significant social impacts associated with any of the substation and or the associated transmission line routes. In this regard the potential visual or sense of place issues associated with the proposed substations and transmission line alignments will not exacerbate the impacts associated with the wind turbines themselves. In addition, the visual character of the site has been impacted by the presence of existing power lines that traverse the site. The location of the proposed substation and transmission line options are therefore regarded as acceptable from a social perspective.

The findings of the VIA indicate some localised visual impacts may occur, but are not expected to be significant in comparison to the construction of the wind turbines. The VIA also make reference to the high concentration of existing power lines within the study area which account for a considerable amount of visual disturbance within close proximity of the proposed WEF site.

Table 4.12: Assessment of substation and 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 power lines.

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 Amakhala Emoyeni WEF is of low significance. In addition, none of the affected farmers interviewed identified health risks associated with the proposed WEF as an issue of concern.

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 producer 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 is current energy needs with clean, renewable energy. Given South Africa's position as one of the highest per capita producer of carbon emissions in the world, this would represent a High negative social cost.

Table 4.13: Assessment of no-development option

Nature: The no-development option would result in the lost opportunity for South Africa to supplement is current energy needs with clean, renewable energy		
	Without Mitigation	**With Mitigation**
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 mitigated?	Yes	
Enhancement: See below		
Cumulative impacts: Reduce carbon emissions via the use of renewable energy and associated benefits in terms of global warming and climate change.		
Residual impacts: See cumulative impacts		

Recommended mitigation measures

The proposed WEF should be developed and the mitigation and enhancement measures identified in the SIA should be implemented. However, as indicated above there are concerns regarding the impact of the WEF on the sense of place and the areas landscape character. These issues need to be addressed in the design and layout of the proposed WEF.

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).

With regard to the area, The Amakhala Emoyeni WEF is one of three proposed WEFs located in the area between Cookhouse and Bedford within the Blue Crane Route Municipality. The other two WEFs located adjacent to the Amakhala Emoyeni WEF are the proposed African Clean Energy Developments (ACED) Cookhouse WEF (authorised by DEA) and the Terrapower Cookhouse WEF (EIA still in process). Figure 4.1 below illustrates the location of the 3 WEFs in relation to each other and within the context of the major towns and roads in the area.

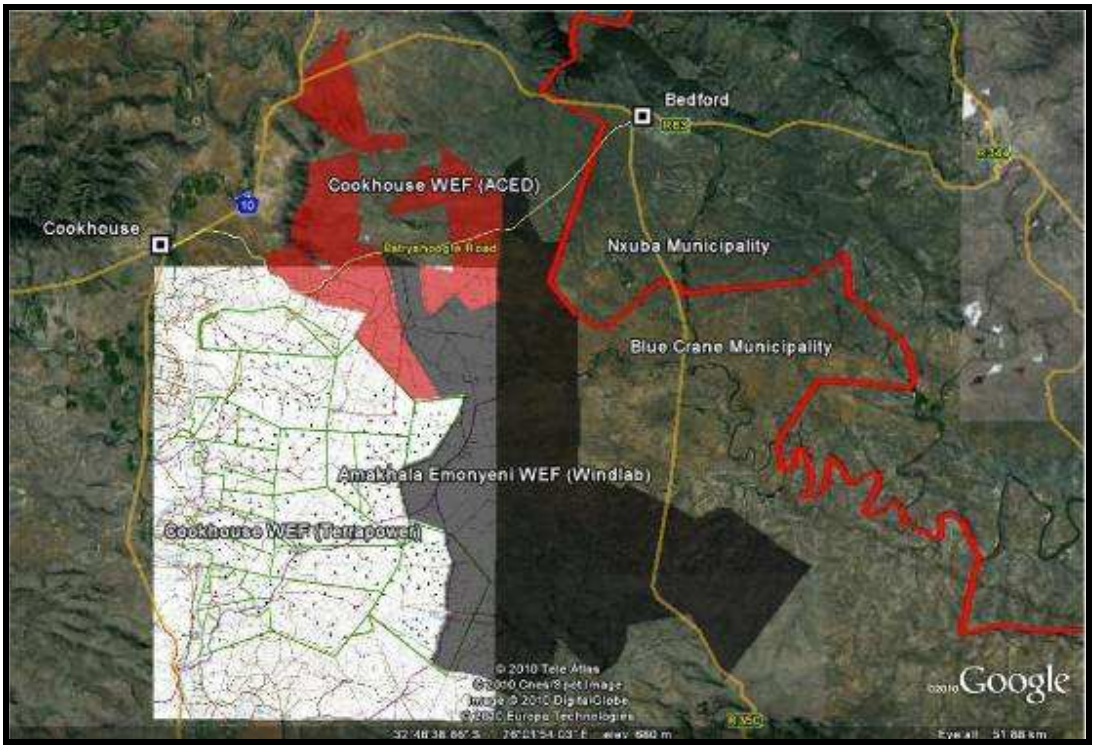


Figure 4.1: The Cookhouse (ACED and Terrapower) and Amakhala Emoyeni WEFs

The cumulative impacts associated with the proposed WEFs from a social perspective relate largely to the impact on sense of place and visual impacts. The area designated for the proposed WEF projects is rural and agricultural in nature. The dominant current land use activity in the area is livestock farming. Game farming, hunting and and eco-tourism are also an increasingly important activities. The proposed WEFs will dramatically alter the sense of place and the existing landscape which will be dominated by turbines. However, the findings of the SIA indicate that the majority of landowners affected by the Amakhala Emoyeni WEF felt the proposed WEF would have a positive impact on the area and that the revenue generated from the agreement with Windlab would assist them to continue farming. It is assumed that this also applies to the two other WEFs.

In terms of visibility to passing motorists, three key roads are located in the vicinity of the proposed WEF sites namely, the N10 to the west that links Port Elizabeth and Middelberg via Cookhouse, the R63 to the north between Somerset East and Bedford via Cookhouse and the R350 to the east that connects Bedford and Grahamstown. In addition, there is one secondary dirt road (Patryshoogte) that runs through the northern section of the proposed WEF sites and links Cookhouse and Bedford.

The N10 is an important road link between the Nelson Mandela Municipality (Port Elisabeth) to the south and the interior of the country, and is characterised by areas of high scenic beauty, particular within the Blue Crane Route Municipality. The proposed WEF area will be potentially visible from the N10 at a number of places where the turbines are not screened by the natural topography. The R63 is a rural tarred road that links the N10 ~14km north east of Cookhouse. The proposed three

proposed WEFs and associated turbines will be visible on both sides of a 2.5km section of the N10. The R63 is a relatively quiet road that is utilised mainly by local farmers and residents of Bedford. The R350 is a rural tarred road that is in very poor condition and is used primarily by local farmers to access Bedford in the North and Grahamstown in the South. The proposed WEF site will be potentially visible from o both sides of a 7km section of the R350. The Patryshoogte road in a secondary dirt road that bisects the proposed WEF development area and links Cookhouse to Bedford. The road in used by local farmers to access these urban centres and the market via the N10.

The findings of the VIA (MetroGIS, September, 2010) note that the combination of the Cookhouse WEF visual impact footprint with the Amakhala Emoyeni WEF is expected to form a stark and noticeable contrast within this predominantly rural to natural region. However, it should be noted that the Poseidon substation and the associated transmission lines have, to some extent, negatively impacted the areas rural sense of place.

The visual and cumulative impacts on landscape character are highlighted in the research undertaken by Warren and Birnie (2009). 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 wind farm applications.

In summary, the proposed establishment of three WEFs in the area will have a significant impact on the landscape and the areas rural sense of place and character. These impacts will be exacerbated by the large size of the proposed WEFs (in excess of 200 turbines each) and their location. The cumulative impact of the proposed WEFs has also been raised as a concern by the BCDA, specifically with regard to the potential impact on the hunting sector. As indicated above, it is not possible to effectively mitigate the visual impacts associated with WEFs. As a result the Australian Guidelines stress the importance of general location and site selection.

Table 4.14: 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 (4)	Local and regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	High (70)	High (65)
Status	Negative	Negative
Reversibility	Yes. Wind turbines 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 rural sense of place and character of the area, such as tourism, bird watching and hunting.		
Residual impacts: See cumulative impacts		

Assessment of No-Go option

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

Recommended mitigation measures

The establishment of more than one WEF in the area is likely to have a negative cumulative impact on the areas sense of place and the landscape. 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 WEFs in the area, and the associated number of wind turbines. In addition, the siting of individual turbines on each of the WEF sites should be informed by findings of the VIA, specifically with respect to visual impact on farmsteads in the area and roads frequently used tourists.

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 wind energy facility decommissioning phase is likely to involve the disassembly and replacement of the existing turbines with more modern technology. This is likely to take place in the 20-

30 years post commissioning. All of the components of the wind turbine, with the exception of the turbine blades, can be reused or recycled. The decommissioning phase is therefore likely to create additional, construction type jobs, as opposed to the jobs losses typically associated with decommissioning.

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:

- Windlab should investigate the option of relocating employees to other WEFs when the Amakhala Emoyeni WEF is decommissioned;
- Windlab should ensure that retrenchment packages are provided for all staff who stand to lose their jobs when the WEF is decommissioned;
- All structures and infrastructure associated with the Amakhala Emoyeni WEF should be dismantled and transported off-site on decommissioning;
- Windlab should establish 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.

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 WEFs.

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);
- Eastern Cape Provincial Growth and Development Plan (2004-2014);
- The Cacadu District Municipality Integrated Development Plan (IDP) (2007-2012);
- The Blue Crane Route Municipality Integrated Development Plan (IDP) (2007-2012);

The findings of the review indicated that wind energy was strongly supported at a national and local level. At a provincial level the PGDP does not specifically make reference to renewable energy, however, investment in energy infrastructure is identified as one of the key requirements. Based on this is it reasonable to assume that the establishment of WEFs is supported. At a local level the Cacadu District

Municipality IDP identifies 7 key strategic priorities. The key priority that is relevant to the proposed WEF is:

- Sustainable Resource Management and Use; Specifically to investigate and validate renewable energy alternatives, promotion of energy efficiency and accreditation of carbon credits. ,

The Blue Crane Route Municipality IDP has identified alternative energy projects as a key driver for local economic development

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 WEF's are supported at a national, provincial and local level. It is therefore the opinion of the author that the establishment of a WEF on the proposed site is supported by national, provincial and local policy and planning guidelines.

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.

Based on the information from other WEF projects, the total capital expenditure during the construction phase will be in the region of R 15 billion. The construction phase is expected to extend over a period of 24-30 months and create approximately 200-220 employment opportunities. The work associated with the construction phase will be undertaken by contractors and will include the establishment of the access roads, services and erection of the wind turbines.

It is anticipated that approximately 25% (or 55) of opportunities will be available to skilled personnel (engineers, technicians, management and supervisory), 35% (or 77) to semi-skilled personnel (drivers, equipment operators), and 40% (or 88) to low skilled personnel (construction labourers, security staff etc). The majority of the employment opportunities are likely to be associated with the contactors appointed to construct the WEF and associated infrastructure. In this regard the majority of contractors use their own staff and this will limit the potential for direct employment opportunities for locals during the construction phase.

In terms of business opportunities for local companies, the expenditure of R 15 billion during the construction phase will create business opportunities for the regional and local economy. However, given the technical nature of the project and high import content associated with wind turbines the opportunities for the local Cookhouse/Bedford/Somerset East economy are likely to be limited.

The sector of the local economy that is most likely to benefit from the proposed development is the local service industry. The potential opportunities for the local service sector would be linked to accommodation, catering, cleaning, transport and security, etc. The majority of the construction workers will be accommodated in the towns of Cookhouse, Bedford and Somerset East. This will create opportunities for local hotels, B&Bs, guest farms and people who want to rent out their houses. In addition, a proportion of the total wage bill earned by construction workers over the

24-30 month construction phase is also likely to be spent in the regional and local economy. The total wage bill for the four-year construction phase will be in the region of R 87.50 million. The injection of income into the area in the form of rental for accommodation and wages will create opportunities for local businesses in towns such as Cookhouse, Bedford and Somerset East. The benefits to the local economy will however be confined to the construction period (24-30 months).

Potential negative impacts

- Influx of construction workers employed on the project;
- Increased risk of stock theft, poaching and damage to farm infrastructure associated with construction workers;
- Increased risk of veld fires associated with construction related activities;
- Impact of heavy vehicles, including damage to roads, safety, noise and dust;
- Loss of agricultural land associated with construction related activities.

The significance of the potential negative impacts with mitigation was assessed to be of Low significance. The majority 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. contract HIV/ AIDS) was assessed to be of Medium-High negative significance. 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	Significance With Mitigation
Creation of employment and business opportunities	Medium (Positive impact)	Medium (Positive impact)
Presence of construction workers and potential impacts on family structures and social networks	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)
Risk of stock theft, poaching and damage to farm infrastructure	Medium (Negative impact)	Low (Negative impact)
Risk of veld fires	Medium (Negative impact)	Low (Negative impact)
Impact of heavy vehicles and construction activities	Low (Negative impact)	Low (Negative impact)
Loss of farmland	High (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;

- Impact on tourism and the creation of potential tourist opportunities (Impact on tourism may also be negative in some instances);
- The establishment of infrastructure to generate renewable energy;
- Revenue to be earned by local farmers who have turbines on their land.

Based on information from similar studies, it is expected that the proposed wind energy facility will employ approximately 90 full time employees over 25-year period. Approximately 25% of opportunities will be available to skilled personnel (forecasters, technicians, management and supervisory, etc), 35% to semi-skilled personnel (drivers, equipment operators), and 40% to low skilled personnel (road maintenance, security, etc). The proposed WEF will therefore create potential employment opportunities in the Eastern Cape Province and Blue Crane Municipality. However, given that the wind energy sector in South Africa is relatively new it may be necessary to import the required operational and maintenance skills from other parts of South Africa or even overseas. However, it will be possible to increase the number of local employment opportunities through the implementation of a skills development and training programme linked to the operational phase. Such a programme would support the strategic goals of promoting local employment and skills development contained in the Blue Crane IDP.

Given the location of the proposed WEF, the majority of permanent staff are likely to reside in Cookhouse and Bedford. In terms of accommodation options, a percentage of the permanent employees may purchase a house in one of these two towns, while others may decide to rent. Both options would represent a positive economic benefit for the region. In addition, a percentage of the monthly wage bill earned by permanent staff would be spent in the local economy. This will benefit local businesses in towns such as Cookhouse, Bedford and Somerset East. The benefits to the local economy will extend over the 25-30 year operational lifespan of the project.

The findings of the SIA also indicate that wind energy facility also has the potential to benefit local tourism by attracting people to the area to view the facility. However, the visual impacts associated with the proposed WEF may also impact negatively on certain tourist activities. 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

- Impact of the proposed wind energy facility on the current farming activities, specifically the potential loss of productive farm land;
- The visual impacts and associated impact on sense of place and the landscape.

With the exception of the visual impact and impact on sense of place, all of the negatives impacts are can be effectively mitigated to a significance of Low.

The visual and cumulative impacts on landscape character 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 wind farm applications. The research also found that if people regard a region as having 'enough' wind farms already, then they are more likely to oppose

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

Table 5.2: Summary of social impacts during operational phase

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

5.2.4 Assessment of cumulative impacts

In addition to the proposed Amakhala Emoyeni WEF, two other WEFs are proposed in the area between Cookhouse and Bedford within the Blue Crane Route Municipality, namely the proposed African Clean Energy Developments (ACED) Cookhouse WEF and the Terrapower Cookhouse WEF. The ACED WEF has been authorised by DEA.

The cumulative impacts associated with the proposed WEFs from a social perspective relate largely to the impact on sense of place and visual impacts. In this regard the proposed WEFs will alter the areas sense of place and the landscape, which will be dominated by turbines. These impacts will be exacerbated by the large size of the proposed WEFs (in excess of 200 turbines each) and their location. The cumulative impact of the proposed WEFs has also been raised as a concern by the BCDA, specifically with regard to the potential impact on the area's hunting industry. However, the findings of the SIA also indicate that the majority of landowners directly affected by the Amakhala Emoyeni WEF felt that the proposed WEF would have a positive impact on the area and that the revenue generated from the agreement with Windlab would assist them to continue farming. It is assumed that this also applies to the two other WEFs.

It is recommended that the environmental authorities 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 WEFs in the area. In addition, the siting and number of individual turbines on each of the WEF sites should be informed by findings of the relevant VIAs, specifically with respect to the visual impact on farmsteads and important roads in the area.

5.2.5 Substation and transmission line options

The findings of the SIA indicate that there are no significant social impacts associated with any of the substations and or the associated transmission line routes. In this regard the potential visual or sense of place issues associated with the proposed substations and transmission line alignments will not exacerbate the

impacts associated with the wind turbines themselves. The location of the proposed substation and transmission line options are therefore regarded as acceptable from a social perspective.

5.2.6 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 Amakhala Emoyeni WEF is of low significance. In addition, none of the affected farmers interviewed identified health risks associated with the proposed WEF as an issue of concern.

5.2.7 Assessment of no-development option

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

The no-development option also represents a lost opportunity in terms of the employment and business opportunities (construction and operational phase) associated with the WEF. This also represents a negative social cost.

5.2.8 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 wind energy facility decommissioning phase is likely to involve the disassembly and replacement of the existing turbines with more modern technology. This is likely to take place in the 20-30 years post commissioning. All of the components of the wind turbine, with the exception of the turbine blades, can be reused or recycled. The decommissioning phase is therefore likely to create additional, construction type jobs, as opposed to the jobs losses typically associated with decommissioning.

When and if the wind turbine facility is finally decommissioned, the impacts are likely to be limited due to the relatively small number of permanent employees (90) 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).

Windlab should also establish 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.

5.3 RECOMMENDATIONS

Based on the findings of the SIA it would appear that none of the landowners who stand to be directly affected by the proposed wind energy facility are opposed to the development. The findings of the SIA also indicate that the development will create employment and business opportunities for locals during both the construction and operational phase of the project. In order to enhance the local employment and business opportunities the mitigation measures listed in the report should be implemented. Windlab, in consultation with the relevant stakeholders, should also investigate the opportunities for establishing a community trust. The revenue for the trust would be derived from the income generated from the sale of energy from the WEF. The mitigation measures listed in the report to address the potential negative impacts during the construction phase should also be implemented. The establishment of a Community Trust does not only create potential benefits for local communities, but also addresses the issue of impact equity. In the case of the majority of renewable energy facilities, such as the Upington solar facility, the directly affected landowner is compensated for the loss of land, while the adjacent landowners and communities bear the external costs associated with the visual impacts on the sense of place and the landscape character of the area.

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 WEF near Cookhouse is therefore supported by the findings of the SIA.

However, the cumulative impacts associated with the three, large proposed WEFs on the areas sense of place and landscape cannot be ignored. The cumulative impact of WEFs on the rural landscapes is an issue that will need to be addressed by the relevant environmental authorities, specifically given the large number of applications for WEFs that have been submitted over the last 12 months.

5.4 IMPACT STATEMENT

The findings of the SIA undertaken for the proposed Amakhala-Emoyeni WEF indicate that the development will create employment and business opportunities for locals during both the construction and operational phase 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. However, the visual impacts associated with facility will impact on the areas rural sense of place and landscape character. This impact will be for the entire operational lifespan (approximately 30 years) of the facility. The potential for cumulative impacts also exists due to the proximity of the proposed African Clean Energy Developments (ACED) Cookhouse WEF and the Terrapower Cookhouse WEF. The ACED WEF has been authorised by DEA. These potential cumulative impacts do not, however, constitute a fatal flaw. However, it is recommended that the environmental authorities 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 WEFs in the area. 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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- BJ de klerk: 05/07/2010, local farm owner;
- Charles Price, Doorn Boom Farm: 16/09/2010;
- Chris Brockwell & Derek Bowker: 02/07/2010, local farm owners;
- Chris Wilken: Blue Crane Development Agency: 15/07/2010;
- Francois van Niekerk: 29/09/2009
- Keith Gladwell, Woodlands Nature Reserve: 16/09/2010;
- Peter Bowker: 01/07/2010, local farm owner;
- Linda Nama (Environmental Health Manager, Cacadu DM): 14/07/2010
- Louis Whitehead: 29/06/2010, local farm owner;
- Mr and Mrs Geoff Hobson: 01/07/2010 & 15/07/2010, local farm owners;
- Nicholas Bowker: 05/07/2010, local farm owner;
- Pierre and Vanessa van Niekerk: 01/07/2010, local farm owners;
- Rob Beech: Blue Crane Development Agency: 15/07/2010;
- Ros Turner:BCR Tourism: 15/07/2010

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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 reso*urces.
- the *degree* to which the impact can be *mitigated.*

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

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

S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

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

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

ANNEXURE C

BACKGROUND INFORMATION DOCUMENT

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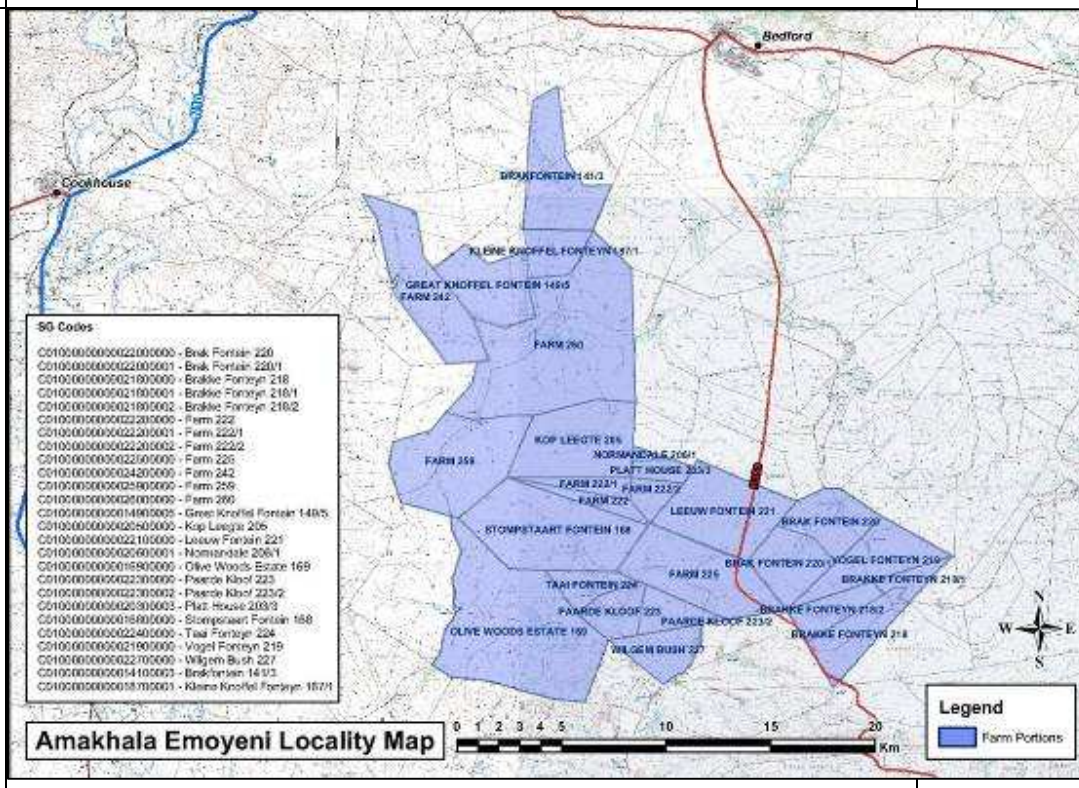
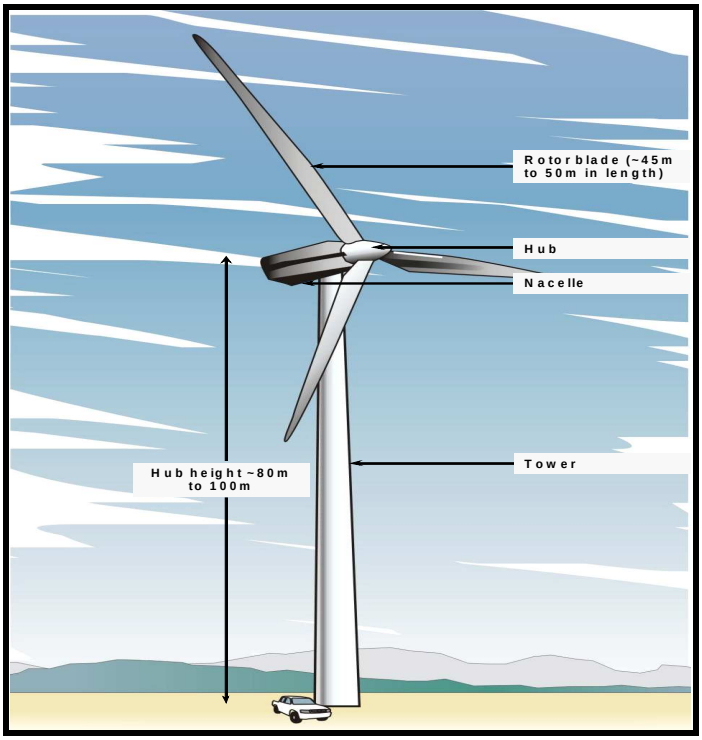
BACKGROUND INFORMATION DOCUMENT FOP SOCIAL IMPPACT ASSESSMENT

Project Name	Amakhala Emoyeni Wind Energy Facility
Project Developer	Windlab Developments South Africa (Pty) Ltd
Location/nearest Town(s)	Cookhouse & Bedford, Eastern Cape
Local Authority	Blue Crane Route Local Municipality (Somerset East) & Cacadu District Municipality (Port Elizabeth)
Locality Map	

Brief project description	**Windlab** has identified the potential to establish a new **wind energy facility (WEF)** on *farm portions 1, 2 and remainder of Farm 222, portion 3 of Farm 203 (Platt House), remainder of Farm 205 (Kop Leegte), portion 1 of Farm 206 (Normandale), remainder of Farm 168 (Stompstaart Fontein), remainder of Farm 224 (Taai Fontein), remainder of Farm 221 (Leeuw Fontein), portion 2 and remainder of Farm 223 (Paarde Kloof) , remainder of Farm 227 (Wilgem Bush), remainder of Farm 225, portion 1, 2 and remainder of Farm 218 (Brakke Fonteyn), remainder of Farm 259, remainder of Farm 260, portion 5 of Farm 149 (Great Knoffel Fonteyn), remainder of Farm 242, portion 1 and remainder of Farm 220 (Brak Fontein), remainder of Farm 219 (Vogel Fonteyn), remainder of Farm 169 (Olive Woods Estate), portion 3 of Farm 141 (Brakfontein), portion 1 of Farm 187 (Kleine Knoffel Fonteyn)* east of the town of **Cookhouse** in the Eastern Cape (Figure 1.1). The establishment of up to **350 x 1.5-3 MW** (capacity) turbines, **3 substations** and **associated infrastructure** (see below for more information) is proposed.
Typical Infrastructure Associated with a Wind Energy Facility (WEF)	A Wind Energy Facility consists of multiple wind turbines which are used to capture the kinetic energy of the wind and generate electricity. This captured kinetic energy is used to drive a generator located within the wind turbine and the energy is subsequently converted into electrical energy. A typical wind turbine consists of four primary components: • The **foundation unit** upon which the turbine is anchored to the ground • The **tower** which typically between 80m and 100m in height. • 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 (each up to 60 m in length). • 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.  *Typical turbine structure and components* A turbine is designed to operate continuously, unattended and with low maintenance for more than 20 years or >120 000 hours of operation. Once operating, a wind farm can be monitored and controlled remotely, with a mobile team for maintenance, when required.

	 *Wind Energy Facility, Saxony, Germany*
Typical construction phase activities	The construction phase of the wind energy facility is dependent on the number of turbines to be erected, but can be estimated at one week per turbine. In order to construct the proposed wind energy facility and associated infrastructure, a series of activities will need to be undertaken. They are as follows: • Conduct surveys e.g. geotechnical survey, site survey and confirmation of the turbine micro-siting footprint; • Establishment of access roads to the site; • Undertake site preparation e.g. clearance of vegetation at the footprint of each turbine, the establishment of internal access roads and excavations for foundations; • Construct foundations for each turbine; • Transport of components and equipment to site; • Establishment of Laydown Areas on Site at each turbine position for the storage of wind turbine components etc; • Construct turbines on site; • Construct substation/s on site; • Establishment of ancillary infrastructure i.e. workshop, contractor's equipment camp etc; • Connection of wind turbines to the substation;' • Connect substation to power Grid via transmission lines; • Undertake site remediation i.e all construction equipment is removed from the site, the site rehabilitated where practical and reasonable. The number of construction personnel involved in the construction phase is typically in the region of 200-220. The duration of the construction period is typically in the region of 24-30 months.

Typical operation phase activities	Each turbine within the wind energy facility will be operational except under circumstances of mechanical breakdown, extreme weather conditions or maintenance activities. The wind turbine will be subject to periodic maintenance and inspection. Periodic oil changes will be required. Any waste products (e.g. oil) will be disposed of in accordance with relevant waste management legislation. It is not known at this stage exactly how many people will be responsible for monitoring and maintenance of the facility. It is likely that no permanent staff will be required on site for any extended period of time.
Decommissioning	The turbine infrastructure which will be utilised for the proposed Wind Energy facility is expected to have a lifespan of approximately 20 - 30 years (with maintenance). Equipment associated with this facility would only be decommissioned once it has reached the end of its economic life. It is most likely that decommissioning activities of the infrastructure of the WEF would comprise the disassembly and replacement of the turbines with more appropriate technology/infrastructure available at that time.
Questions to Consider	The typical social issues associated with wind energy facilities include: **Construction phase** • Impacts associate with construction related activities, such as noise, dust, traffic and presence of construction workers; • Disruption of farming activities and potential increased risk of veld fires; • Creation of employment opportunities **Operational phase** • Visual impact on the landscape; • Impact on tourism in the area, positive and negative. In your view, would these impacts apply to the proposed facility in your area, and do you think there are any other key social impacts that might occur.

ANNEXURE D

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 wind energy facility, 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	Windlab, in discussions with the Blue Crane Municipality, should aim to employ a minimum of 80% of the low-skilled workers from the local area where possible. This should also be made a requirement for all contractors. Windlab should also develop a database of local BEE service providers

Mitigation: Action/control	Responsibility	Timeframe
• Ensure that a minimum of 80% of the low-skilled workers are sourced from the local area;	• Windlab and & contractors	• Employment and business policy document that sets out local employment targets to be in place before construction phase commences.
• Where required, implement appropriate training and skills development programmes prior to the initiation of the construction phase to ensure that 80% target is met.	• Windlab	• Where required, training and skills development programmes to be initiated prior to the initiation of the construction phase.
• Skills audit to be undertaken to determine training and skills development requirements;	• Windlab	• Skills audit to determine need for training and skills development programme undertaken within 1 month of commencement of construction phase commences.
• Develop a database of local BEE service providers and ensure that they are informed of tenders and job opportunities;	• Windlab	• Database of potential local BEE services providers to be completed before
• Identify potential	• Windlab	

opportunities for local businesses		construction phase commences.

Performance Indicator	• 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 where possible. • 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	• Windlab 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 wind energy facility, including infrastructure etc.
Potential Impact	The presence of construction workers who live outside the area and who are housed in local towns can impact on 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
• 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 area in and around the towns of Cookhouse, Bedford and Somerset East.	• Windlab and contractors	• 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 workers should	• Windlab	

be able to provide proof of having lived in the area for five years or longer.		construction phase, establishment of MF etc,
• Identify local contractors who are qualified to undertaken the required work;	• Windlab	• MF established before construction phase commences.
• Establish 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;	• Windlab	• Code of Conduct drafted before construction phase commences. • Briefing session for construction workers held before they commence work on site.
• Develop a Code of Conduct to cover the activities of the construction workers housed on the site;	• Windlab and contractors	
• Ensure that construction workers housed attend a brief 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.	• Windlab and contractors and CLC	
• Ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct;	• Contactors	
• 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.	• Contractors	
• 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.	• Contractors	
• On completion of the construction phase all construction workers must be transported back to their	• Contractors	

place of origin within two days of their contract ending. The costs of transportation must be borne by the contractor.		

Performance Indicator	• 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 where possible; • 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; • CLC 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	• Windlab and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.

Safety, poaching, stock theft and damage to farm infrastructure

OBJECTIVE: To avoid and or minimise the potential impact of the activities during the construction on the safety of local communities and the potential loss of stock and damage to farm infrastructure.

Project component/s	Construction and establishment activities associated with the establishment of the wind energy facility, including infrastructure etc.
Potential Impact	Impact on safety of farmers and communities (increased crime etc) and potential loss of livestock due to stock theft by construction workers and also damage to farm infrastructure, such as gates and fences.
Activity/risk source	The presence of construction workers on the site can pose a potential safety risk to local farmers and communities and may also result in stock thefts. The activities of construction workers may also result in damage to farm infrastructure.
Mitigation: Target/Objective	To avoid and or minimise the potential impact on local communities and their livelihoods.

Mitigation: Action/control	Responsibility	Timeframe
• The housing of construction workers on the site should be limited to security personnel; • Establish a MF with the	• Windlab and contractors • Windlab	• Establish MF before construction phase commences. • Develop Code of Conduct prior to commencement of

adjacent farmers and develop a Code of Conduct for construction workers. • Inform all workers of the conditions contained in the Code of Conduct. • Dismiss all workers that do not adhere to the code of conduct for workers. All dismissals must be in accordance with South African labour legislation. • Compensate farmers / community members at full market related replacement cost for any losses, such as livestock, damage to infrastructure etc.	• Windlab and contractor • Contractors • Contractors	construction phase. The Code of Conduct should be signed by Windlab and the contractors before the contractors move onto site; • Inform all construction workers of Code of Conduct requirements before construction phase commences. • Compensate Farmers / community members within 1 month of claim being verified by Windlab and or Contractor/s.

Performance Indicator	• Community MF in place before construction phase commences. • Code of Conduct developed and approved prior to commencement of construction phase. • All construction workers made aware of Code of Conduct within first week of being employed. • Compensation claims settled within 1 month of claim being verified by Community MF.
Monitoring	• Windlab and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.

Increase risk of veld fires

OBJECTIVE: To avoid and or minimise the potential risk of increased veld fires during the construction phase.

Project component/s	Construction and establishment activities associated with the establishment of wind energy facility, including infrastructure etc.
Potential Impact	Veld fires can pose a personal safety risk to local farmers and communities, and their homes, crops, livestock and farm infrastructure, such as gates and fences.
Activity/risk source	The presence of construction workers and their activities on the site can increase the risk of veld fires.
Mitigation: Target/Objective	To avoid and or minimise the potential risk of veld fires on local communities and their livelihoods.

Mitigation: Action/control	Responsibility	Timeframe
• Ensure that open fires on the site for cooking or heating are not allowed except in	• Windlab and contractors	• Ensure that these conditions are included in the Construction Phase EMP.

designated areas. • Provide adequate fire fighting equipment onsite. • Provide fire-fighting training to selected construction staff. • Compensate farmers / community members at full market related replacement cost for any losses, such as livestock, damage to infrastructure etc.	• Windlab and contractors • Contractors • Contractors	• Ensure that designated areas for fires are identified on site at the outset of the construction phase. • Ensure that fire fighting equipment and training is provided before the construction phase commences. • Compensate Farmers within 1 month of claim being verified by MF.
Performance Indicator	• Conditions contained in the Construction EMP. • Designated areas for fires identified on site at the outset of the construction phase. • Fire fighting equipment and training provided before the construction phase commences. • Compensation claims settled within 1 month of claim being verified by Community MF.	
Monitoring	• Windlab 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 wind energy facility, 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 also minimise damage to roads.

Mitigation: Action/control	Responsibility	Timeframe
• 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.	• Contractors	• 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

• Ensure that all vehicles are road-worthy, drivers are qualified and are made aware of the potential noise, dust and safety issues; • 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.	• Contractors • Contractors • Contractors	commences. • Ensure that drivers are made aware of the potential safety issues and enforcement of strict speed limits when they 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	• 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	• Windlab D and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.

Impact on farming activities

OBJECTIVE: To avoid and or minimise the potential impact on current and future farming activities during the construction phase.

Project component/s	Construction phase activities associated with the establishment of the wind energy facility and associated infrastructure.
Potential Impact	The footprint of the wind energy facility and associated infrastructure will result in a loss of land that will impact on farming activities on the site.
Activity/risk source	The footprint taken up by the wind energy facility and associated infrastructure.
Mitigation: Target/Objective	To minimise the loss of land taken up by the wind energy facility and associated infrastructure and to enable farming activities to continue where possible, specifically grazing.

Mitigation: Action/control	Responsibility	Timeframe

• Minimise the footprint of the wind energy facility and the associated infrastructure. • Rehabilitate disturbed areas on completion of the construction phase. Details of the rehabilitation programme should be contained in the EMP. • Investigate the possibility of allowing farmers in the area to continue to use the site for grazing, or the option of leasing the land for grazing to other local farmers and possibly emerging farmers.	• Savannah Environmental and Windlab • ECO and Contractors • Windlab	• Footprint for wind energy facility should be defined in the Construction EMP before construction phase commences. • Rehabilitation should be on-going and completed within 3 months of the completion of the construction phase. • Meeting/s with local farmers to discuss lease options should take place during the construction phase.
Performance Indicator	• Footprint of wind energy facility included in the Construction Phase EMP. • Meeting/s held with farmers during construction phase.	
Monitoring	• 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 wind energy facility 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 wind energy facility will create approximately 30 full time employment opportunities.
Mitigation: Target/Objective	In the medium to long term employ as many locals as possible to fill the 30 full time employment opportunities.

Mitigation: Action/control	Responsibility	Timeframe
• The entire workforce of 90 permanent staff will be based in local towns of Cookhouse, Bedford and or Somerset East. Windlab should commit to implementing a 5-year training and skills development and training programme. The initial local content target is 30%, however, after 5 years the objective is to have all the employment opportunities taken up by locals. • Identify local members of the community who are suitably qualified or who have the potential to be employed full time.	• Windlab • Windlab	• 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	• 5 year training and skills development programme developed and designed before construction phase completed; • Potential locals identified before construction phase completed.
Monitoring	• Windlab must monitor indicators listed above to ensure that they have been met for the operational phase.

Impact on tourism and highlight benefits of renewable energy projects

OBJECTIVE: Maximise the potential tourism opportunities during the operational phase. In addition, highlight the benefits of renewable energy projects.

Project component/s	Operational phase of the project.
Potential Impact	The proposed wind energy facility has the potential to provide Blue Crane Municipality with an attraction that would improve its attraction to tourists. The development also has the potential to promote the benefits of renewable energy projects.
Activity/risk source	The establishment of a wind energy facility has the potential to create and attraction for visitors to the area. The development also has the potential to promote the benefits of renewable energy projects.
Mitigation: Target/Objective	To enhance the potential tourism and renewable energy opportunities associated with the proposed wind energy facility.

Mitigation: Action/control	Responsibility	Timeframe
• Liaise with representatives from the Blue Crane Municipality and tourism organisations to raise awareness of the proposed wind energy facility;	• Windlab	• Set up meeting with Blue Crane Municipality and local tourism organisations during the construction phase.
• Establish a renewable energy interpretation centre at the site. The centre should be equipped with information boards that provide visitors with information on the project and other relevant information. Information should also be provided on renewable energy and its benefits.	• Windlab	• Establish interpretation centre at the outset of the construction phase. This will create and opportunity to provide tourists with information on both the construction and operational phases of the project.
• Information should presented in the two main languages in the Eastern Cape, namely English, and Xhosa.	• Windlab	

Performance Indicator	• Meeting/s with Blue Crane Municipality and local tourism organisations during the construction phase to discuss key issue and opportunities. • Establishment of interpretation centre at the outset of the construction phase.
Monitoring	• Windlab must monitor indicators listed above to ensure that they have been met for the operational phase.

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 wind energy facility.
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 (90) is relatively small. Decommissioning is also similar to the construction phase in that it will also create temporary employment opportunities.
Activity/risk source	Decommissioning of the wind energy facility.
Mitigation: Target/Objective	To avoid and or minimise the potential social impacts associated with decommissioning phase of the wind energy facility.

Mitigation: Action/control	Responsibility	Timeframe
• Retrenchments should comply with South African Labour legislation of the day.	• Windlab	• When wind energy facility is decommissioned.

Performance Indicator	• South African Labour legislation relevant at the time.
Monitoring	• Windlab and Department of Labour.