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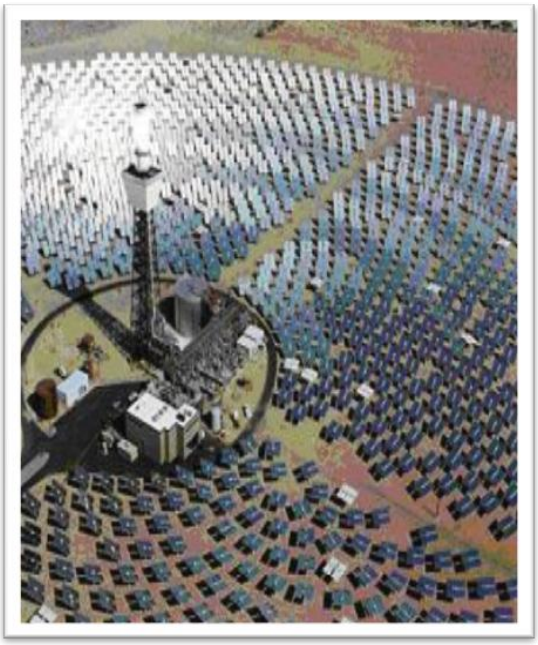
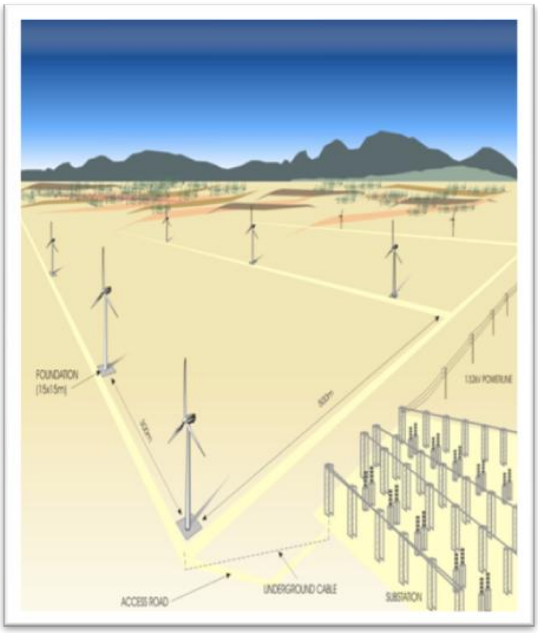
AFRICAN DEVELOPMENT BANK GROUP

ESKOM RENEWABLE ENERGY INVESTMENT PROJECT

South Africa





ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

SUMMARY

Energy, Environment and Climate Change Department

July 2010

TABLE OF CONTENTS

Project name	:	**ESKOM RENEWABLE ENERGY INVESTMENT PROJECT**
Country	:	South Africa
Project number	:	P-ZA-F000-002

1. INTRDUCTION

1.1 African Development Bank support to South Africa's energy sector will enable the continued development of legal and regulatory frameworks as well as enhance development of local and regional renewable energy sources through a financially sustainable Eskom that could contribute significantly to improving the country's energy mix over the medium to long term. The project will thus help increase generation capacity using available resources, at the same time help further the foundations for a low-carbon growth trajectory, and help achieve national and sub-regional development objectives. The project will thus ensure that South Africa's success to date in leading the sub-regional leadership in support of a low carbon and pro-poor energy sector is not derailed. Further as a leader on the continent, South Africa would help demonstrate large-scale renewable generation, thus driving the renewable industry and the private sector towards future investment on the continent.

1.2 The proposed project will consist of investments in renewable energy. Component 1 will include the 100 MW Wind Power Project (know as Sere) whilst Component 2 includes the 100 MW (greater than 20MW) Upington Concentrating Solar Power (CSP) Project. The Wind Power Project Plant is proposed to comprise a cluster of up to 100 wind turbines (typically described as a wind energy facility) to be constructed on an area covering approximately 16 km^2 in extent, off-set at a distance of 2 km from the coastline. The CSP plant is being developed on a demonstration basis and if successful, will demonstrate South Africa's role as leading the low carbon energy agenda for the sub region, with scale-up potential in SAPP countries, including Botswana and Namibia (with an estimated potential of over 20 GW).

1.3 The nature and extent of this facility, as well as potential environmental impacts associated with the construction of facilities of this nature is explored in more detail in the full Environmental Social Impact Assessment (ESIA) Reports for the two projects. The project site is located in sparsely occupied semi-arid or arid landscapes that are predominantly used for grazing sheep or cattle.

1.4 Eskom has completed the acquisition of 16 km2 of land needed for the Sere Wind Power Project. The land is being purchased from three farm owners on a willing buyer-willing seller basis. No resettlement will result from the development of the wind farm or acquisition of the right-of-way for its 132 kV transmission line. Eskom Holdings Limited (Eskom) proposes to

establish a commercial wind energy facility on a site in the Western Cape Province. Eskom is also currently negotiating the purchase of land from a single landowner for the CSP plant site near Upington. The CSP plant will occupy approximately 4 km^2 of the acquired farm, and the right-of-way for the 132 kV transmission line to connect to the grid is located on the same farm property. There will be no resettlement, and farming activities (cattle grazing) could continue on the remainder of the farm.

2. PROJECT DESCRPTION AND JUSTFICATION

2.1 PROJECT DESCRIPTION

The Project Development Objective (PDO) is to enable Eskom Holdings to enhance power supply and energy security in an efficient and sustainable manner to support the long-term carbon mitigation strategy of South Africa.

2.2 PROJECT COMPONENTS

2.2.1 The proposed project will consist of investments in renewable energy. Component 1 will include the 100 MW Sere Wind Power Project whilst Component 2 includes the 100 MW Upington Concentrating Solar Power Project.

2.2.2 Component 1: Wind is a commercially mature renewable energy technology but at present, there is no significant electricity generated by wind in South Africa. The Western Cape Province Wind Energy Facility to be located approximately 300 km north of Cape Town near the town of Skaapvlei, has the potential to accommodate up to 200 MW of wind capacity. A priority activity for this subsector is development of Phase I of this wind site – the Sere Wind Power Project, consisting of a 100 MW wind farm comprising forty to fifty 2.0 to 2.5 MW (Class 2A) wind turbines. The project is fully scoped and specified. The site has a "moderate" wind resource; based on measurements completed to date at the site, it is expected that the plant will have a load factor of 24.7 percent under a P-90 exceedance scenario. The site is near about 40-kms from the existing 132-kV sub-transmission line.

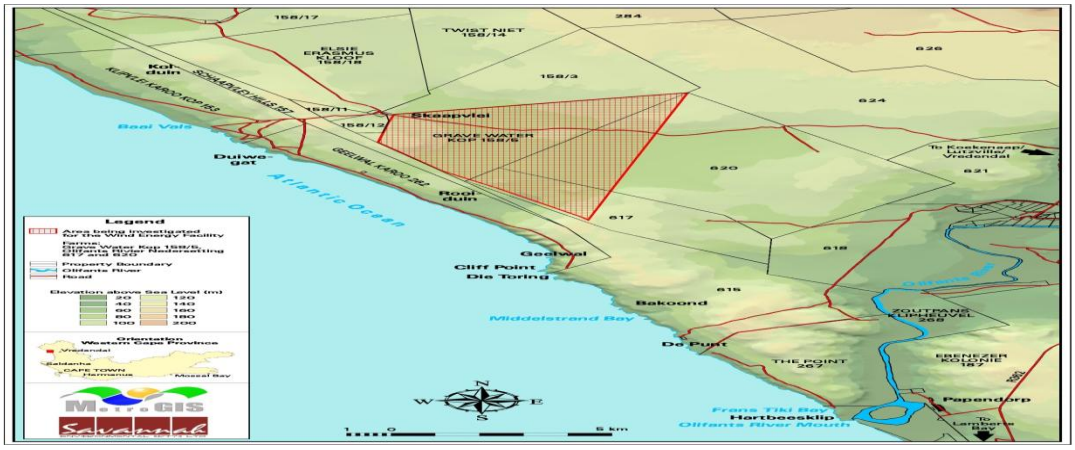


Figure 2.1: Locality map showing the 37 km^2 study area for the establishment of a wind energy facility on the West Coast north of the Olifants River.

2.2.3 Component 2: CSP is the renewable energy source with the largest potential in South Africa. Grid-connected solar thermal power can provide large volumes of firm generation capacity, comparable to what is currently provided by coal-fired power plants. However, in addition to being more costly, the initial CSP plants will have higher risk than coal-fired power plant. The Upington Concentrating Solar Power plant is a tower and mirror design configured to operate as a base load or mid merit unit. Utilizing molten salt as a thermal circulating fluid and storage medium would allow the plant to achieve a 60-65 percent annual load factor with a rated capacity of 100 MWe. Phase 1 of the project will involve a technology assessment study. This is a detailed study assessing the recent developments in CSP technologies. This is due to the vast improvements in the CSP technology, its performance, improvements in the various sub-systems and reduction in risks in implementing the technologies or power plants. The aim of the study will be to assess the possibility of other plant configurations based on these improvements and the site data (Upington solar and wind data, water, etc). The study will be conducted by an independent consultant. The study will be used to finalize the performance specifications of the plant.

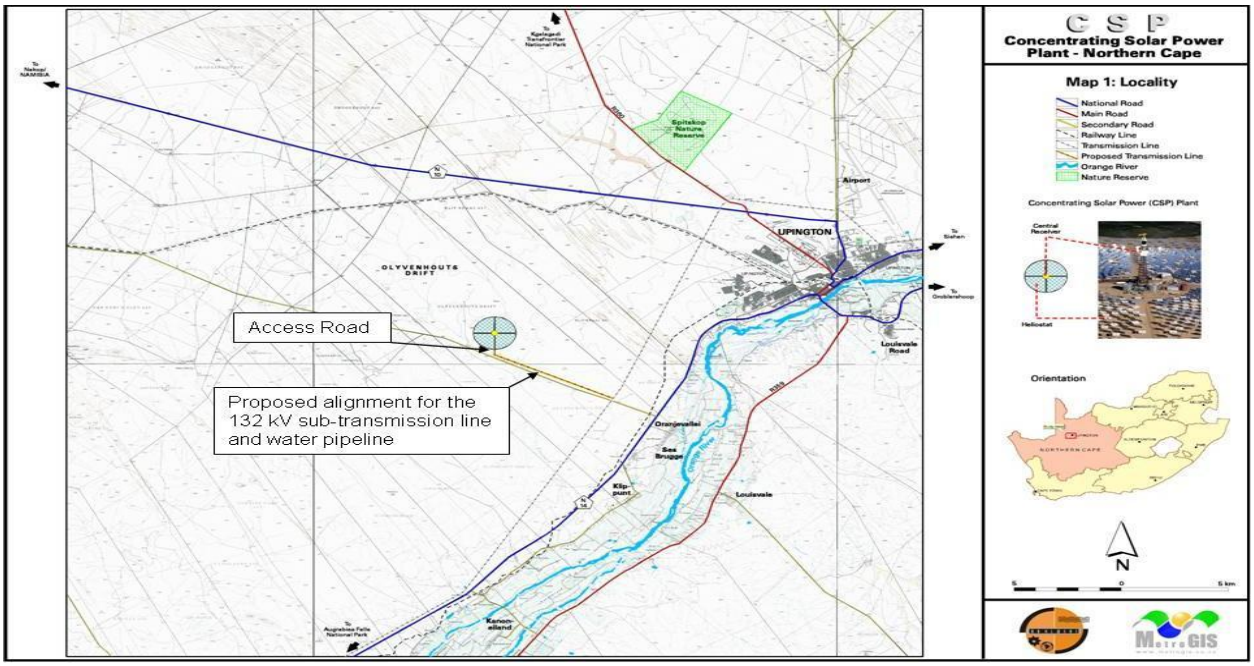


Figure 2.2: A map indicating the location of the CSP Plant on the nominated preferred site (Farm Olyvenhouts Drift) also is showing the additional infrastructure.

2.3 JUSTIFICATION OF THE PROJECT

2.3.1 Internationally, there is an increase in the deployment of renewable energy technologies for the generation of electricity due to concerns such as climate change and exploitation of non-renewable resources. The South African Government has set a 10-year target for renewable energy of 10 000 GWh renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro. This is amounts to approximately "'4% (1 667 MW) of the total estimated electricity demand (41 539 MW) by 2013. In order to assist Government in meeting its target, Eskom is investigating potential renewable energy projects, which include a Concentrating Solar Thermal project in the Northern Cape, as well as the proposed Wind Energy Facility in the Western Cape.

2.3.2 In responding to the growing electricity demand within South Africa, the need for diversifying Eskom's energy mix, as well as meeting the country's targets for renewable energy, Eskom has undertaken initiatives to establish renewable forms of electricity generation capacity. Eskom embarked upon a research programme to investigate South Africa's sources of renewable energy, and identify appropriate alternative solutions to meet the electricity needs of the country. Through this research, the viability of a wind energy facility was investigated, and the potential to establish a wind energy facility at a site along the West Coast within the Western Cape was identified.

3. POLICY LEGAL AND ADMINISTRATIVE FRAMEWORK

3.1 This section outlines the legal and regulatory framework, which is relevant to the proposed development of the 100MW Wind Farm Project. The legal and regulatory framework provides the various legal aspects that must be adhered to at project design, implementation and later when it is decommissioned and during operation. The following are selected laws governing environmental and social issues of the project:

3.2 NATIONAL LAWS INCLUDE:

3.2.1 The following legislation and guidelines have informed the scope and content of this EIA Report:

- National Environmental Management Act (NEMA; Act No 107 of 1998) » EIA Regulations, published under Chapter 5 of the NEMA (GN R38S, GN R386 and GN R387 in Government Gazette 28753 of 21 April 2006) » Guidelines published in terms of the NEMA EIA Regulations, in particular: >I> Guideline 3: General
- Guide to Environmental Impact Assessment Regulations, 2006 (DEAT, June 2006)

- Guideline 4: Public Participation in support of the Environmental Impact Assessment Regulations, 2006 (DEAT, May 2006)
- Guideline 5: Assessment of alternatives and impacts in support of the Environmental Impact Assessment Regulations, 2006 (DEAT, June 2006)
- Guideline on Public Participation, 2006 (DEA&DP, July 2006)
- Guideline on Alternatives, 2006 (DEA&DP, July 2006) Approach to undertaking the EIA Phase Page 43
- Guideline document developed by DEA&DP entitled Strategic Initiative to Introduce Commercial Land Based Wind Energy Development to the Western Cape -Towards a Regional Methodology for Wind Energy Site Selection (Western Cape Provincial Government, May 2006).
- Specialist study guidelines published by DEA&DP, in particular: ... Strategic initiative to introduce commercial land-based wind energy development to the Western Cape (specifically Reports 5 and 6).
- Guideline for determining the scope of specialist involvement in EIA processes (June 2005) ... Guideline for involving visual and aesthetic specialists in EIA processes (June 2005) .
- Guideline for involving biodiversity specialists in EIA processes (June 2005) ... Fynbos Forum Ecosystem Guidelines for environmental assessment in the
- Western Cape (2005) Guideline for involving heritage specialists in EIA processes (June 2005)
- Guideline for involving hydrogeologists in EIA processes (June 2005) .. Guideline for Environmental Management Plans (June 2005)
- Guideline for involving social assessment specialists in EIA processes (February 2007)
- Guideline on public participation: NEMA Environmental Impact Assessment Regulations (September 2007)

3.3 African Development Bank's Guidelines

3.3.1 As per the Environmental and Social Assessment Procedures (ESAP) of AfDB, the proposed project is classified as Category 1. The following AfDB Standards are applicable:

- Environmental and Social Assessment Procedures

- Policy on Involuntary Resettlement
- Gender Policy
- Policy on Information Disclosure
- Policy on Consultation with Civil Society.

In addition, the ESIA was elaborated in compliance with the World Bank guidelines:

- Environmental Assessment (OP 4.01, BP 4.01, GP 4.01)
- Natural Habitats (OP 4.04, BP 4.04, GP 4.04)
- Forest (OP 4.36, GP 4.36)

4. DESCRIPTION OF THE PROJECT ENVIRONMENT

4.1 This chapter of the EIA summary provides a description of the environment that may be affected by the Wind Energy Facility proposed on a site to the north of the Olifants River on the West Coast of the Western Cape Province and the CSP plant to be constructed in the Northern Cape Province. The CSP plant is intended to operate at an installed capacity of up to 100 MW electrical. The exact output will depend on the specification of the equipment installed and the ambient operating conditions. Phase 1 of the project will involve a technology assessment study. This is a detailed study assessing the recent developments in CSP technologies. This is due to the vast improvements in the CSP technology, its performance, improvements in the various sub-systems and reduction in risks in implementing the technologies or power plants. The aim of the study will be to assess the possibility of other plant configurations based on these improvements and the site data (Upington solar and wind data, water, etc). The study will be conducted by an independent consultant. The study will be used to finalize the performance specifications of the plant.

4.2 This information is provided in order to assist the reader in understanding the possible effects of the proposed project on the environment. Aspects of the biophysical, social and economic environment that could directly or indirectly be affected by, or could affect the proposed development have been described. This information has been sourced from both existing information available for the area and proposed development site as well as collected field data, and aims to provide the context within which the environmental assessment has been conducted. A more detailed description of each aspect of the affected environment is included within the specialist scoping reports contained within Appendices G –Q and is available in http://www.eskom.co.za/live/content.php?Item_ID=5672.

4.3 Wind Energy Facility Development Component

4.3.1 Climatic Conditions

4.3.1.1 The West Coast area is characterized by a semi-arid Mediterranean climate with maximum temperatures ranging from 20°C -30°C, depending on the season. Extreme temperatures can be extremely harsh, with summer temperatures often exceeding 40°C. The climate is strongly influenced by the cold Benguela current and coastal berg wind conditions. Rainfall is between 100 mm to 200 mm per annum, with the majority of the precipitation occurring during the winter months. The rainfall is supplemented by coastal fog, which often occurs in the area during winter.

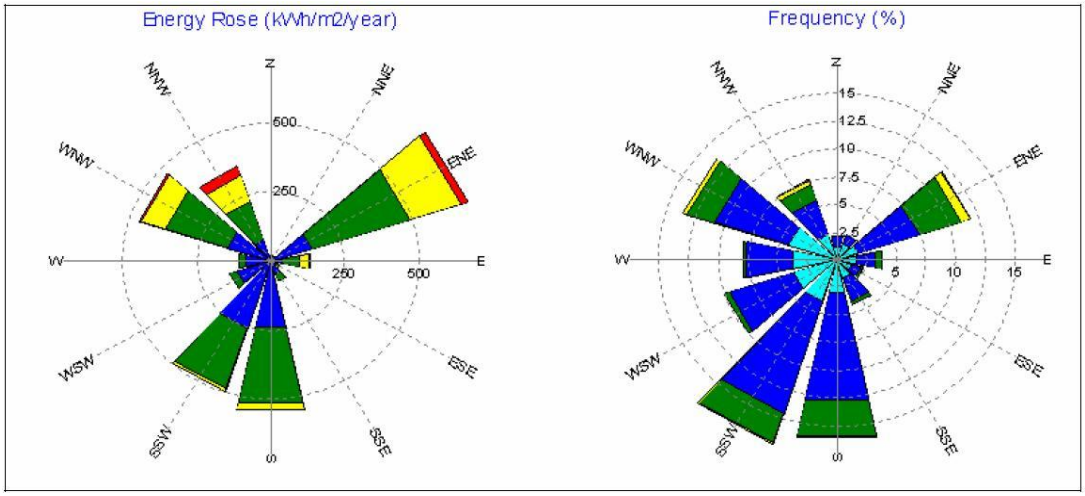


Figure 4.2: Wind Rose from measured data at the Eskom meteorological station at De Punt, indicating both wind energy as well as frequency of wind direction (% of time in a direction)

4.3.1.2. The prevailing winds are predominantly from the south west during summer (onshore wind) and from the north east during winter (berg wind). The desiccating, hot, north-easterly 'berg winds' occur throughout the year. The cold ocean and warmer land ma!!!s results in typical daily cycle of offshore breezes at night and onshore winds increasing in strength during the day.

4.3.2 Topography

4.3.2.1 The topography of the broader study area is described as undulating plains with the coastline (or coastal forelands) to the west characterised by steep cliff faces (refer to Figure 6.5). Two major river valleys occur within the region, these being the Olifants River south of the site and the Klein Goerap River approximately 40 km north of the site. Moving inland the terrain becomes moreundulating and hilly, and is characterized by hills and low mountains east of the R363.

4.3.2.2 The region is characterized by a surface cover comprising primarily of red aeolian sand of Tertiary to Quaternary age, overlying granite and gneiss of the Namaqualand Metamorphic Complex. These wind-blown sands frequently form low relief, mobile bedforms that are blown over underlying harder calcareous soils. The dunes are able to form up and down the slopes of hills and valleys to reveal micro 'climbing falling' dune morphologies.

4.3.3 Regional Setting The broader study area is an arid, sparsely populated area with less than 10 people per km2 mostly concentrated within the small towns of the area. Large tracts of land within the study area are still in an untransformed state with varying degrees of degradation.

4.3.4 Flora and Fauna

4.3.4.1 Natural wildlife is common on the site, but species diversity is low -small and medium bovids (springbok, steenbok and duiker), small carnivores (meerkat and aardwolf) along with numerous rodents, birds and reptiles were observed during the course of this study. The presence of faunal species is dictated. by the habitats present on and adjacent to the development site, and includes Namaqualand Strandveld, Sand Fynbos, permanent, seasonal and ephemeral pans, cultivated lands (including the old cultivated areas located on the farm Skaapvlei, and existing lands adjacent to the Olifants River and tributaries), and alien trees (mostly eucalypts and acacias in areas crossed by the proposed power line route),

4.3.5 Ecological Profile

4.3.5.1 The site proposed for the development of the wind energy facility and associated power line falls within the Namaqualand coastal region of the Cape Floristic Region, and includes two biomes, i.e. the Fynbos biome, and the Succulent Karoo biome (Mucina & Rutherford 2006). These vegetation types are, due to the arid nature of this region, not very dense or tall in growth but rather scattered and low and represent a typical semi-desert environment. The Succulent Karoo is the only arid region recognised as a world biodiversity hotspot (Mittermeier et al., 2000).

4.3.5.2 More than 90% of the Succulent .Karoo is used as natural grazing, a form of land use that is, at least in theory, not incompatible with the maintenance of biodiversity and ecosystem processes (Desmet, 1999). However, much of the remaining natural habitat is vulnerable to a wide range of other threats.

4.3.5.3 Namaqualand Strand veld is an extremely widespread vegetation type, especially in the context of the Cape Floristic Region, of which it is a part. This vegetation type extends from the Doringbaai area, some 20 km south of the Olifants River mouth, up the west coast for about 300 km, to the Hondeklipbaai area, and is therefore formally part of the Succulent Karoo biome. The vegetation type typically occurs in a band from 1 to 30 km inland, on deep sands, which are often

grey, red, brown or orange. This vegetation type is regarded as a Least Threatened vegetation type in terms of the National Spatial Biodiversity Assessment (NSBA; Rouget et a/2004), with 92% of its original extent still intact. Significant habitat losses within this vegetation type have occurred in the recent past as a result of various mining activities along the west coast. Furthermore, Namaqualand Strandveld is significantly under-conserved in formal conservation areas, with less than 1% of the national target of 26% under some sort of conservation management, and it is therefore vulnerable to future transformation. A portion of this vegetation type will be protected within the proposed expansion of the Namaqua National Park in the area between the Groen and the Spoeg rivers.

4.3.6 Social Profile

The project site and surrounds are sparsely populated. Human-made environment is limited to occasional wind pumps, fenced stock camps and off-road tracks which are only accessible with a four wheel drive vehicle. Much of the landscape, even within the site is undeveloped, being devoid of paths or tracks and is only accessible on foot. Ambient noise levels recorded in this area are considered to be equal to the acceptable day-and night-time noise rating levels for a rural residential district. The closest farm homesteads or residences that might potentially be impacted upon by the proposed wind energy facility are located at Skaapvlei, Skilpadvlei and Nooitgedag.

- The current operation on the farm Skaapvlei is comprised of a core flock of approximately 650 sheep. The average carrying capacity of Skaapvlei has been formally assessed at 7 hall Standard Stock Unit (SSU) (Hansie Visser, pers. comm). One permanent labourer is associated with the operation. Two farmhouses are associated with Skaapvlei, with only one of the farmhouses permanently occupied. The second house is used as a s~cond home utilised by the landowners. Two families currently reside on the property, one of which is the permanent worker on Skaapvlei. A number of outbuildings including storage facilities for fodder -are also associated with Skaapvlei Farm.

- Skilpadvlei is currently utilised for grazing for approximately 500 sheep. The estimated average carrying capacity is 4 hall SSU in good rainfall years, and 7 hall SSU in dry years. One permanent labourer is associated with operations on Skilpadvlei. One farmhouse and a number of outside buildings are located on Skilpadvlei. One of the buildings is permanently occupied by the labourer and his family.

- Nooitgedag and associated irrigation area smallholdings is currently utilised for sheep grazing. The property is currently being leased to Mr Samuel Agenbach. However, the landowner has indicated that he intends to develop the property for wilderness based tourism purposes in the future. Current activities include farming with a core flock of 600 sheep. The estimated average carrying capacity is 9 hall SSU. Drought fodder for Nooitgedag is sourced from the irrigation area small holdings. One farmhouse is located

on Nooitgedag, but is currently unoccupied. Currently, one permanent and tenured farm worker is associated with Nooitgedag.

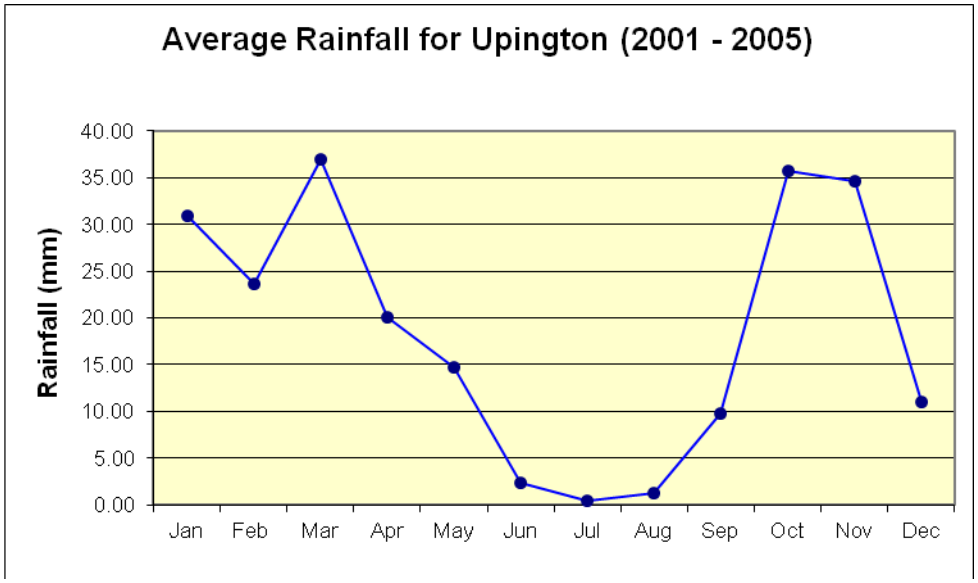
4.4 Concentrating Solar Power (CSP) plant

4.4.1 Locality

The study area is situated within the Siyanda District Municipality, in the Northern Cape Province adjacent to the Orange River. The Siyanda District Municipality is situated to the north of the province and covers an area of 103 771 square kilometres with its borders aligned with Botswana and Namibia.

4.4.2 Climate

The climatic conditions of this region of the Northern Cape are typical of conditions characteristics of semi-desert / arid savannah areas. The area is characterised by fluctuating temperatures, low and unpredictable rainfall and high evaporation rates. The low annual rainfall (average of 170 – 240 mm in Upington or even lower in some surrounding areas) is significantly lower than the evaporation rate. Rainfall usually occurs during the late spring and summer months.



4.4.3 Topography and Landscape

The area is characterized by flat terrain and is, in general, an area of little topographical relief. Isolated hills and mountains can be found in the area. The area surrounding Upington can be described as large sandy plans with windblown sand dunes and low hills breaking the flat relief. The area to the south of Upington becomes more mountainous as one travels to Groblershoop.

4.4.4 Geology and soils

The geology of the area is characterised by the metamorphosed sediments and volcanics, intruded by granites and is known as the Namaqualand Metamorphic Province. The soils are reddish, moderately shallow, sandy and often overlay layers of calcrete of varying depths and thickness. The soils are typically weakly structured with low organic content. These soils drain freely, which results in a soil surface susceptible to erosion, especially wind erosion when the vegetation cover is sparse.

4.4.5 Social Environment

The study area is situated within the Siyanda District Municipality (DC8) which is one of the 5 District Municipalities located in the Northern Cape Province. Siyanda District Municipality (DC8) is situated to the north of the province and covers an area of 103 771 square kilometres with its borders aligned with Botswana and Namibia. This district municipality consists of 6 local municipalities. One potential site identified for the construction of CSP plant falls within the area of jurisdiction of the Khara Hais local Municipality (NC083) while the other two potential sites fall within !Kheis Local Municipality (NC084). The !!Khara Hais Local Municipality (NC083) consists of 12 wards and !Kheis Local Municipality (NC084) consists of 4 wards. The preferred site, site 1, is located approximately 15km south west of Upington within Ward 10 of !!Khara Hais Local Municipality. This ward has an area of 1474 square kilometres.

5. PROJECT ALTERNATIVE

5.1 No Project Alternative

The 'do nothing' alternative translates to Eskom not establishing a wind energy facility on the demarcated site within the Western Cape (that is, maintaining the status quo). The following impacts would result:

- The project would not assist Eskom or the South African government in reaching their set targets for renewable energy.

- ❖ The potential to harness and utilize good wind energy resources at the site north of the Olifans River would be lost.
- ❖ The National electricity grid would not benefit from the additional generated power (Eskom propose that up to at least 200 mw can be realized from the proposed facility on the West Coast (based on turbine technology choice).

This is, therefore, not a preferred alternative.

5.2 Technology alternatives

5.2.1 A detailed site layout optimisation/'micro-siting' exercise has been undertaken by Eskom to effectively 'design' the wind energy facility within the proposed development site. The layout of the wind turbines and ancillary infrastructure (including access roads, lay down areas and the substation site) was planned primarily in terms of the wind resource in the area. The overall aim was to maximise electricity production through exposure to the wind resource, while minimising infrastructure, operation and maintenance costs, and social and environmental impacts.

5.2.2 Specialist software was used to assist Eskom in selecting the optimum position (in terms of generating capacity) for each turbine. This micro-siting exercise revealed the best possible positions for the turbines, substation and other infrastructure from a technical perspective. It was proposed that the 100 turbines are constructed in four rows (marked as rows A-D) which lie parallel and equidistant to one another. In order to accommodate site-specific alternative turbine placements on the ground (e.g. in order to avoid or mitigate an area of environmental sensitivity), the "turbine rows" have been considered as 200 m wide "corridors" of disturbance, which provides a degree of flexibility for the placement of infrastructure. Each "corridor" would contain the row of turbines together with other associated infrastructure such as the access road, lay down areas, cabling trench etc, and is sufficiently wide to allow for alternative positioning of the infrastructure within the corridor. This micro-sitting information informed the specialist impact assessments undertaken at the EIA phase. The four "corridors" of disturbance have been considered in detail through the specialist studies and conclusions drawn as to where changes in site-specific footprints may be required in order to avoid potentially sensitive areas.

5.2.3 Dish technology: These systems are highly efficient and modular and can provide higher power levels when multiple units are combined. Small dishes using Stirling engines at the focal point were considered in the study, along with larger dishes producing steam for a central steam turbine. Two dish options were considered.

5.2.4 Trough technology: This is the only solar thermal electric technology that only solar thermal electric technology has seen long-term commercial use. Six different types of trough

systems were considered. The systems vary from commercially available to prototype designs that are currently being developed.

5.2.5 Solar chimney: Solar chimneys have had a number of proponents within South Africa because of their potential for low operation cost and large-scale deployment.

5.2.6 Solar Concentrator Off-Tower (SCOT) technology: The SCOT technology is one of the newest approaches selected for the study. It offers the potential for very-high-efficiency operation.

6. POTENTIAL IMPACTS AND MITIGATION/ENHANCEMENT MEASURES

6.1 This chapter serves to assess the identified potentially significant environmental impacts associated with the proposed site for the development of Eskom Renewable Energy Investment Project and to make recommendations for the management of these impacts.

6.2 The construction activities for Eskom Renewable Energy Investment Project include land clearing for site preparation and access/haul roads; transportation of supply materials and fuels; construction of foundations involving excavations and cement pouring; compaction of laydown areas and roadways, maneuvering and operating cranes for unloading and installation of equipment; laying cabling; and commissioning of new equipment. Decommissioning activities may include removal of the temporary project infrastructure and site rehabilitation. Environmental issues associated with these construction and decommissioning activities may include, among others, threats to biodiversity and ecological processes, including habitat alteration and impacts to wildlife through mortality, injury and disturbance; impacts to sites of heritage value; soil erosion; and nuisance noise from the movement of vehicles transporting equipment and materials during construction.

6.3 Environmental issues specific to the operation of both wind energy and CSP facility include visual impacts; noise produced by the spinning of rotor blades; avian/bat mortality resulting from collisions with blades; and light and illumination issues.

6.4 Beneficial and Adverse Impacts

6.4.1 The proposed Eskom Renewable Energy Investment Project will have the following anticipated impacts:

- The project complements South Africa's energy mix. Worldwide, many solutions and approaches are being developed to reduce environmental pollution and CO2 emissions. It is acknowledged that the more cost effective solution in the short-term is not necessarily the least expensive long-term solution. This holds true not only for direct project cost, but for also indirect project cost such

as impacts on the environment. Renewable energy options follow such a model in that such ventures typically have high capital costs, however, the fuel costs for such a facility are free. This has a net result of a low long-term cost for such a facility, with added benefits of reduced (or zero) environmental pollution. Renewable energy is considered one of the 'clean sources of energy' with the potential to contribute greatly to a more ecologically, socially and economically sustainable future;

- developing a sustainable energy source has vast environmental benefits;
- the proposed project is expected to create a large number of temporary and a limited number of permanent jobs;
- the proposed project could attract businesses to the area to meet the additional infrastructure and support services demands;
- it could establish a desperately needed source of employment for the local communities;
- it will make a contribution to the local municipal tax base;
- it will improve employment equity and occupational opportunities;
- indirect local benefits could accrue to the local communities in the form of donations and financial assistance to the Local Authority to improve the existing infrastructure in the area;
- the proposed project could have regional economic benefits;
- Potential Impact on Vegetation: overall the impact of the proposed wind energy facility on the vegetation on site is likely to have a medium local (Site scale; 3 700 ha site) and low regional (southern Namaqualand coast; < 500 000 hal impact. The primary negative impacts are direct, permanent loss of natural vegetation (30 ha to 70 ha in development footprints, and direct, long-term loss of natural vegetation (30 ha to 70 hal in areas that will be disturbed by heavy construction machinery,
- Potential Impacts on Terrestrial Fauna: A wide range of vertebrate species, including threatened lizard and mammal species, are expected to occur in the general area where development will take place. Of the four faunal habitats identified in the immediate area (i.e., coastal strip, coastal dunes, rock and inland Succulent Karoo vegetation), the wind energy facility will only impact on the inland Succulent Karoo habitat (Namaqualand Strandveld and Namaqualand Sand Fynbos). Due to its extent and homogenous nature, this habitat is the least sensitive of the four habitats, although at least two Red Data reptile and one Red Data mammal species may be associated with it.
- Potential Impacts on Avifauna: Impacts on avifauna associated with the proposed wind energy facility include: disturbance during construction, maintenance and operation disturbance to the presence and distribution of the resident avifauna, and on the movement patterns of birds commuting through the

area as a result of the operating wind energy facility ,habitat destruction collision with the turbines.

- The threat of collision with the turbine blades is probably the most concerning issue, but the real extent of this threat is not currently well understood within the South African context. Unlike more problematic wind energy facilities identified in other parts of the world, the proposed wind energy facility is not positioned overly close to any known avian fly-ways, and does not otherwise impose on a particularly bird-rich environment, so it is unlikely to result in significant numbers of avian casualties through collision with the turbine blades, or cause undue loss of habitat or disturbance to any locally, regionally or nationally important bird populations.
- Potential Impacts on Geomorphology and Surface Processes: In terms of the current wind energy facility layout, one turbine (turbine number 62) and associated access road are possibly located within 50 m of a wetland (Row C), while the access road within Row B of turbines may pass within 50 m of another wetland. However, it would appear that by shifting the turbine and access road (in the case of the former) and the access road (in the case of the latter) at least 20 m and 10 m respectively within the impact corridor, these concerns may be avoided.
- Potential I impact on Soil Erosion: Increased soil erosion is likely to occur in the project area during the road rehabilitation, operations of borrow pits and quarries, construction of the wind park and buildings and installation of turbines.
- **Potential Visual Impact:** The structures of the wind farms will create a visual alteration of the landscape. In the case of the São Vicente site area, the construction of the wind farm will alter the topographic landscape;

- Construction activities and new access roads may interfere with water runoff.

- During construction of the project there will be an increase in traffic in the areas of implementation;

- Potential impacts on endemic gecko species Tarentola caboverdiana substituta if activities are not mitigated. These impacts have been identified as being potential habitat loss, introduction of alien competitors and/or predators and risk to individual animals being crushed by construction activities;

- Possibility impacts on avifauna species if activities are not mitigated. These potential impacts have been identified as being namely disturbance of bird activity due to noise and human presence during construction and collision risk during operation.

6.5 Mitigation/Enhancement Measures

Impact	Mitigation Measure
Potential Impacts on Vegetation	✓ In order to minimize direct impacts on the habitats/vegetation, as much of the the previously cultivated area as possible should be utilized for the placement of infrastructure; ✓ The high local sensitivity area (clay hill) at the western comer of the Site should Ideally not be developed, as this supports an unusual mix of species on heavier clay soils, including at least one Red Data Book listed species *(Leucoptera nodosa).* This is likely to affect the first three turbine positions (turbines 1-3). In terms of best practice, the suggested mitigation is to move the turbines which affect this area (best practice requires avoidance of impacts). Where total avoidance of the sensitive area is not feasible, a suitably qualified botanist should be contracted to position the turbines and infrastructure in this area with the least impact possible, and to plan a Search & Rescue program for any plants of concern that can be translocated;Roads should be kept to a minimum (as per draft layouts presented, with only one or two links between turbine rows) in order to limit direct vegetation loss and habitat fragmentation (Indirect impact). ✓ Following construction, rehabilitation of all areas disturbed during the construction phase and that are not required for regular maintenance operations must be undertaken. The main areas thus requiring rehabilitation will be parts of the laydown areas next to the turbines, the crane tracks alongside the permanent 6m roads, any cable routings where these fall outside the above-mentioned areas, and disturbed areas around the planned visitor centre and substation.
Potential Impacts on Terrestrial Fauna	✓ Removal of animals from the affected areas before the start of site clearing/construction and relocating these to safe areas would only be a valid mitigation option in the case of tortoises. All other reptile and small mammal species are extremely difficult to catch and it would be a futile attempt to try to relocate them. Before site clearing, affected areas should be thoroughly searched for tortoises and market colonies. Tortoises found must be released in adjacent unaffected areas. Meerkat colonies in affected areas should be dug up manually, affording the animals a fair chance to escape before heavy machinery is brought into the areas to clear the site or excavate.

Potential Impacts on Avifauna	✓ In order to minimise impacts on bird species which may have active nests oln the immediate vicinity of the construction area, It may be necessary to (a) survey the construction area immediately before work commences, and (b) to work around any such nest sites located in this pre-construction survey. » Should any Important nest sites be located close to WEF in the pre-construction monitoring of the site, these should be given special consideration in the planning of all routine maintenance activities. » The collection of quantitative Information on the densities of key reSident bird species in the area of the proposed wind energy facility will form a vital part of the survey and monitOring programme in order to determine potential disturbance Impacts on these species. ✓ Minimize the development footprint and to rehabilitate the damaged vegetation to minimize the habitat losses to resident priority bird species. ✓ Any significant Impacts of the wind energy facility on priority bird populations be detected by the monitoring scheme, required mitigation could include: » Painting the blades of selected, problem turbines. » Temporarily (at certain times and/or in certain weather conditions) or even permanently shutting down selected, problem turbines. ✓ The specific sites of each of the turbines, and those allocated to the auxiliary structures of the wind energy facility, should be Inspected Immediately pre-construction as part of the monitoring programme to ensure that no critical avian microhabitats are affected.
Potential Impacts on Geomorphology and Surface Processes (Increased runoff relative to the pre-disturbed state as a result of sealed surfaces roads, roofs)	✓ Use existing roads wherever possible; ✓ Ensure new roads have culverts placed in topographic lows; ✓ Avoid all pans and drainage lines and associated SO m buffer zones, wherever possible for the siting of Infrastructure, even if of a temporary nature.
Potential Visual Impacts	✓ The primary visual impact, namely the appearance and dimensions of the wind energy facility (mainly the wind turbines) is not possible to mitigate. The functional design of the structures and the dimensions of the facility cannot be changed in order to reduce visual impacts. ✓ Alternative colour schemes (i.e. painting the turbines sky-blue, grey or darker shades of white) are not permissible as the CANs Marking of Obstacles expressly states, "Wind turbines shall be painted bright white to provide the maximum daytime conspicuousness". Failure to adhere to the prescribed colour specifications will result in the fitting of supplementary daytime lighting to the wind turbines, once again aggravating the visual impact. The potential for mitigation is therefore low or non-existent.

	✓ The mitigation of secondary visual impacts, such as security and functional lighting, may be possible and should be implemented and maintained on an on-going basis.
Potential Noise Impacts	✓ Determine of whether time or other constraints would need to be stipulated with regard to all construction related vehicular traffic along the Skaapvlei access road. ✓ Monitoring of any limitations/constraints that might be imposed. ✓ The introduction of a low noise road surface along the section of Skaapvlei Road passing the smallholding community Is recommended In order to reduce the Impact.
Potential Impacts associated with Transportation, Access Infrastructure	✓ The additional construction traffic has the potential to lead to premature failure of the access roads, both surfaced and gravel, between the source and the site; ✓ The gravel roads may need regular grading to smooth out the surface, but may need to be re-gravelled after completion of the project to ensure a good driving surface. Any consideration of formallslng the DR2225 road to an asphalt surface would require further investigation and a detailed pavement design (in agreement with the provincial road department); ✓ Re-using materials from old mine tailings should be investigated since the material has already been disturbed and could be re-cycled for use in the project. The haul route will be to the west of the site and the Impact on the external road network will be greatly reduced.
Potential Impacts on the Social Environment	✓ Eskom should establish a liaison committee made up of representatives from Eskom, the contractors and adjacent landowners to devise a code of conduct for workers to address conflicts that may arise. ✓ Eskom should compensate farmers in full for any stock losses and or damage to farm infrastructure that can be positively linked/proven to be linked to construction workers. Thl~ should be contained In the agreement of good conduct to be signed between Eskom and the adjacent and neighbouring landowners. Eskom should ensure that all construction workers are appropriately informed of the consequences of stock theft, Illegal hunting and trespassing on adjacent farms at the outset of the construction phase. ✓ Construction workers found guilty of stealing livestock, illegal hunting and or damaging farm infrastructure should be dismissed and charged. ✓ No open fires for cooking or heating should be allowed on the site during the construction phase. ✓ Firefighting equipment should be provided on site for fighting veld fires and other fires that may develop on site. Fire fighting training should be provided to selected construction staff at the outset of the construction phase.

7. ENVIRONMENTAL HAZARD MANAGEMENT

Eskom implemented a behavior-based safety observation tool and senior leadership training aimed at strategic and operational aspects of effectively managing safety. Increased leadership commitment was demonstrated through national and regional work stoppages to reinforce the importance of safety, in particular in high-risk activities. Eskom has established divisional contractor for, partnering with contractors to address safety, health and environmental concerns. In addition, Eskom engaged the services of an international specialist on a three-year contract to evaluate electrical safety as well as a behavioral safety program. Changes were made to the Eskom electrical training material to incorporate some of the recommendations made. With respect to community safety, campaigns to improve public awareness were rolled out in various media, included school visits, and the handout of safety materials.

8. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

8.1 The ESMP addresses key environmental issues identified in the ESISA in terms of the applicable regulatory framework and ROD conditions, by making provision for corresponding actions:

- Visual impacts: minimize visibility of the power station and the contrast with surrounding environment, through careful planning and placement of lighting, lighting shields and limited removal of natural vegetation;
- Removal of animals from the affected areas before the start of site clearing/construction and relocating these to safe areas would only be a valid mitigation option in the case of tortoises. All other reptile and small mammal species are extremely difficult to catch and it would be a futile attempt to try and relocate them. Before site clearing, affected areas should be thoroughly searched for tortoises and market colonies. Tortoises found must be released in adjacent unaffected areas. Meerkat colonies in affected areas should be dug up manually, affording the animals a fair chance to escape before heavy machinery is brought into the areas to clear the site or excavate.
- In order to minimise impacts on bird species, which may have active nests on the immediate vicinity of the construction area, It may be necessary to (a) survey the construction area immediately before work commences, and (b) to work around any such nest sites located in this pre-construction survey. » Should any Important nest sites be located close to WEF in the pre-construction monitoring of the site, these should be given special consideration in the planning of all routine maintenance activities. » The collection of quantitative Information on the densities of key resident bird species in the area of the proposed wind energy facility will form a vital part of the survey and monitoring programme in order to determine potential disturbance Impacts on these species.
- The primary visual impact, namely the appearance and dimensions of the wind energy facility (mainly the wind turbines) is not possible to mitigate. The functional design of

the structures and the dimensions of the facility cannot be changed in order to reduce visual impacts.

- Noise impacts: ensure that all necessary acoustic designs are installed and maintained such that the overall generated noise level from the installation does not exceed 70dBA at the property boundary;
- Social impacts: maintain communication and consultation with community arrangements through operational phase of project through maintenance of up-to-date register of neighboring property owners; ensure that neighboring owners have accurate contact numbers at the plant; and make an emergency plan of action with neighboring community and relevant authorities in case of an emergency such as a veld fire, oil spill or water contamination.

8.2 The ESMP sets forth institutional arrangements with the objective of establishing clear reporting, communication, responsibilities for environment and safety, the requirements for training of personnel in appropriate levels of awareness and competence; a program on monitoring and performance measurement and for inspection, documentation and reporting. The critical positions include: a Generation Environmental Manager with overall responsibility for plant environmental performance; a Power Station Manager with responsibility for assembling an EMS management team and ensuring that adequate human, financial, and technical resources are made available, conducting periodic reviews of EMS effectiveness and taking appropriate action as a result of findings and recommendations of management review and audits; and a Safety and Health Environmental Officer charged with implementation of the EMS. The ESMP also provides for the establishment of an Environmental Committee with quarterly meetings and a Safety and Health Environmental Committee to meet every two months.

8.3 The budget that has been allocated for both the WEF and CSP project including for the servitude is R35.36M million. This will cover purchase of land and servitude as well as all cost related compensation including relocation of cattle and ESMP implementation.

9. PUBLIC CONSULTATIONS AND DISCLOSURE

9.1 The aim of public consultation and disclosure is to provide feedback of the findings of the environmental impact assessment studies undertaken, and to invite comment on the proposed project. The draft Environmental Impact Assessment Report was made available for review and comment by Interested and Affected Parties (I&APs) and stakeholders were informed about the projects and consulted at various stages of the EIA process. During the Scoping Phase public participation was comprehensive and included advertising in national, regional, and local newspapers, subsequent notifications in regional and local newspapers, and the dissemination of a nontechnical Background Information Document (BID) in English, Afrikaans, and local languages, which was updated on various occasions to take account of the evolution of the

project. All interested and affected parties are invited to attend the public meeting held on Thursday, 24 January 2008 at the Lutzville Sports & Rugby Club (Open House 18hOO -19hOO, Public Meeting at 19hOO) and/or the stakeholder meeting on Friday, 25 January 2008 at the Koeberg Visitor's Centre, Cape Town (at 09h30).

9.2 The public consultation takes place at the following public places in the project area from 07 January 2008 to 07 February 2008.

Town	Venue
Vredendal	Vredendal Library Matzlkama Municipality
	Department of Agriculture & Land Care
Lutzville	Lutzvllle Municipal Office *I* Library
	Lutzville Farmers Association
Vanrhynsdorp	Cape Nature Offices
Ebenhaeser	Post office *I* Library
Strandfonteln	Municipal Office
Doringbaai	Library
Moorreesburg	West Coast District Municipality offices

- The report was also made available on:
  - www.eskom.co.za/eia
  - www.savannahSA.com

9.3 In terms of the CSP Plant, as part of the Environmental Social Impact Assessment (ESIA) and public participation process, the draft Environmental Impact Report was made available for public review from 8 February 2007 to Friday, 9 March 2007 at the following public places:

- Kheis Public Library (No 97 Oranje Street, Groblershoop)
- Kheis Municipal Offices (No 97 Oranje Street, Groblershoop.
- Karstens Boerdery (Karstens Farms, Kanoneiland)
- Agrimark (Water Affairs Offices, Louisevale Road, Upington)
- Upington Magistrate Office (Weideman Street, Upington)
- Khara Hais Municipal Offices (Market Street, Civic Center)
- Forum Public Library (Keimoes Weg, Upington)
- Baballelo Public Library (King Street, Upington)
- Khara Hais Public Library (Market Street, Next to Civic Center)
- Koeberg Visitors Centre (R27 off West Coast Road, Duynefontein, Melkbostrand)

- The report was also made available on:

  - **www.eskom.co.za/eia**
  - **www.bohlweki.co.za**

10. COMPLEMENTARY INITIATIVES

10.1 Gender Labor Division

The project is not expected to cause any major negative impacts on either women or men both during construction and during implementation. Since the power generated will feed into the national grid, projects benefits should be seen in a national context. Increased power supply will, therefore have positive impacts on gender empowerment at the national and local levels. Nationally, the regular supply of affordable electricity will benefit households, schools, health service facilities and income generating activities. Reliable electricity supply will enable the growth of industries, which mostly employ women such as textile manufacturing, food processing, etc. At the local level, the project will provide employment for women from project area during its operation phase, mostly in the areas of administration and general management, cleaning and catering.

10.2 Positive impacts on the tourism economy of the area

Positive economic spin-offs for the area relate mainly to the wind energy facility becoming a tourism drawcard due to the substantial scale of the development and the general awareness of global warming, the importance of renewable energy and the need for Eskom to keep up with the growing electricity demand.

10.3 Creation of employment and business opportunities (construction phase)

The construction phase for phase 1 (50 turbines) is expected to last approximately 12 months. During this period, the project will create a number of employment and business opportunities associated with the construction of the components of the wind turbines, the transport of the various components of the wind turbines to the site, the preparation of the site for establishment of the turbines and the actual process of establishing the wind turbines on-site. In addition, employment and business opportunities will be created by the required upgrading of Skaapvlei Road and the installation of a 132 kV power line from the site to Juno Substation. The potential exists for local companies to either partnership or subcontract with the selected wind turbine supplier to create further job opportunities.

10.4 Promotion of clean, renewable energy (operational phase)

10.4.1 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 recently been identified as the world's second largest producer carbon emissions (Cape Times, 15 November 2007).

10.4.2 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.

10.5 Knowledge Transfer

10.5.1 It is also important to highlight that the implementation of wind based technologies in Cape Verde will imply not only the importation of equipment/technologies but also of essential technical expertise, which does not exist in the country. Through technology and expertise transfer, the local technical labor force will receive training in wind power generation and on renewable energy technical issues.

11. CONCLUSION

11.1 In responding to the growing electricity demand within South Africa, as well as the country's targets for renewable energy, Eskom has a drive to establish renewable forms of energy generation capacity and contribute to the targets published in the Renewable Energy White Paper. Through research, the viability of a wind energy facility and CSP plant have been established and Eskom proposes that a facility comprising up 100 wind energy turbines can be established on the identified site on the West Coast.

11.2 The positive implications of establishing a wind energy facility and the CSP plant include:

- The project would assist Eskom or the South African government in reaching their set targets for renewable energy.
- The potential to harness and utilise good wind energy resources at the site north of the Olifants River would be realised.
- The National electricity grid would benefit from the additional generated power (Eskom propose that up to at least 200 MW can be realised from the proposed facility on the West Coast (based on turbine technology choice).
- Promotion of clean, renewable energy in South Africa.
- Positive impacts on the tourism economy of the area.
- Creation of local employment and business opportunities for the area.

12. REFERENCES AND CONTACTS

12.1 References

Savannah Environmental (Pty) Ltd Karen Jodas & Jo-Anne Thomas 2008, Final Environmental Impact Report: Proposed Wind Energy Facility and Associated Infrastructure, Western Cape Province

12.2 Contacts:

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