# SOCIAL IMPACT ASSESSMENT
# (DRAFT REPORT)
# HAPPY VALLEY WIND ENERGY FACILITY
# EASTERN CAPE PROVINCE

**JULY 2011**

**Prepared for**

**SAVANNAH ENVIRONMENTAL (Pty) Ltd**

**By**

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# EXECUTIVE SUMMARY

## INTRODUCTION AND LOCATION

Savannah Environmental (Pty) Ltd were appointed by Renewable Energy Investments (REI) South Africa as the lead consultants to manage the Environmental Impact Assessment (EIA) process for the establishment of proposed Happy Valley Wind Energy Facility (WEF) and associated infrastructure ~7 km northwest of the town of Humansdorp in the Eastern Cape Province, South Africa.

Tony Barbour Consulting was appointed by Savannah Environmental (Pty) Ltd (hereafter referred to as Savannah Environmental) to undertake a specialist Social Impact Assessment (SIA) as part of the EIA process. This report contains the findings of the Draft SIA undertaken as part of the EIA process. The Draft SIA will be finalised, if necessary, following closure of the comment period for the Draft Environmental Impact Report (EIR).

## DESCRIPTION OF THE PROPOSED WIND ENERGY FACILITY

An area of approximately 4.8 km$^2$ is being considered for the establishment of 14 x 1.5-3 MW (capacity) turbines (~30 MW output) and the associated infrastructure. The energy will be fed into the Eskom grid. The project is therefore an Independent Power Producer (IPP) project.

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 Happy Valley site, access is likely to be from the N2 (to the south of the proposed site) as well as existing gravel and access roads.
- An internal access road that links the wind turbines on the site. The road is likely to be approximately 3-5 m wide;
- Cabling between the turbines to be lain underground where practical;
- A substation;
- An overhead 66 kV distribution line that will link the wind energy facility to the Eskom electricity distribution network/grid via the Melkhout substation.

## 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. 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 Kouga Municipality Integrated Development Plan (IDP) (2007-2012);

The findings of the review indicate that wind energy was strongly supported at a national 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.

**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 450-500 million. The construction phase is expected to extend over a period of 6-8 months and create approximately 60 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.

Of this total, approximately 33% (20) of opportunities will be available to skilled personnel (engineers, technicians, management and supervisory), ~33% (20) to semi-skilled personnel (drivers, equipment operators), and ~33% (20) to low skilled personnel (construction labourers, security staff). 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 450-500 million 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 Humansdorp, Jefferies Bay and Cape St Frances 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 local towns of Humansdorp, Jefferies Bay and Cape St Frances. 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 6-8 month construction phase is also likely to be spent in the regional and local economy. The total wage bill for the 6-8 month construction phase will be in the region of R 20-25 million. The injection of income into the area in the form of rental for accommodation and wages will create opportunities for local businesses in Kareedouw and Humansdorp. The benefits to the local economy will however be confined to the construction period (6-8 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 grass fires** | Medium (Negative impact) | Low (Negative impact) |
| **Impact of heavy vehicles and construction activities** | Low (Negative impact) | Low (Negative impact) |
| **Loss of farmland** | Medium (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;
- The establishment of infrastructure to generate renewable energy.

Based on information from similar studies, it is expected that the proposed wind energy facility will employ approximately 20 full time employees over 25-year period. The wage bill associated with the operational phase is estimated at R3 million per year (current value). Due to the need for specialised skills it may be necessary to import the required operational and maintenance skills from other parts of South Africa or even overseas. Approximately 80% of the permanent employment positions can be filled by local residents. 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 Kouga IDP.

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;
- Impact on tourism and the creation of potential tourist opportunities.

The potential visual impact and impact on sense of place, and the associated impact on tourism cannot be effectively mitigated. As such the significance rating is High negative. In this regard the findings of the VIA do not support the establishment of a WEF on the Happy Valley site.

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) |
| **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** | High (Negative impact) | High (Negative impact) |
| **Impact on tourism** | Medium (Positive and Negative) | Medium (Positive and Negative) |

**Cumulative impacts**

Based on the information available at the time of undertaking the SIA, it would appear that two other WEFs are proposed in the area to the north of the N2. These include the proposed Deep River WEF located 10 km to the west of the Happy Valley site and the proposed WEF located on the Farm Dieprivier Mond adjacent to the Deep River WEF site.

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. This impact will be exacerbated by the sequential visibility (e.g. the effect of seeing two or more wind farms along a single journey, e.g. road or walking trail) of the sites, specifically for motorists travelling along the N2, which is an important tourist route that links Cape Town with Eastern Cape.

It is therefore 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. In this regard it is noted that the findings of the VIA (MetroGIS, July 2011) indicate that the site is not suited to the development of a WEF. The VIA also confirms that the construction of 13 wind turbines together with the roads and other ancillary infrastructure will increase the cumulative visual impact within the region. This is specifically relevant in light of the authorised RedCap Kouga WEF located to the south of the site.

**Substations and transmission lines**
The findings of the SIA support the findings of the VIA and indicate that Alternative 1 for the transmission lines is the preferred alternative. There are no significant social impacts associated with the on-site substation.

**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 Happy Valley WEF is of low significance. In addition, none of the affected parties 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 Happy Valley WEF. This also represents a negative social cost.

**Decommissioning phase**
The decommissioning of WEFs, such as the proposed Happy Valley WEF, typically involves 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. The decommissioning phase is therefore likely to create additional, construction type jobs, as opposed to the jobs losses typically associated with decommissioning.

In, addition, when and if the wind turbine facility is finally decommissioned, the impacts will be limited to a small number of permanent employees (20-25) 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).

REI should also consider the establishment of 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.

**RECOMMENDATIONS**

The findings of the SIA indicate that the proposed development will create employment and business opportunities for locals during both the construction and operational phase of the project. However, these benefits will be limited. In order to enhance the local employment and business opportunities the mitigation measures listed in the report should be implemented. REI 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 and used to support local IDP projects and initiatives. The establishment of a Community Trust should be discussed with the Kouga Local Municipality. 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.

However, the findings of the VIA do not support the development of a WEF on the Happy Valley site (MetroGIS, July 2011). This is due specifically to the visually prominent location of the site, coupled with the inherent character and scenic beauty of the area. The VIA, does, however, note that despite the high significance associated with the visual impacts, the anticipated visual impact does not, constitute a fatal flaw. This is due specifically to the localised area of potential high visual impact (i.e. within 5km), the relatively low incidence of visual receptors and the small scale of the proposed facility. The VIA also notes that the impact is not likely to detract from the regional tourism appeal, numbers of tourists or tourism potential of the existing centres such as St Francis Bay.

The findings of the SIA confirm the concerns noted in the VIA. In addition, a number of the affected landowners interviewed indicated that the visual impacts associated with the proposed WEF represented a significant issue of concern. However, the authors of the SIA are of the opinion that the establishment of WEFs, such as the proposed Happy Valley WEF, along important and established tourism routes, such as the N2 National Route, should be reconsidered. In this regard it is recommended that the authorities give careful consideration to the approval of WEFs that have the potential to impact negatively on the visual character of existing and future tourist routes.

In addition, the cumulative impacts associated with the three 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 proposed development 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 establishment of the proposed Happy Valley will also will increase the cumulative visual impact associated with WEFs within the region. This is specifically relevant in light of the authorised RedCap Kouga WEF located to the south of the site and the importance of the N2 as tourist route. It is therefore recommended that an alternative site that is less visually exposed be investigated.

In addition, 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.

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# SECTION 1: INTRODUCTION

## 1.1 INTRODUCTION

Savannah Environmental (Pty) Ltd were appointed by Renewable Energy Investments (REI) South Africa as the lead consultants to manage the Environmental Impact Assessment (EIA) process for the establishment of proposed Happy Valley Wind Energy Facility (WEF) and associated infrastructure ~7 km northwest of the town of Humansdorp in the Eastern Cape Province, South Africa (Figure 1.1).

Tony Barbour Consulting was appointed by Savannah Environmental (Pty) Ltd (hereafter referred to as Savannah Environmental) to undertake a specialist Social Impact Assessment (SIA) as part of the EIA process. This report contains the findings of the Draft SIA undertaken as part of the EIA process. The Draft SIA will be finalised, if necessary, following closure of the comment period for the Draft Environmental Impact Report (EIR).

## 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

REI has identified the potential to establish a new wind energy facility (WEF) on farm Portion 1 of Farm 810, approximately 7 km northwest of the town of Humansdorp in the Eastern Cape (Figure 1.1).

The proposed project site is located on Farm Portion 1 of Farm 810 within the Kouga Local Municipality (EC108), approximately 7 km northwest of the town of Humansdorp, 23 km northwest of the municipal administrative centre of Jeffrey's Bay and 95 km west of the Nelson Mandela Metropolitan Area (Port Elizabeth). The Kouga Local Municipality is one of 10 municipalities that fall within the greater Cacadu District Municipality (DC10).

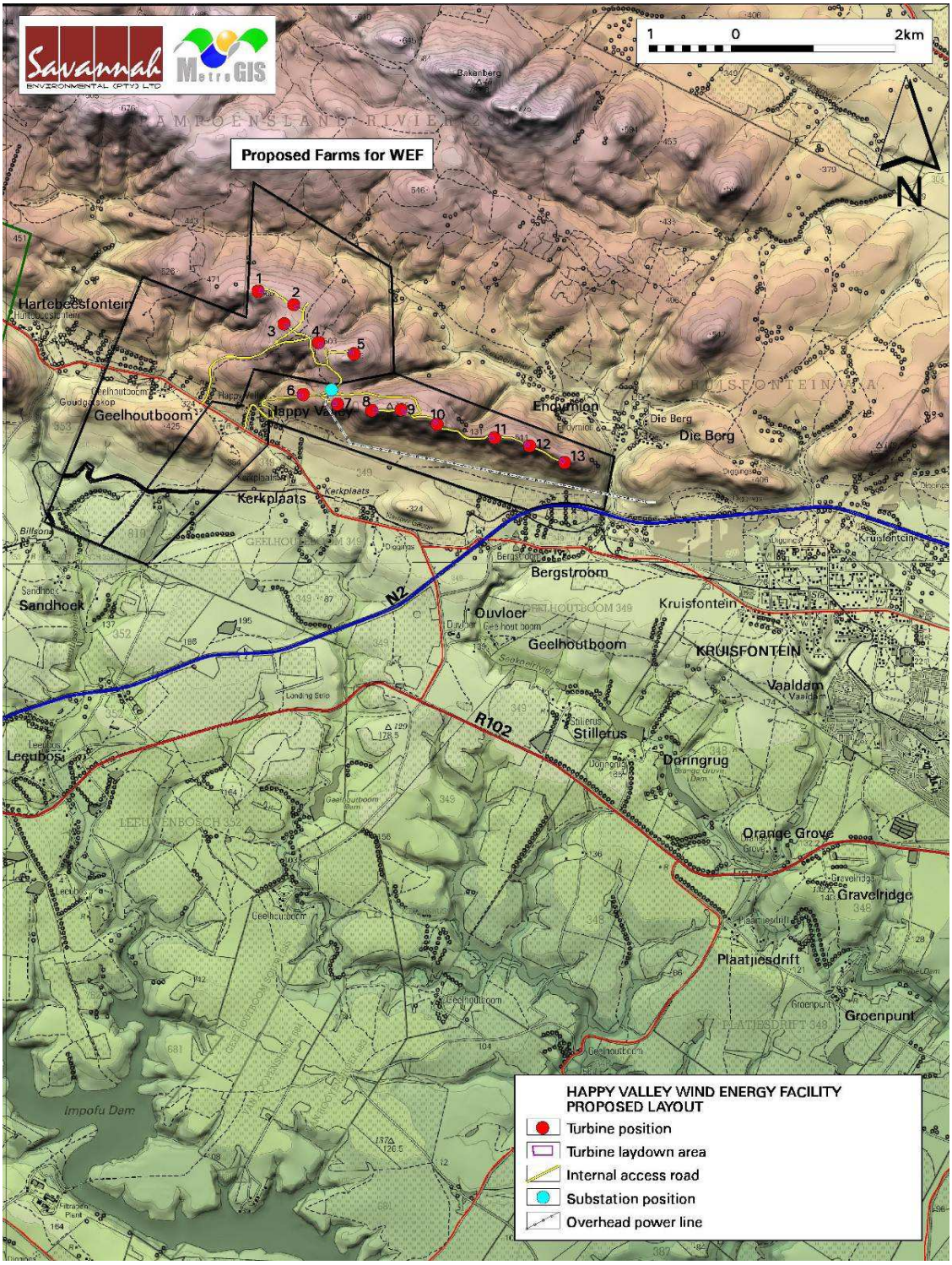



**Figure 1.1: Location of proposed Happy Valley Wind Energy Facility**

## 1.4 PROJECT DESCRIPTION

An area of approximately 4.8 km² is being considered for the establishment of 14 x 1.5-3 MW (capacity) turbines (~30 MW output) and the associated infrastructure. The energy will be fed into the Eskom grid. The project is therefore an Independent Power Producer (IPP) project.

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 Happy Valley site, access is likely to be from the N2 (to the south of the proposed site) as well as existing gravel and access roads.
- An internal access road that links the wind turbines on the site. The road is likely to be approximately 3-5 m wide;
- Cabling between the turbines to be lain underground where practical;
- A substation;
- An overhead 66 kV distribution line that will link the wind energy facility to the Eskom electricity distribution network/grid via the Melkhout substation.

A typical wind turbine consists of four primary components (Figure 1.2):

- The **foundation unit** upon which the turbine is anchored to the ground. The 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 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.

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

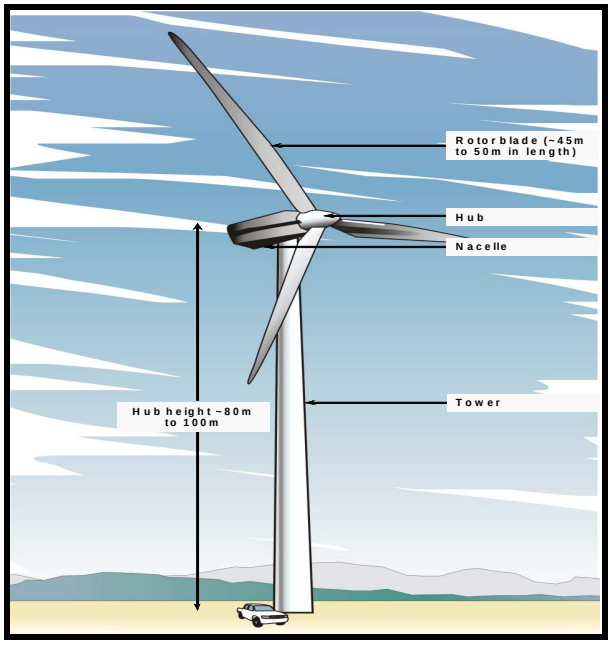



**Figure 1.2: Typical turbine structure and components**

Based on information from WEFs with a similar number of wind turbines and capacity the total estimated capital expenditure associated with the construction of 14 wind turbines is anticipated to be in the region of R 450-500 million. The construction phase is expected to extend over a period of 6-8 months is expected to create approximately 60 employment opportunities. The wage bill associated with the construction phase is estimated at R20-25 million over the 6-8 month period (current value). The estimated lifespan of the WEF is 25-30 years and the wage bill for the operational phase will be in the region of R 3 million per annum.

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.

## 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. 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 SIAs for WEF's in the Eastern and Western 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 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 REI 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 are based on international best practice and have been used widely in South Africa. Tony Barbour has also undertaken specialist SIA studies for over 20 WEFs in South Africa.

Alexandra O'Donoghue has a BSc in Environmental Science from Rhodes University and is currently completing her honours degree in Environmental Science at Rhodes University.

## 1.8 DECLARATION OF INDEPENDENCE

This confirms that Tony Barbour and Alexandra O'Donoghue, 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 an overview of:

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

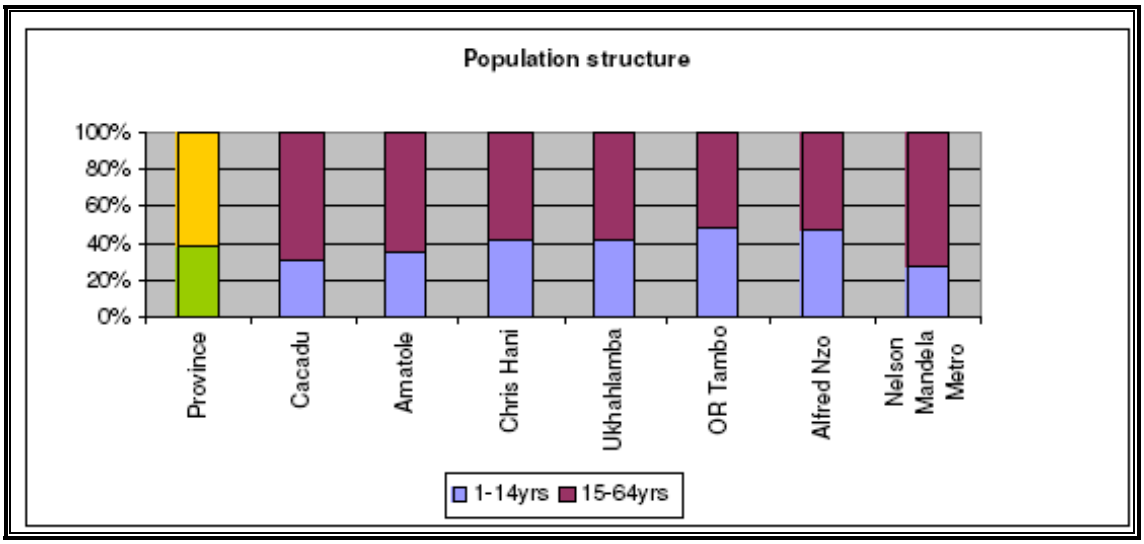
## 2.2 PROVINCIAL CONTEXT

The proposed Happy Valley 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**

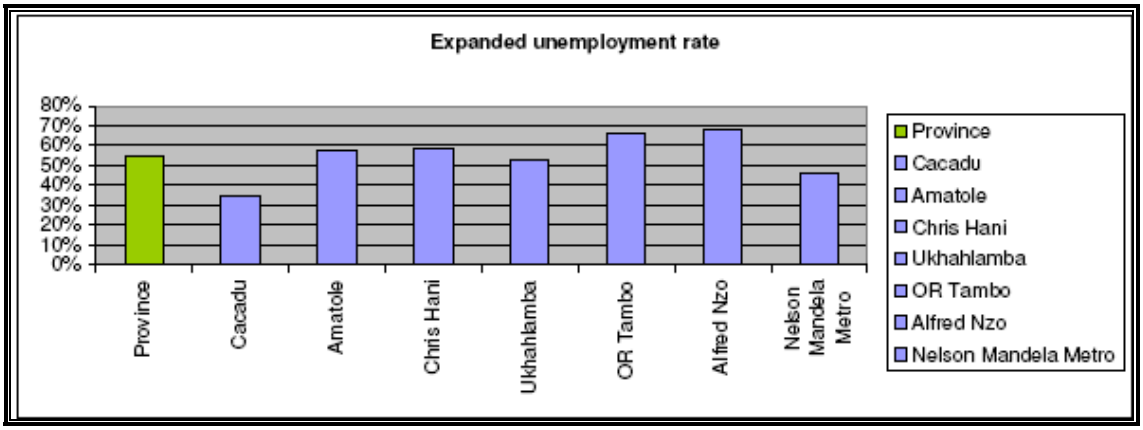



**Source: Austrian Development Agency (2005)**

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). The Cacadu District Municipality has the lowest unemployment rate in the province.

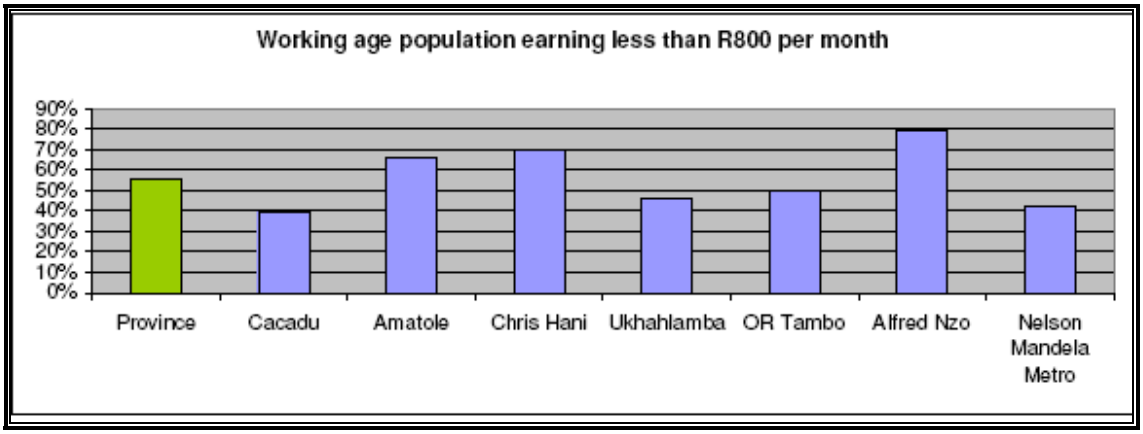
**Figure 2.2: Expanded unemployment rate for the Eastern Cape Province**




**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). The figure for the Cacadu district is 40%.

**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 Happy ValleyWEF is located approximately 100 km west of the Nelson Mandela Metropole and the 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 Kouga Municipality

The proposed project site (Figure 2.1) is within the Kouga Local Municipality (EC108), Eastern Cape Province. The proposed project area is located on farm Portion 1 of Farm 810.

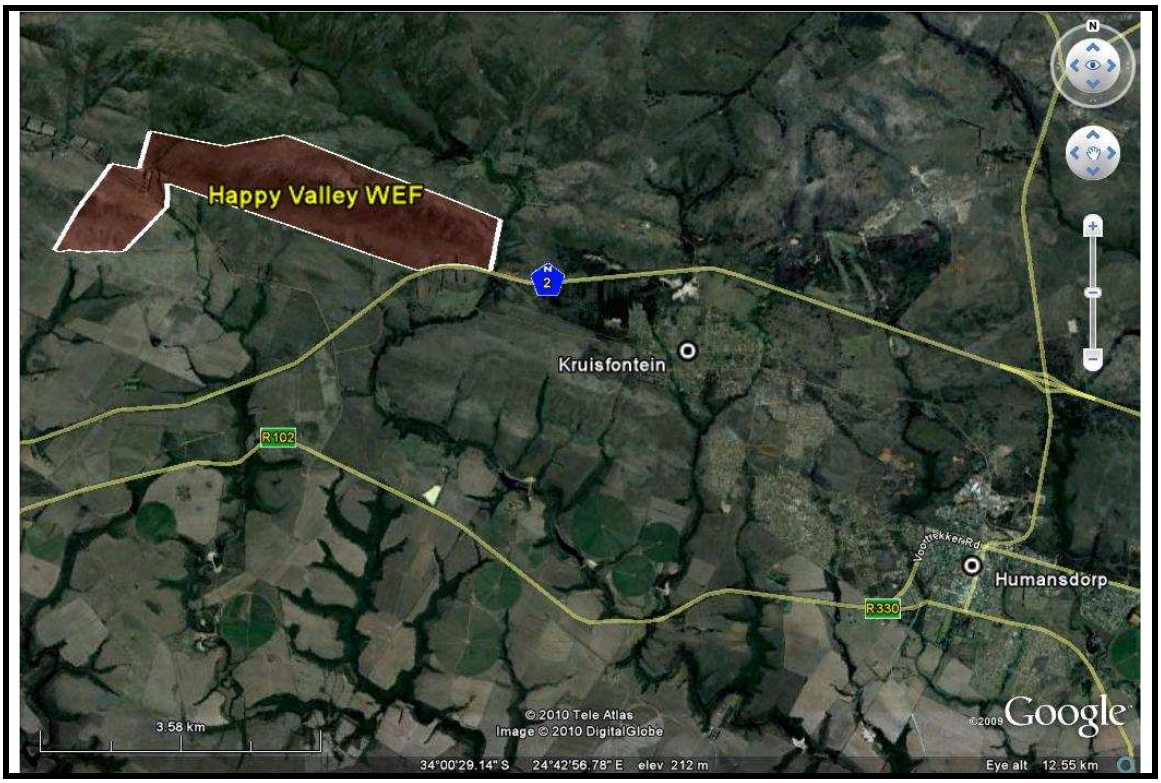



**Figure 2.1: Proposed Project Location (source: Garmin, Google Earth)**

The Kouga Local Municipality (Figure 2.2) (category-B Municipality[2]), which forms part of the greater Cacadu District Municipality (DC10, category-C Municipality), is located in the southern coastal region of the Eastern Cape approximately 80km west of the Nelson Mandela Metropolitan area (Port Elizabeth). The largest towns within the Municipality are Jeffrey's Bay and Humansdorp and administrative centre of the Municipality is located in Jeffrey's Bay.

The municipality is divided into 10 administrative wards.

[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


**Figure 2.2: Kouga Local Municipality (Source: Municipal Demarcation Board, Garmin, Google Earth)**

The municipality is approximately 2 419 km² in size (~4% of the greater Cacadu District Municipality) and bordered in the in the north by the Sundays River and Baviaans Local Municipalities, in the east by the Nelson Mandela Metropolitan area (Port Elizabeth), in the south by the Indian Ocean and in the west by the Kouga Local Municipality.

The population the Kouga Municipality is estimated at 73 274 (Community Survey, 2007) with an annual growth rate of ~2.4% per annum (Kouga Local Municipality IDP, 2007-2012). The population constitutes approximately 18% of the greater Cacadu District. The population density within the Municipality is estimated at 30.3 people/km (Community Survey, 2007). The majority of the population (~75%) lives in the urban nodes while ~25% live in rural villages or homesteads (Kouga Local Municipality IDP, 2007-2012).

The age profile of the population reveals that approximately 66% of the population falls within the economically active age bracket 15 to 65 years of age. The dependency ratio[3] is, however, is 0.5 which means that every 2 working individual supports 1 non-working/unemployed individual.

[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.

Just under half of the population is classified as Coloured (47.7%) followed by Black African (33.4%) and White (18.7) These demographics are reflected in the dominant languages within the Municipality, with 64.9% of the population Afrikaans speaking, 29% isiXhosa speaking and 4.9% English speaking.

The level of education within the Municipality is relatively high. Just over 10% of the population (~ 1 in 10) has no schooling, while over 20% have Std 10/Grade 12 certificate. Approximately 6% of those with a Grade 12 qualification go on to obtain an education at University/Technikon level.

Unemployment within the Municipality is estimated at 15.4% (2001) which in below the Eastern Cape average of ~32% (Eastern Cape State of the Environment Report, 2004), while ~42% of the population are listed as 'not economically active'. The largest sectors in terms of employment within the municipality in 2001 were Agriculture, Forestry & Fishing (~9%), Community Service (~8%%), Wholesale and Retail (4%) Construction (~3%) and Manufacturing (~2%). The 2001 Census data listed 73% as Undetermined.

### 2.3.2 Kouga Local Municipality – Ward 4 & 1

The majority of the area occupied by the proposed project is located in Ward 4 of the Kouga Local Municipality. However, a small portion of the proposed WEF development also falls within Ward 1. Ward 4 and 1 together constitute ~50% (1 205 $km^2$) of the total area of the Municipality (2 419 $km^2$). Both Wards are predominantly rural and agricultural in terms of land uses. The largest town in Ward 4 is Kruisfontein while in Ward 1 the largest settlement is Cape St. Francis Bay. Ward 4 and 1 together constitute the majority of the western half of the Kouga Local Municipality.

#### Population

According to Census 2001 data, the total population of Ward 4 and Ward 1 was 11 095 and 4 965 respectively. More recent data could not be sourced, but it is assumed that the population of both would have increased given the positive population growth rate (2.5%) between 1996 & 2010 noted in the Kouga IDP (2007-2012).

**Table 2.1: Population for Ward 4 and Ward 1, Kouga LM**

| Population Group | Ward 4 | | Ward 1 | |
|---|---|---|---|---|
| | Number | % | Number | % |
| Black African | 1694 | 15.3 | 1366 | 27.5 |
| Coloured | 9065 | 81.7 | 1269 | 25.5 |
| Indian or Asian | 5 | 0.05 | - | - |
| White | 331 | 3.0 | 2332 | 46.9 |
| Total | 11095 | 100 | 4967 | 100 |

***Source: Census 2001***

Table 2.1 above indicates that Ward 4 and Ward 1 are quite different in terms of the relative percentage of their population grouping. Ward 4 is predominantly coloured (~82%) with the Black African population group making up ~15% followed by the White population group with 3%. Ward 1, by contrast, has a relatively large White population group that makes up almost half (~47%) of the Ward's total population.

The Black African (~27%) and Coloured (~25%) population groups each account for around a quarter of the total population in Ward 1. This difference is linked to the large White component of population of the town of Cape St. Francis Bay in Ward 1.

**Age distribution**

Table 2.2 below indicates that the youth cohort (<15 years) in both Ward 4 and Ward 1 are moderate to low at ~30% and ~21% respectively. The post retirement cohort (>64) is low in Ward 4 at 3.5% and moderate in Ward 1 at ~12%. The dependency ratio is 0.5 in Ward 4 and 0.48 in Ward 1, which means that 2 working individual support approximately 1 non-working/unemployed individual.

**Table 2.2: Age distribution for study area communities**

| Age Group | Ward 4 | Ward 1 |
|---|---|---|
| 0-4 | 1030 | 350 |
| 5-9 | 1103 | 346 |
| 10-14 | 1233 | 343 |
| [Youthful dependents] | [3366] | [1039] |
| 15-19 | 1079 | 340 |
| 20-24 | 1027 | 365 |
| 25-29 | 1084 | 395 |
| 30-34 | 1008 | 399 |
| 35-39 | 919 | 373 |
| 40-44 | 699 | 293 |
| 45-49 | 609 | 274 |
| 50-54 | 391 | 266 |
| 55-59 | 278 | 354 |
| 60-64 | 252 | 291 |
| 65-69 | 137 | 234 |
| 70-74 | 115 | 169 |
| 75-79 | 67 | 102 |
| 80 and over | 64 | 71 |

***Source: Census 2001***

**Education levels**

As seen in Table 2.3 below, according to 2001 Census data, approximately 40% (corresponding to an absolute total of 2 662 people) of the population of Ward 4 aged 15 and older were estimated to be functionally illiterate/ innumerate in 2001. The relevant percentage for the Ward 1 was estimated at 18.3% (corresponding to an absolute total of 657 people). This pattern reflects the largely unskilled rural agricultural labour force in Ward 1.

Given the strong correlation between education and skills levels as well as the relevant size of each Ward, it may be assumed that a significant portion of the study area's working age population have only sufficient skills for elementary jobs. Ward 1, however, does offer more skilled labour reflected in the fact that 29% of the population have a Std 10/Grade 12 qualification and ~18% have a tertiary level of education

**Table 2.3: Ward 4 and 16 education levels**

| Description | Ward 4 | Ward 1 |
|---|---|---|
| No schooling | 745 | 169 |
| Some primary | 1917 | 488 |
| [% functional illiteracy/ innumeracy][4] | 40% [2662] | 18.3%[657] |
| Complete primary | 810 | 215 |
| Some secondary | 2163 | 1063 |
| Std 10/Grade 12 | 810 | 1018 |
| Higher | 204 | 634 |

***Source: Census 2001***

### Employment levels

The employment statistics presented in Table 2.4 below indicate that approximately 46% of the Ward 4 population and 53% of the population of Ward 1 were employed in 2001. Unemployment rates for both Wards were relatively low with respect to the provincial and national and averages, estimated at ~13% and ~10% respectively.

**Table 2.4: Study area communities employment levels (15 – 64 age groups)**

| Description | Ward 4 % | Ward 1 % |
|---|---|---|
| Employed[5] | 46.2 | 53.0 |
| Unemployed | 13.4 | 10.1 |
| Not Economically Active[6] | 40.4 | 36.9 |

***Source: Census 2001***

### Household income

Table 2.5 below indicates that almost 95% of households in Ward 4 and ~76% of households in Ward 1 were living on less than the accepted South African R1 600/ month minimum subsistence level in 2001. Significantly, the 'no formal income' category was the most pronounced at ~56% and ~43% respectively. Approximately 12% of household heads in Ward 4 and 22% in Ward 1 were earning an income clustered in the R800-R3200/ month range.

**Table 2.5: Household income (by head of household)**

[4] 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).

[5] 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).

[6] 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.

| Income per month | Ward 4 % | Ward 1 % |
|---|---|---|
| No formal income | 56.1 | 43.5 |
| R 1 – R 400 | 10.6 | 4.9 |
| R 401 – R 800 | 19.6 | 15.1 |
| R 801 - R 1 600 | 8.6 | 12.7 |
| [% households below minimum subsistence level] | [94.9] | [76.2] |
| R1 601 - R 3 200 | 3.1 | 8.9 |
| R 3 201 – R 6 400 | 1.3 | 6.4 |
| R 6 401 – R 12 800 | 0.5 | 5.1 |
| R 12 801 – R 25 600 | 0.1 | 1.9 |
| R 25 601 and higher | - | 1.6 |

***Source: Census 2001***

**Sectoral employment**

Table 2.6 below provides an overview of proportional employment per economic sector by head of household for the relevant Wards within the Kouga Local Municipality.

The largest employer in Ward 4 is the Agricultural sector which accounts for ~43% of the formal employment in the area. This sector is followed by the Construction, Wholesale and Retail sector, the Finance, Real Estate and Community Services sectors, which employ ~11%,~9% and ~8% of the employed population within the Ward respectively. Approximated 14% are categorised as "Other or not adequately defined."

Ward 1's sectoral employment profile shows that just under a quarter (~26%) of formal employment is provided by the Agricultural sector followed by the Wholesale and Retail sector (~17%), the Construction sector (~12%) and the Community Services sector (~10%).

**Table 2.6: Sectoral contribution to employment**

| Description | Ward 4 % | Ward 1 % |
|---|---|---|
| Agriculture, hunting, forestry and fishing | 42.9 | 24.5 |
| Mining and quarrying | 0.0 | 0.0 |
| Manufacturing | 4.5 | 3.7 |
| Electricity, gas and water supply | 0.2 | 0.2 |
| Construction | 10.6 | 12.4 |
| Wholesale and retail trade | 8.6 | 16.8 |
| Transport. Storage and communication | 1.1 | 1.9 |
| Fin., real estate and bus. Services | 2.1 | 6.8 |
| Community, social and personal services | 8.4 | 9.9 |
| Other and not adequately defined | 14.1 | 9.8 |
| Private households[7] | 7.5 | 14.0 |

***Source: Derived from Census 2001***

## 2.4 SURROUNDING LAND USES

The Kouga municipal consists of two distinct areas, the coastal belt (including the well know towns of Jefferies Bay and Cape St Frances) and the inland more mountainous area. The proposed site is located within at the start of the more mountainous area, and area which is largely rural and agricultural in character (Photograph 2.1). The closest town to the site is Humansdorp (~7 km east of the site). The important coastal, holiday settlements of Jeffery's Bay and Cape St Frances are located approximately 40 km south east of the site, while the Nelson Mandela Metropolitan Area (Port Elizabeth) is located approximately 95 km east of the site.

The site itself is characterised by undulating agricultural land located to the north of the N2 (See photographs 2.1-2.6). The local farmers (and their families) have been stock farming (beef and dairy cattle and sheep) for between 15 and 300 years.

Road access to the proposed WEF site is from a gravel road that turns north off the the R102 and crosses the N2 to the west of Humansdorp. The N2 is a recognized tourist route that links Cape Town to the west and the Nelson Mandela Metropolitan Area to the east. An existing sub-substation, the Melkhout substation is located approximately 8 km to the east of the site.

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

**Photograph 2.1: View of bridge crossing N2 looking north towards site**

**Photograph 2.2: View for gravel access road looking north towards ridge along which turbines would be located**

**Photograph 2.3: View looking east showing the ridge on the left where proposed turbines will be located and Kleinberg on the right.**

**Photograph 2.4: View looking north-west towards the site from the road between Cape St Frances and Humansdorp. The town of Humansdorp in located in the foreground.**

**Photograph 2.5: View looking north from Mayer dairy farm looking towards the site. The N2 is located between the Mayer farm and the site.**

**Photograph 2.6: View looking north from Mayer dairy farmstead towards the site. The N2 is located between the Mayer farm and the site.**

# SECTION 3: POLICY AND PLANNING CONTEXT

## 3.1 INTRODUCTION

Section 3 provides an 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 Kouga Local Municipality Integrated Development Plan (IDP) (2007-2012);

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

The section also provides a summary of some of the key social issues associated with wind farms based on international experience. The findings of the review concentrate on three documents, namely the National Wind Farm Development Guidelines produced by the Environment Protection and Heritage Council (EPHC) of Australia (Draft, July, 2010), recent research on wind energy development in Scotland undertaken by Warren and Birnie in 2009 (Warren, Charles R. and Birnie, Richard V.(2009) 'Re-powering Scotland: Wind Farms and the 'Energy or Environment?' Debate'), and a review of the potential health impacts associated with wind farms undertaken by the Australian Health and Medical Research Council (July, 2010).

## 3.2 NATIONAL LEVEL ENERGY POLICY

### 3.2.1 National Energy Act (Act 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 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 and 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.

### 2.4.1 Kouga Local Municipality Integrated Development Plan (2007-2012)

The Kouga Local Municipality Integrated Development Plan (IDP) (2007-2012) identifies 5 Key Priority Areas (KPA) in line with the National standards to address the municipality's development objectives:

- Infrastructure and Basic Services;
- Socio-economic Development;
- Institutional Transformation;
- Good Governance and Public Participation;
- Financial viability and Management.

With focus on these KPAs an analysis of the status quo across numerous sectors within the Municipality was undertaken to highlight the key objectives and associated strategies. Those objectives that are relevant to the proposed WEF include:

- Communities of Kouga have access to safe and convenient road networks. The road networks should support tourism, people's access to economic activities, as well as access to education, health and social service;
- All formal households have access to reliable and affordable electricity as well as streetlights, which supports safety and access for emergency services in Kouga, by 2012;
- Economic growth is stimulated in the Kouga region, and sustainable employment has been facilitated by creating a 5% growth in job creation by 2011;
- Kouga Municipality manages the available land in a sustainable manner that makes land available for development initiatives and economic growth that meets legal requirements.

## 3.4 REGIONAL METHODOLOGY FOR WIND ENERGY SITE SELECTION

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

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

**Cumulative Impact Issues**

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

As a result the document recommends that:

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

In this regard, it should be noted that two other proposed WEFs are located in the vicinity of the Happy Valleysite.

**Recommended Disturbed Landscape Focus**

The proposed methodology recommends focusing on existing disturbed rural landscapes, and in particular, those rural landscapes that have already been "vertically compromised" by the location, for example, of transmission lines, railway lines, and all phone towers. In this regard an existing substation, the Dieprivier substation and associated transmission lines, are located on the site.

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

The document notes that in Europe in the past, a great degree of emphasis was given to quantifying views from residential locations. This policy emphasis has effectively led to pushing WEF projects into more "remote" rural locations. The study notes that in the SA context this policy would effectively "penalising" rural areas, and compromising wilderness and touristic visual values. In this regard, the proposed Happy Valleysite is located in a remote, sparsely populated and undeveloped area. However, as indicated above, an existing substation, the Dieprivier substation and associated transmission lines, are located on the site.

## 3.5 INTERNATIONAL EXPERIENCE WITH WIND FARMS

### 3.5.1 Introduction

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

The first is the National Wind Farm Development Guidelines produced by the Environment Protection and Heritage Council (EPHC) of Australia (Draft, July, 2010). The guidelines highlight the potential social and biophysical impacts associated with WEFs. Given the similarities between South Africa and Australia, such as large, unobstructed landscapes and climates, these guidelines are regarded as relevant to the South Africa situation.

The second relates to recent research on wind energy development in Scotland undertaken by Warren and Birnie in 2009 (Warren, Charles R. and Birnie, Richard V.(2009) 'Re-powering Scotland: Wind Farms and the 'Energy or Environment?' Debate'). The Scottish experience is also regarded as relevant to the South Africa context for a number of reasons. Firstly, installed wind power capacity has expanded

rapidly in Scotland over the past decade. Before 1995 no wind farms existed. By late 2008, there were 59 operational onshore wind farms, 65 consented to or under construction and a further 103 in the planning process (BWEA, 2008). South Africa faces a similar situation, with a rush of applicants seeking approval for WEFs. Secondly, the impact on the landscape, specifically the Scottish Highlands, was one of the key concerns raised in Scotland. The impact on undeveloped, natural landscapes is also likely to become an issue of growing concern in South Africa. The key points raised in the article by Warren and Birnie that are relevant to South Africa are summarized below.

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

### 3.5.2 National Wind Farm Development Guidelines (Australia)

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

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

With regard to WEFs, the noise produced by wind turbines is associated with their internal operation and the movement of the turbine blades through the air. The noise levels associated with a WEF are 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.

### 3.5.3 Experience from Scotland and Europe

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

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

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

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

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

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

limited) evidence, wind farms seem unlikely to have more than small, 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 impacts 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.

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

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

### 3.5.4 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, June 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.

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 Kouga Local Municipality Integrated Development Plan (IDP) (2007-2012);

The findings of the review indicated that wind energy was strongly supported at a national 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 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 grass 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 WEFs the capital expenditure associate with the construction of 14 wind turbines with a generation potential of 30 MW would bne in the region of R 450-500 million. The construction phase is expected to extend over a period of 6-8 months and create approximately 60 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.

Of this total, approximately 33 % (20) of opportunities will be available to skilled personnel (engineers, technicians, management and supervisory), ~33 % (20) to semi-skilled personnel (drivers, equipment operators), and ~ 33 % (20) to low skilled personnel (construction labourers, security staff). Due to the low education and skills levels in the area, the majority of opportunities for residents in the local towns of Humansdorp, Jefferies Bay and Cape St Frances are likely to be limited to the low and semi-skilled category, specifically for Historically Disadvantaged Individuals (HDIs). 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 necessarily locals from the area. Due to the low education and skills levels in the area the opportunities for skills development and training of locals may be limited. However, due to the relatively recent boom in the construction industry (2000-2008), the required civil engineering contracting and construction skills are likely to be available in the local area The required expertise and skills would also be available in the Nelson Mandela Metro which is located within 100 km of the site.

In terms of business opportunities for local companies, the expenditure of R 450-500 million 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 Humansdorp, Jefferies Bay and Cape St Frances economy are likely to be limited. Opportunities may however occur for engineering companies located in the Nelson Mandela Metropolitan Region. 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. The construction workers associated with the construction phase are likely to be accommodated in the local towns of Humansdorp, Jefferies Bay and Cape St Frances. 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 6-8 month construction phase will be spent in the regional and local economy. Based on information from other WEFs the total wage bill associated with the construction phase is estimated at R 20-25 million. The injection of income into the area in the form of rental for accommodation and wages will create opportunities for local businesses in Humansdorp, Jefferies Bay and Cape St Frances. The benefits

to the local economy will however be confined to the construction period (6-8 months).

The local hospitality industry in Humansdorp, Jefferies Bay and Cape St Frances 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)<br>(Rated as 2 due to potential opportunities for local communities and businesses) | Local – Regional (3)<br>(Rated as 3 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 (36) |
| **Status** | Positive | Positive |
| **Reversibility** | N/A | N/A |
| **Irreplaceable loss of resources?** | N/A | N/A |
| **Can impact be enhanced?** | Yes | |
| **Enhancement:** See below | | |
| **Cumulative impacts:** Opportunity to up-grade and improve skills levels in the area. However, due to relatively small number of local employment opportunities this benefit is likely to be limited. | | |
| **Residual impacts:** Improved pool of skills and experience in the local area. However, due to relatively small number of local employment opportunities this benefit is likely to be limited. | | |

**Assessment of No-Go option**
There is no impact as it maintains the current status quo. The potential employment and economic benefits associated with the proposed 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, REI 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 REI should meet with representatives from the Kouga 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 REI 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**

- REI should develop a database of local companies, specifically companies that qualify as Black Economic Empowerment (BEE) 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, REI should assist local BEE companies to complete and submit the required tender forms and associated information.
- The Kouga 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 Humansdorp, Jefferies Bay and Cape St Frances. 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).

A number of people interviewed indicated that there had been an increase in employment seekers to the area due to the growth in the local squid (chokka) industry in recent years and that this was a concern. Concerns were also raised about the influx of employment seekers due to the rumours regarding the proposed construction of the ESKOM nuclear power station at Oyster Bay. The area is therefore already experiencing an influx of employment seekers. However, the potential risk posed by the influx of construction workers associated with the proposed Happy Valley WEF to local family structures and social networks is likely to be low. This finding is based on the relatively small number of construction workers associated with the construction phase, namely 60. 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 impacts will be low.

**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)<br>(Rated as 2 due to potential severity of impact on local communities) | Local (1)<br>(Rated as 1 due to potential severity of impact on local communities) |
| **Duration** | Short term for community as a whole (1)<br>Long term-permanent for individuals who may be affected by STDs etc. (5) | Short term for community as a whole (1)<br>Long term-permanent for individuals who may be affected by STDs etc (5) |
| **Magnitude** | Low for the community as a whole (4)<br>High-Very High for specific individuals who may be affected by STDs etc. (10) | Low for community as a whole (4)<br>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)<br>Moderate-High for specific individuals who may be affected by STDs etc. (51) | Low for the community as a whole (18)<br>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, REI 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;
- REI 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;
- REI 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;
- REI 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 6-9 month construction phase. This would reduce the risk posed by construction workers from outside the area on local family structures and social networks;
- It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.

### 4.4.3 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. The adjacent land owner, Mr Mayer, indicated that he did not believe that the proposed WEF would impact on his current dairy operations. However, the potential issue of stock theft was raised as a concern. These impacts can, however, be effectively managed and mitigated. In addition, it is assumed that REI has 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 (3)<br>(Rated as 4 due to potential severity of impact on local farmers) | Local (2) |
| **Duration** | Short term (2) | Short term (2) |
| **Magnitude** | Moderate (6)<br>(Due to reliance on agriculture and livestock for maintaining livelihoods) | Low (4) |
| **Probability** | Probable (3) | Probable (3) |
| **Significance** | Medium (33) | 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, it is assumed that REI have entered into an agreement with the affected landowners whereby the company will compensate for damages. In addition, the potential impacts can be mitigated. The mitigation measures include:

- REI should consider the option of establishing a MF (see above) that includes local farmers and develop a Code of Conduct for construction workers. This committee should be established prior to commencement of the construction phase. The Code of Conduct should be signed by REI and the contractors before the contractors move onto site;
- REI 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 REI, 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 REI 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 REI 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.

### 4.4.4 Increased risk of grass fires

The presence of construction workers and construction-related activities on the site poses an increased risk of grass fires that could in turn pose a threat to livestock, 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 grass fires is heightened by the windy conditions in the area, specifically from December to February.
- The risk of fire related damage is exacerbated by the distance to fire-fighting vehicles located in the nearest town of Humansdorp.

**Table 4.4: Assessment of impact of increased risk of grass fires**

| **Nature:** Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of grass fires | | |
|---|---|---|
| | **Without Mitigation** | **With Mitigation** |
| **Extent** | Local (4)<br>(Rated as 4 due to potential severity of impact on local farmers) | Local (2) |
| **Duration** | Short term (2) | Short term (2) |
| **Magnitude** | Moderate due to reliance on agriculture for maintaining livelihoods (6) | Low (4) |
| **Probability** | Probable (3) | Probable (3) |
| **Significance** | Medium (36) | Low (24) |
| **Status** | Negative | Negative |
| **Reversibility** | Yes, compensation paid for stock and crop losses etc | |
| **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, it is assumed that REI have entered into an agreement with the affected landowners whereby the company will compensate for damages. It is assumed that this includes losses associated grass fires. In addition, the potential increased risk of grass fires can be effectively mitigated. The mitigation measures 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 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 will be from the R 102 and a gravel road that crosses the N2 and then later also crosses a railway line. The movement of heavy construction vehicles during the construction phase has the potential to damage roads and create noise, dust and safety impacts for other road users.

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 establishment of 14 turbines would therefore be in the region of 70 trips. 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 findings of the SIA indicate that the issues related to the movement of heavy vehicle traffic during the construction phase can be effectively mitigated. These issues are therefore not regarded as significant concerns. In addition, heavy the roads are already used by heavy vehicles that collect milk and beef cattle from the local farms in the area. In addition, it is assumed that REI has 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 damage to local roads.

**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)<br>(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, it is assumed that REI 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 and internal farm roads. In addition, the potential impacts associated with heavy vehicles and dust can be effectively mitigated. The aspects that should be covered include:

- The contractor must ensure that damage caused to roads by the construction related activities, including heavy vehicles, is repaired before the completion of the construction phase. The costs associated with the repair should be borne by the REI;
- 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 farmland for future farming activities.

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. In addition, in the case of the Happy Valley site the impact is likely to be linked to limited due to the location of the proposed wind turbines on relatively steep slopes and ridges. These areas are not used as key farming areas. However, the loss of potential veld for grazing is still an issue. As indicated above, it is assumed that REI have 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 (2) | Local (1) |
| **Duration** | Long term-permanent if disturbed areas are not rehabilitated (5) | Short term if damaged areas are rehabilitated (1) |
| **Magnitude** | Minor (2) | Minor (2) |
| **Probability** | Definite (5) | Highly Probable (4) |
| **Significance** | Moderate (45) | Low (16) |
| **Status** | Negative | Negative |
| **Reversibility** | Yes, disturbed areas can be rehabilitated | Yes, disturbed areas can be rehabilitated |
| **Irreplaceable loss of resources?** | No, disturbed areas can be rehabilitated | No, disturbed areas can be rehabilitated |
| **Can impact be mitigated?** | Yes however, loss of farmland during operation cannot be avoided | Yes, however, loss of farmland during operation 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, it is assumed that REI 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 also be effectively mitigated. 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;

- REI should compensate farmers that suffer a permanent loss of land due to the establishment of the WEF. Compensation should be based on accepted land values for the area. 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;
- The establishment of infrastructure for the generation of clean renewable energy.

**Potential negative impacts**
- Impact of the proposed wind energy facility on the current farming activities, specifically the potential loss of productive farm land;
- Impact on tourism and the creation of potential tourist opportunities;
- The visual impacts and associated impact on sense of place and landscape character of the area.

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

### 4.5.1 Creation of employment and business opportunities

Based on information provided by REI Energy approximately 10 permanent staff (administrative, management, monitoring, maintenance and security) will be employed during the operational lifespan of the Happy Valley WEF (25-30 years). In addition, approximately 12 security personnel will be employed. The wage bill associated with the operational phase is estimated at R3 million per year (current value).

Due to the need for specialised skills it may be necessary to import the required operational and maintenance skills from other parts of South Africa or even overseas. All of the security positions can however be filled by local residents. 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 Kouga IDP.

Given the location of the proposed WEF the majority of permanent staff is likely to reside Humansdorp. Some permanent staff may also elect to live at the coast, in towns such Jeffery's Bay and Cape St Frances. In terms of accommodation options, a percentage of the new permanent employees may purchase houses in one of these towns, while others may decide to rent. Both options would represent a positive economic benefit for the region. In addition, a percentage of the annual wage bill earned by permanent staff would be spent in the regional and local economy. This will benefit local businesses in the local towns in the area. The benefits to the local economy will extend over the 25-year operational lifespan of the project. The local hospitality industry is also likely to benefit from the operational phase. These benefits are associated with site visits by company staff members and other

professionals (engineers, technicians etc) who are involved in the company and the project but who are not linked to the day-to-day operations.

Research undertaken by Warren and Birnie (2009) also highlights the importance of addressing community benefits in the development and implementation of WEFs. The findings of the research 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 favored 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.

**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<br>**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:

- REI 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;
- REI, in consultation with the Kouga Municipality, should investigate the opportunity of 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 trust could be used to address low education and skills levels in the area.

### 4.5.2 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 IDP Manager of the Kouga LM, Mr. Fadane, indicated that municipality supported the project, as it would promote sustainable development in the area.

The overall contribution to South Africa's total energy requirements of the proposed wind energy facility is relatively small. However, the ~30 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 4.8: 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 REI should:

- Use the project to promote and increase the contribution of renewable energy to the national energy supply;
- Implement a training and skills development programme for locals during the first 5 years of the operational phase. The aim of the programme should be to maximise the number of South African's employed during the operational phase of the project;
- 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 structure of the potential Community Trust should be based on the approach adopted by the Theewaterskloof Local Municipality in the Western Cape, whereby the income generated from the sale of energy is used to support community projects and initiatives listed in the local IDP.

### 4.5.3 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 cattle 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 WEFs also tends 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. Mr. Mayer, and adjacent farm owner, indicated that he did not feel that the proposed WEF would impact on his current dairy farming operations. However, Mrs. Elton raised concerns regarding the impact of WEFs on dairy cattle. Mr Griffiths from WESSA also indicated that WESSA had received complaints from some farmers in the Eastern Cape that wind farms had impacted negatively on their cows. This statement should however be treated with a degree of caution as no WEFs had been established in the Eastern Cape Province at the time of undertaking the interviews (June 2011).

**Table 4.9: 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, it is assumed that REI 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.

### 4.5.4 Visual impact and impact on sense of place

The Australian National Wind Farm Development Guidelines, (Draft, July 2010), indicate that 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.

The turbines associated with the proposed WEF will have a visual impact and, in so doing, impact on the rural sense of the place of the area and the landscape. While none of the local farmers interviewed identified visual impacts as a significant concern, this does not imply that the proposed WEF will not impact on the area's sense of place and the landscape. Experience from elsewhere, such as Australia and Scotland, indicates that impacts on the landscape represents one of the most

significant concerns associated with wind farms. The potential for mitigating the impact on the area's sense of place and the landscape is low. In this regard the Australian National Wind Farm Development Guidelines stress the importance of **general location** and **site selection.**

With regard to the Happy Valley WEF, the site is visible from the N2, which is an important tourist route. The R62, which is also an important tourist route and designated scenic route, is located to the south-west of the site. Although the site is not visible from the R62, motorist who use the R62 will be exposed the Happy Valley WEF when they travel along the N2. In addition, a number of the local landowners in the area, including Mr. Mayer (dairy farm) and Mr Roesenkraaz (game farm) both raised concerns regarding the potential visual impact that the proposed Happy Valley WEF would have on the areas sense of place and their quality of life. Photographs 2.5 and 2.6 illustrate the view from the Mayer's farm towards to the proposed site.

The key findings of the Visual Impact Assessment (VIA) undertaken by MetroGIS (MetroGIS, July, 2011) indicate that the region has a rural character with a number of individual farming homesteads/dwellings occurring within the study area. It is also a particularly picturesque part of the country, in close proximity to the southern seaboard of the country, and is thus a known tourist destination. The VIA notes that the visibility of the WEF will be high, with a high frequency of exposure for significant stretches of the N2, the R102, the R62, the southern part of the R330 and a number of secondary roads. The northern part of the R330 and the R332 will be mostly shielded from visual impact, with isolated areas having a low to moderate frequency of exposure.

In terms of specific settlements, the VIA indicates that the towns of Kruisfontein and Humansdorp are expected to experience a high frequency of visual exposure, both within the towns and in the surrounding area. In addition, a large number of settlements and homesteads, especially those within the river valley zone will be visually exposed, with a high frequency of exposure. The specific findings of the VIA are summarised below.

**Potential visual impact on users of major roads (N2, R102, R62, R330 and R332) and secondary roads in close proximity to the proposed WEF**

Potential visual impact on users of national, arterial and secondary roads in close proximity of the proposed WEF (i.e. within 10 km) are expected to be **high**. No mitigation is possible.

**Potential visual impact on residents of towns, settlements and homesteads in close proximity to the proposed WEF.**

The potential visual impact on residents of Kruisfontein and on the residents of homesteads and settlements within a 5 km to 10 km radius of the proposed WEF is expected to be **high**. No mitigation is possible.

**Potential visual impact on sensitive visual receptors (users of roads and residents of towns, settlements and homesteads) within the region**

The visual impact on the settlements and homesteads within the region (beyond the 10 km radius) is expected to be of **moderate to high** significance. No mitigation is possible.

**Potential visual impact on protected areas in close proximity to the proposed WEF.**

The potential visual impact on conservation/protected areas within a 10 km radius of the proposed WEF (i.e. the Thaba Manzi and Jumanji Game Farms) is expected to be of **moderate** significance. There is no mitigation for this impact.

**Potential visual impacts on the visual character and sense of place of the region.**

The anticipated visual impact of the facility on the regional visual character, and by implication, on the sense of place, is expected to be **moderate**. There is no mitigation for this impact.

**Potential visual impact of the proposed facility on tourist routes, tourist destinations and tourism potential within the region.**

The region has a rural character and is located within a particularly picturesque part of the country. It is in close proximity to the southern seaboard, and is thus a known tourist destination. In addition, the N2 is a well-known and well used tourist access route, and the arterial and secondary roads make for scenic drives.

The anticipated visual impact of the facility on existing tourist routes, as well as on the tourism potential of the region, is expected to be **moderate**. There is no mitigation for this impact.

The VIA concludes that the construction and operation of the Happy Valley Wind Energy Facility and its associated infrastructure will have a visual impact on the natural scenic resources and rural character of the region. The VIA goes onto note that the ridges earmarked for the development of the WEF are generally considered to be scenic and sensitive topographical features with limited existing visual disturbance. The proposed development is expected to transform the natural character of these ridges for the entire operational phase of the facility; with potential longer term residual visual impacts caused by the removal of vegetation cover for the construction of internal access roads on steep elevated slopes.

The VIA also notes that a potential conflict of interest exists with respect to future conservation based development and tourism opportunities within the above areas due to the expected visual impact of the WEF.

Considering all factors, the author of the VIA concludes that the particular study area is not suited to the development of a WEF on the site as proposed. This is due to its visually prominent location, coupled with the pastoral character and inherent scenic beauty of the natural features and of the greater study area. The location of turbines on the ridge line in this visually exposed environment results in a high visual prominence and an undesirable negative visual impact.

However, the VIA notes that despite the high significance associated with the visual impacts, the anticipated visual impact does not, constitute a fatal flaw. This is due specifically to the localised area of potential high visual impact (i.e. within 5km), the relatively low incidence of visual receptors and the small scale of the proposed facility. This impact is also not likely to detract from the regional tourism appeal,

numbers of tourists or tourism potential of the existing centres such as St Francis Bay. The findings of the SIA confirm the concerns noted in the VIA. In addition, a number of the affected landowners interviewed indicated that the visual impacts associated with the proposed WEF represented a significant issue of concern.

**Table 4.10: 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 (4)<br>(Reflects impact on local residents and travellers along N2 and R 62) | Local (4)<br>(Reflects impact on local residents and travellers along N2 and R 62) |
| **Duration** | Long term (4) | Long term (4) |
| **Magnitude** | High (8) | High (8) |
| **Probability** | Highly Probable (4) | Highly Probable (4) |
| **Significance** | High (64) | High (64) |
| **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.

### 4.5.5 Impact on tourism

The potential impacts on tourism are closely related to potential visual impacts associated with the proposed WEF. In this regard the Happy Valley WEF site is visible from the N2, which is an important tourist route. As indicated above, the R62, which is located to the south-west of the site, is also an important tourist route and a designated scenic route. As indicated above the findings of the VIA indicate that the region has a rural character and is located within a particularly picturesque part of the country. It is in close proximity to the southern seaboard, and is thus a known tourist destination. In addition, the N2 is a well-known and well used tourist access route, and the arterial and secondary roads make for scenic drives. The anticipated visual impact of the facility on existing tourist routes, as well as on the tourism potential of the region, is expected to be **moderate**. There is no mitigation for this impact.

In addition, it is worth noting the N2 is the major access for visitors to the internationally renowned Garden Route area of South Africa. The N2 provides tourists with a scenic link between the Garden Route and Cape Town to the south west and Port Elizabeth to the north east. The establishment of WEF along this route is likely to impact negatively on the experience of tourists travelling along the N2.

However, research in Scotland undertaken by Warren and Birnie (2009) found that there appeared to be no clear evidence that tourists would be put off by the presence of wind farms in tourism areas. 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 an area's reputation as an environmentally friendly area, provided they are sensitively sited. 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 minimise the potential impact on landscapes and as such also reduce the potential impact on tourism.

**Table 4.11: Impact on tourism**

| **Nature:** Potential impact of the wind energy facility on local tourism | | |
|---|---|---|
| | **Without Mitigation** | **With Mitigation** |
| **Extent** | Local (3) | Local (3) |
| **Duration** | Long term (4) | Long term (4) |
| **Magnitude** | Low (4) | Low (4) |
| **Probability** | Probable (3) | Probable (3) |
| **Significance** | Medium (33) | Medium (33) |
| **Status** | Negative | Negative |
| **Reversibility** | Yes | |
| **Irreplaceable loss of resources?** | No | |
| **Can impact be enhanced?** | Yes | |
| **Enhancement:** See below | | |
| **Cumulative impacts:** Potential for fewer tourists to visit the area, and impact on tourist sector (Negative). | | |
| **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.

## 4.6 ASSESSMENT OF SUBSTATION AND TRANSMISSION LINES OPTIONS

REI has identified the preferred site for the new substation, which is located on the site and the route alternatives for the 132 kV distribution lines that will link the wind energy facility to the existing Melkhout substation located approximately 8 km east of the site and 3 km north of Humansdorp. There are two alternatives for the power line which will link with the Melkhout Substation. The first alternative follows the alignment of the existing Eskom distribution power lines for the whole length of the alignment. The second alternative follows the alignment the Eskom distribution lines for most of its alignment. For a short section, however, this alternative alignment branches away from the existing Eskom line to follow the N2 for some distance, where after it re-joins the alignment of the Eskom line.

The findings of the VIA indicate that the power line will be highly visible to the south, with less visual exposure to the north due to topography. Visual receptors include users of the N2, R102, R330, R332, Kruisfontein and a number of homesteads / settlements. It is noteworthy that the viewshed for the power line falls largely within that of the proposed turbines. The VIA notes that there is a negligible difference between the exposure of Alternative 1 and 2, meaning that either option will result in potential visual impact. However, Alternative 1 follows an existing power line alignment for its entire length, while Alternative 2 does not.

In this respect, Alternative 1 is considered preferable to Alternative 2 from a visual perspective as the existing infrastructure may help to 'absorb' the visual impact somewhat. Other than the selection of the preferred alternative, there is no mitigation for this impact. The significance of the impact is rated as moderate negative by the VIA.

Based on the findings of the SIA there are no significant social impacts associated with the on-site substation. The social impacts associated with the transmission line route are linked to the visual and sense of place issues. In this regard the findings of the VIA indicate that impact associated with the substation will be Low, while the impacts associated with the transmission lines were rated as Medium. The findings of the SIA support the findings of the VIA in that Alternative 1 is the preferred alternative.

**Table 4.12: Assessment of substation and transmission line options**

| **Nature:** Potential visual impact and impact on sense of place associated with the substation and transmission lines | | |
|---|---|---|
| | **Without Mitigation** | **With Mitigation** |
| **Extent** | Local (3) | Local (3) |
| **Duration** | Long term (4) | Long term (4) |
| **Magnitude** | Low (4) | Low (4) |
| **Probability** | Probable (3) | Probable (3) |
| **Significance** | Medium (33) | Medium (33) |
| **Status** | Negative | Negative |
| **Reversibility** | Yes | |
| **Irreplaceable** | No | |

| | | |
|---|---|---|
| **loss of resources?** | | |
| **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 Happy Valley 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, based on the information available at the time of undertaking the SIA, it would appear that two other WEFs are proposed in the area to the north of the N2. These include the proposed Deep River WEF located 10 km to the west of the Happy Valley site and a proposed WEF located on the Farm Dieprivier Mond located near the Deep River site.

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. The proposed WEFs will dramatically alter the sense of place and the existing landscape which will be dominated by turbines. In this regard a number of local residents in the area raised concerns regarding the cumulative impacts associated with the establishment of WEFs in the Hummansdorp, Jefferies Bay and Cape St Frances area. They were not opposed to wind energy per se, however, concerns were raised regarding the number of proposed WEFs being mooted in the area.

In terms of visibility to passing motorists, the N2 is an important tourist route. The issue of Sequential Visibility (e.g. the effect of seeing two or more wind farms along a single journey, e.g. road or walking trail) is therefore a concern. The potential cumulative impacts are also highlighted by the findings of the VIA (MetroGIS, July 2011), which indicate that the proposed site is not suitable for the establishment of a WEF. The VIA also notes that the construction of 13 wind turbines together with the roads and other ancillary infrastructure will increase the cumulative visual impact within the region. This is specifically relevant in light of the authorised RedCap Kouga WEF located to the south of the site.

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 people's perception and relationship with the landscape. In the South African context, the majority of South Africans have a strong connection with and affinity for the large, undisturbed open spaces that are characteristic of the South African landscape. 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 or possibly more WEFs in the area will have a significant impact on the landscape and the areas rural sense of place and character. This impact will be exacerbated by the sequential visibility of the sites, specifically for motorists travelling along the N2, which is an important tourist route that links Cape Town with Eastern Cape. 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 (this would require a reduced number of WEFs to be established in the area)** |
| **Extent** | Local and regional (4) | Local and regional (3) |
| **Duration** | Long term (4) | Long term (4) |
| **Magnitude** | Moderate (6) | Low (4) |
| **Probability** | Definite (5) | Definite (5) |
| **Significance** | High (70) | Medium (55) |
| **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 roads frequently used by tourists and farmsteads in the area.

## 4.10 ASSESSMENT OF DECOMMISSIONING PHASE

Major social impacts associated with the decommissioning phase are typically 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 Happy Valley WEF, it is likely that the decommissioning phase will be indefinitely deferred, as it is envisaged that turbines will be disassembled and replaced with more modern technology at the end of their 25-30 year lifespan. 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.

When and if the wind turbine facility is finally decommissioned, the impacts are likely to be limited due to the relatively moderate number of permanent employees (20-25) affected. The potential impacts associated with the decommissioning phase can also be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be Low (negative).

**Recommended mitigation measures**

The following mitigation measures are recommended:

- REI should investigate the option of relocating employees to other WEFs when the Happy Valley WEF is decommissioned (if feasible);
- REI 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 Happy Valley WEF should be dismantled and transported off-site on decommissioning;
- REI should consider establishing an Environmental Rehabilitation Trust Fund to cover the costs of decommissioning and rehabilitation of disturbed areas. The Trust Fund should be funded by a percentage of the revenue generated from the sale of energy to the national grid over the 25-30 year operational life of the facility. The rationale for the establishment of a Rehabilitation Trust Fund is linked to the experiences with the mining sector in South Africa and failure of many mining companies to allocate sufficient funds during the operational phase to cover the costs of rehabilitation and closure.

# 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 Kouga Municipality Integrated Development Plan (IDP) (2007-2012);

The findings of the review indicated that wind energy was strongly supported at a national 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 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 450-500 million. The construction phase is expected to extend over a period of 6-8 months and create approximately 60 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.

Of this total, approximately 33% (20) of opportunities will be available to skilled personnel (engineers, technicians, management and supervisory), ~33% (20) to semi-skilled personnel (drivers, equipment operators), and ~33% (20) to low skilled personnel (construction labourers, security staff). 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 450-500 million 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 Humansdorp, Jefferies Bay and Cape St Frances 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 local towns of Humansdorp, Jefferies Bay and Cape St Frances. 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 6-8 month construction phase is also likely to be spent in the regional and local economy. The total wage bill for the 6-8 month construction phase will be in the region of R 20-25 million. The injection of income into the area in the

form of rental for accommodation and wages will create opportunities for local businesses in Kareedouw and Humansdorp. The benefits to the local economy will however be confined to the construction period (6-8 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 grass fires** | Medium (Negative impact) | Low (Negative impact) |
| **Impact of heavy vehicles and construction activities** | Low (Negative impact) | Low (Negative impact) |
| **Loss of farmland** | Medium (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;
- The establishment of infrastructure to generate renewable energy.

Based on information from similar studies, it is expected that the proposed wind energy facility will employ approximately 20 full time employees over 25-year period. The wage bill associated with the operational phase is estimated at R3 million per year (current value). Due to the need for specialised skills it may be necessary to import the required operational and maintenance skills from other parts of South Africa or even overseas. Approximately 80% of the permanent employment positions can be filled by local residents. 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 Kouga IDP.

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;
- Impact on tourism and the creation of potential tourist opportunities.

The potential visual impact and impact on sense of place, and the associated impact on tourism cannot be effectively mitigated. As such the significance rating is High negative. In this regard the findings of the VIA do not support the establishment of a WEF on the Happy Valley site.

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) |
| **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** | High (Negative impact) | High (Negative impact) |
| **Impact on tourism** | Medium (Positive and Negative) | Medium (Positive and Negative) |

### 5.2.4 Assessment of cumulative impacts

Based on the information available at the time of undertaking the SIA, it would appear that two other WEFs are proposed in the area to the north of the N2. These include the proposed Deep River WEF located 10 km to the west of the Happy Valley site and the proposed WEF located on the Farm Dieprivier Mond adjacent to the Deep River WEF site.

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. This impact will be exacerbated by the sequential visibility (e.g. the effect of seeing two or more wind farms along a single journey, e.g. road or walking trail) of the sites, specifically for motorists travelling along the N2, which is an important tourist route that links Cape Town with Eastern Cape.

It is therefore 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. In this regard it is noted that the findings of the VIA (MetroGIS, July 2011) indicate that the site is not suited to the development of a WEF. The VIA also confirms that the construction of 13 wind turbines together with the roads and other ancillary infrastructure will increase the cumulative visual impact within the region. This is specifically relevant in light of the authorised RedCap Kouga WEF located to the south of the site.

### 5.2.5 Substation and transmission line options

The findings of the SIA support the findings of the VIA and indicate that Alternative 1 for the transmission lines is the preferred alternative. There are no significant social impacts associated with the on-site substation.

### 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 Happy Valley WEF is of low significance. In addition, none of the affected parties 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

The decommissioning of WEFs, such as the proposed Happy Valley WEF, typically involves 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. The decommissioning phase is therefore likely to create additional, construction type jobs, as opposed to the jobs losses typically associated with decommissioning.

In, addition, when and if the wind turbine facility is finally decommissioned, the impacts will be limited to a small number of permanent employees (20-25) 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).

REI should also consider the establishment of 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.

## 5.3 RECOMMENDATIONS

The findings of the SIA indicate that the proposed development will create employment and business opportunities for locals during both the construction and operational phase of the project. However, these benefits will be limited. In order to enhance the local employment and business opportunities the mitigation measures listed in the report should be implemented. REI 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 and used to support local IDP projects and initiatives. The establishment of a Community Trust should be discussed with the Kouga Local Municipality. 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.

However, the findings of the VIA do not support the development of a WEF on the Happy Valley site (MetroGIS, July 2011). This is due specifically to the visually prominent location of the site, coupled with the inherent character and scenic beauty of the area. The VIA, does, however, note that despite the high significance associated with the visual impacts, the anticipated visual impact does not, constitute a fatal flaw. This is due specifically to the localised area of potential high visual impact (i.e. within 5km), the relatively low incidence of visual receptors and the small scale of the proposed facility. The VIA also notes that the impact is not likely to detract from the regional tourism appeal, numbers of tourists or tourism potential of the existing centres such as St Francis Bay.

The findings of the SIA confirm the concerns noted in the VIA. In addition, a number of the affected landowners interviewed indicated that the visual impacts associated with the proposed WEF represented a significant issue of concern. However, the authors of the SIA are of the opinion that the establishment of WEFs, such as the proposed Happy Valley WEF, along important and established tourism routes, such as the N2 National Route, should be reconsidered. In this regard it is recommended that the authorities give careful consideration to the approval of WEFs that have the potential to impact negatively on the visual character of existing and future tourist routes.

In addition, the cumulative impacts associated with the three 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 proposed development 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 establishment of the proposed Happy Valley will also will increase the cumulative visual impact associated with WEFs within the region. This is specifically relevant in light of the authorised RedCap Kouga WEF located to the south of the site and the importance of the N2 as tourist route. It is therefore recommended that an alternative site that is less visually exposed be investigated.

In addition, 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.

# ANNEXURE A

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# ANNEXURE B

## METHODOLOGY FOR THE ASSESSMENT OF POTENTIAL IMPACTS

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

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

# 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 | REI, in discussions with the Kouga 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. REI should also develop a database of local BEE service providers |

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

| | | |
|---|---|---|
| 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;<br>• 80 % of semi and unskilled labour locally sourced where possible.<br>• Database of potential local BEE services providers in place before construction phase commences.<br>• Skills audit to determine need for training and skills development programme undertaken within 1 month of commencement of construction phase. |
| Monitoring | • REI 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 |
|---|---|---|
| • Aim for 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 such as Humansdorp.<br>• Construction workers should be able to provide proof of having lived in the area for five years or longer. | • REI and contractors<br>• REI | • Identify suitable local contractors prior to the tender process for the construction phase.<br>• Tender documents for contractors include conditions set out in SIA, including transport of workers home over weekends, transportation of workers home on completion of construction phase, |

| | | |
|---|---|---|
| • Identify local contractors who are qualified to undertaken the required work;<br>• Consider establishment of 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;<br>• Develop a Code of Conduct to cover the activities of the construction workers housed on the site;<br>• 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.<br>• Ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct;<br>• 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.<br>• 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.<br>• On completion of the construction phase all construction workers must be transported back to their place of origin within two days of their contract ending. The costs of | • REI<br>• REI<br>• REI and contractors<br>• REI and contractors and CLC<br>• Contactors<br>• Contractors<br>• Contractors<br>• Contractors | establishment of MF etc,<br>• MF established before construction phase commences.<br>• Code of Conduct drafted before construction phase commences.<br>• Briefing session for construction workers held before they commence work on site. |

| | | |
|---|---|---|
| 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;<br>• 80 % of semi and unskilled labour locally sourced where possible;<br>• Construction workers employed have proof that they have lived in the area for five years or longer;<br>• MF set up prior to implementation of construction phase;<br>• Code of Conduct drafted before commencement of construction phase;<br>• Briefing session with construction workers held at outset of construction phase; |
| Monitoring | • REI 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;<br>• Establish a MF with the adjacent farmers and develop a Code of Conduct for construction workers.<br>• Inform all workers of the | • REI and contractors<br>• REI<br>• REI and | • Establish MF before construction phase commences.<br>• Develop Code of Conduct prior to commencement of construction phase. The Code of Conduct should be signed by REI and the contractors before the contractors move |

| | | |
|---|---|---|
| conditions contained in the Code of Conduct.<br>• 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.<br>• Compensate farmers / community members at full market related replacement cost for any losses, such as livestock, damage to infrastructure etc. | contractor<br>• Contractors<br>• Contractors | onto site;<br>• Inform all construction workers of Code of Conduct requirements before construction phase commences.<br>• Compensate Farmers / community members within 1 month of claim being verified by REI and or Contractor/s. |

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

## Increase risk of grass 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 | Grass 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 grass fires. |
| Mitigation: Target/Objective | To avoid and or minimise the potential risk of grass 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 designated areas.<br>• Provide adequate fire fighting equipment onsite.<br>• Provide fire-fighting training to selected construction | • REI and contractors<br>• REI and contractors<br>• Contractors | • Ensure that these conditions are included in the Construction Phase EMP.<br>• Ensure that designated areas for fires are identified on site at the outset of the construction phase.<br>• Ensure that fire fighting |

| | | |
|---|---|---|
| staff.<br>• Compensate farmers / community members at full market related replacement cost for any losses, such as livestock, damage to infrastructure etc. | • Contractors | equipment and training is provided before the construction phase commences.<br>• Compensate Farmers within 1 month of claim being verified by MF. |
| Performance Indicator | • Conditions contained in the Construction EMP.<br>• Designated areas for fires identified on site at the outset of the construction phase.<br>• Fire fighting equipment and training provided before the construction phase commences.<br>• Compensation claims settled within 1 month of claim being verified by Community MF. | |
| Monitoring | • REI 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.<br>• Ensure that dust suppression measures are implemented for all heavy vehicles that require such measures during the construction phase commences. |
| • Ensure that all vehicles are road-worthy, drivers are qualified and are made aware of the potential noise, dust and safety issues; | • Contractors | • Ensure that drivers are made aware of the potential safety issues and enforcement of strict speed limits when they are employed. |
| • Ensure that drivers adhere | • Contractors | |

| | | |
|---|---|---|
| to speed limits. Vehicles should be fitted with recorders to record when vehicles exceed the speed limit;<br>• Ensure that damage to roads is repaired before completion of construction phase. | • Contractors | • Fit all heavy vehicles with speed monitors before they are used in the construction phase.<br>• Assess road worthy status of heavy vehicles at the outset of the construction phase and on a monthly basis thereafter;<br>• Ensure that damage to roads is repaired before completion of construction phase. |

| | |
|---|---|
| Performance Indicator | • Conditions included in the Construction Phase EMP.<br>• Dust suppression measures implemented for all heavy vehicles that require such measures during the construction phase commences.<br>• Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed.<br>• All heavy vehicles equipped with speed monitors before they are used in the construction phase.<br>• Road worthy certificates in place for all heavy vehicles at outset of construction phase and up-dated on a monthly basis. |
| Monitoring | • REI 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.<br>• Rehabilitate disturbed areas on completion of the construction phase. Details | • Savannah Environmental and REI<br>• ECO and Contractors | • Footprint for wind energy facility should be defined in the Construction EMP before construction phase commences.<br>• Rehabilitation should be on- |

| | | |
|---|---|---|
| of the rehabilitation programme should be contained in the EMP.<br>• 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. | • REI | going and completed within 3 months of the completion of the construction phase.<br>• 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.<br>• 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 20-25 full time employment opportunities. | | |
| Mitigation: Target/Objective | In the medium to long term employ as many locals as possible to fill the 20-25 full time employment opportunities. | | |
| Mitigation: Action/control | | Responsibility | Timeframe |
| • The entire workforce of permanent staff will be based in local towns such as Humansdorp.<br>• REI 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.<br>• Identify local members of the community who are suitably qualified or who have the potential to be employed full time. | | • REI<br><br>• REI | • Develop 5 year training and skills development programme during the construction phase;<br>• 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;<br>• Potential locals identified before construction phase completed. | | |
| Monitoring | • REI 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.**

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| 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 (20-25) 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. | • REI | • When wind energy facility is decommissioned. |
| Performance Indicator | • South African Labour legislation relevant at the time. | | |
| Monitoring | • REI and Department of Labour. | | |