

ENVIRONMENTAL IMPACT ASSESSMENT PROCESS
FINAL SCOPING REPORT

PROPOSED KLEINZEE 300MW WIND
ENERGY FARM, SOUTH OF KLEINSEE

NORTHERN CAPE PROVINCE
(DEA Ref: 12/12/20/2212)

FINAL FOR SUBMISSION TO DEA
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PROJECT DETAILS

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Wind Farm south of Kleinsee in the Northern Cape
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PURPOSE OF THE SCOPING REPORT

Eskom Holdings SOC Limited is currently undertaking an Environmental Impact Assessment (EIA) process to determine the environmental feasibility of a proposed wind farm on the West Coast, on a site south of Kleinsee, in the Northern Cape Province. Eskom Holdings SOC Limited has appointed Savannah Environmental, as independent environmental consultants, to undertake the EIA. The EIA process is being undertaken in accordance with the requirements of the National Environmental Management Act (NEMA; Act No. 107 of 1998).

Scoping is an important part of the EIA process, as it helps to ensure that the impact assessment is appropriately focussed. The main objectives of the Scoping process are:

- » To engage with stakeholders at an early stage of the development so that they may contribute their views with regards to the proposed project;
- » To identify potential issues and impacts associated with the proposed development;
- » To define the scope of the Environmental Impact Assessment (EIA);
- » To define the methodology that is required for the EIA; and
- » To describe the plan of study for the EIA.

In terms of NEMA, the Scoping Report is submitted to the competent authority (i.e. the National Department of Environmental Affairs (DEA)) as part of the decision-making process with regard to the proposed wind farm. The Scoping Report is also intended to provide sufficient background information to other Organs of State, non-statutory bodies, the general public, organisations and local communities in order to obtain their commentary and input on the proposed development. The Scoping Phase of the EIA process identifies and describes potential issues associated with the proposed project, and defines the extent of the studies required within the EIA Phase of the process. The EIA Phase will assess those identified potential environmental impacts and benefits associated with all phases of the project including design, construction, operation and decommissioning, and will recommend appropriate mitigation measures for potentially significant environmental impacts.

The Scoping Report consists of eleven sections:

- » **Chapter 1** provides background to the proposed wind farm project and the environmental impact assessment
- » **Chapter 2** provides the strategic context for energy planning in South Africa
- » **Chapter 3** describes wind energy as a power option and provides insight to technologies for wind turbines

- » **Chapter 4** provides a description of the processes followed in the determination of acceptable sites for the development of the proposed Kleinzee 300MW Wind Farm Project
- » **Chapter 5** outlines the process which was followed during the Scoping Phase of the EIA process, including the consultation program that was undertaken and input received from interested parties
- » **Chapter 6** describes the existing biophysical and socio-economic environment
- » **Chapter 7** describes the activities associated with the project (project scope)
- » **Chapter 8** presents the evaluation of environmental impacts
- » **Chapter 9** presents the conclusions of the scoping evaluation
- » **Chapter 10** describes the Plan of Study for EIA
- » **Chapter 11** provides a list of references and information sources used in undertaking this Scoping Study.

The Draft Scoping Report provided the public with an opportunity to verify that all potential issues associated with the proposed project have been identified through this scoping study, and provides an opportunity for additional key issues for consideration to be raised. The Final Scoping Report incorporates all comments received prior to submission to the National Department of Environmental Affairs (DEA).

The draft Scoping Report was made available for public review at the following locations from **12 December 2011 to 30 January 2012**.

- » www.savannahsa.com
- » www.eskom.co.za/eia
- » Kleinsee Tourism centre
- » Buffelsrivier office of the Nama Khoi Municipality
- » Komaggas office of the Nama Khoi Municipality?

SUMMARY

Background and Project Overview

Eskom Holdings Ltd has identified a site south of the town of Kleinsee within the Nama Khoi Local Municipality (Northern Cape) for the establishment of a commercial wind farm. The identified site (as assessed in this final scoping report) for the establishment of the proposed **Kleinsee 300 MW Wind Farm** is situated on the West Coast, about 6 km south of Kleinsee in the of the Northern Cape. The facility is proposed to accommodate **up to 200 appropriately spaced turbines** over an extent of approximately **8 682 hectares** for the purpose of electricity generation. The total generating capacity of the proposed facility will be **up to 300 MW**.

Associated infrastructure proposed includes:

- » A cluster of between **150 and 200 wind turbines** to be constructed over an area of ~ **8 682 ha** in extent
- » **Concrete foundations** to support the turbine towers
- » **Cabling** between the turbines to be lain underground where practical
- » An on-site **substation** to facilitate the connection between the facility and the electricity grid
- » An **overhead power line** (400kV) feeding into Eskom's electricity grid at Gromis

Substation (Gromis Substation is situated approximately 16 km from the proposed site)

- » Internal **access roads** between wind turbines
- » **Borrow pits** within the site for the construction of access roads
- » **Office/Workshop** area for maintenance and storage
- » **Information centre**
- » A possible **desalination plant**¹ to de-salt water to be used for the construction phase

The identified site (as assessed in this final scoping report) for the establishment of the proposed Kleinsee 300 MW Wind Farm is as follows:

- » RE of Brazil 329
- » RE of Goraap 323,
- » RE of Honde Vlei 325,
- » RE of Kannabieduin 324,
- » Portion 4 of Rooivlei 327

The nature and extent of this facility, as well as potential environmental impacts associated with the construction of a facility of this nature is explored in more detail in this Scoping Report.

The Scoping Study for the proposed Kleinsee 300 MW Wind Farm south of Kleinsee in the Northern Cape Province has been undertaken in accordance with the EIA Regulations published in Government Notice 33306 of GN R543, R544, R545 and

¹ To be investigated as a possible water supply source

R546 (18 June 2010), in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998).

Environmental Impact Assessment

The scoping phase for the proposed project forms part of the EIA process and has been undertaken in accordance with the EIA Regulations. The Scoping Report aimed to identify potential issues associated with the proposed project, and define the extent of studies required within the EIA. This was achieved through an evaluation of the proposed project involving specialists with expertise relevant to the nature of the project and the study area, the project proponent, as well as a consultation process with key stakeholders that included both relevant government authorities and interested and affected parties (I&APs).

A comprehensive public participation process is being undertaken in accordance with Regulation 54 of Government Notice No R543 of 2010 during the Scoping phase of this EIA process. This public participation process comprises the following:

- » **Notification of the EIA Process** in printed media and on site, as well as through written notification to identified stakeholders and affected landowners.
- » **Identification and registration** of I&APs and key stakeholders.
- » Compilation and distribution of a **Background Information**

Document (BID) to all identified I&APs and key stakeholders.

- » **On-going consultation** with identified I&APs and stakeholders, including Telephonic communication, Focus Group Meetings and one-one-one meetings.
- » Compilation and maintenance of a **database** containing the names and addresses of all identified I&APs and key stakeholders.
- » Preparation of a **Comments and Response Report** detailing key issues raised by I&APs as part of the EIA Process.

Evaluation of the Proposed Project

The overarching objective for the wind farm planning process is to maximise electricity production through **exposure to the wind resource**, while minimising infrastructure, operational and maintenance costs, as well as **social and environmental impacts**. Local level environmental and planning issues will now be considered within **site-specific studies** to be undertaken as part of the EIA for the project. The assessments through the EIA process will assist in delineating areas of environmental sensitivity within the broader site and ultimately inform the placement of the wind turbines and associated infrastructure on the site in order to minimise impacts on the environment.

Issues identified through this scoping study as being potentially associated

with the proposed Kleinzee Wind Farm south of Kleinsee are summarised below.

Positive potential impacts related to the **construction and decommissioning phases** of the wind farm include, *inter alia*:

- » Positive: Social Impacts
 - * Opportunistic labour in-migration
 - * Skills development
 - * Job creation

Negative potential impacts related to the **construction/Decommissioning phases** of the wind farm include, *inter alia*:

- » Visual impacts associated with the construction of the farm and associated infrastructure
- » Impacts on Soils and Agricultural Potential (although anticipated to be low to negligible, it will still have to be investigated)
- » Impacts on Vegetation
- » Impacts on terrestrial Fauna
- » Impacts on Avifauna
- » Impacts on Bats
- » Impacts on Heritage
- » Impacts on Noise sensitive developers
- » Social Impacts

Positive potential impacts related to the **operation** of the wind farm include, *inter alia*:

- » Provision of a clean, renewable energy source for the national grid
- » stabilisation of power supply in Northern Cape
- » Social Impacts:

- * Creation of opportunities to local business during the operational phase, including but not limited to, provision of security, staff transport, and other services
 - * Potential up and down-stream economic opportunities for the local, regional and national economy
- » Assistance towards provision of secure power supply in South Africa

Negative potential impacts related to the **operation** of the wind farm include, *inter alia*:

- » Visual impacts, including visual exposure of wind turbines and associated infrastructure.
- » Impacts on Avifauna and bats, including increased mortality of birds/bats due to collision with turbine blades; increased mortality of birds/bats due to Electrocutation with associated power lines; and habitat loss
- » Noise impacts
- » Heritage Impacts
- » Social Impacts including impacts on existing tourism and tourism potential of the area

The majority of potential impacts identified to be associated with the construction and operation of the proposed wind farm are anticipated to be localised and restricted to the proposed site. No environmental fatal flaws were identified to be associated with the site. However, areas of potential sensitivity were identified through the scoping phase. These areas of sensitivity are

illustrated in the sensitivity map (Refer to **Figure 3**).

The potentially sensitive areas/environmental features that have been identified include:

- » Areas of visual exposure within (but not restricted to) 10 km of the proposed wind farm site such as homesteads and observers travelling along major and gravel roads,
- » Potentially sensitive noise receptors as indicated in Figure 9.2 of this report,
- » Areas of medium to low heritage sensitivity as indicated in Figure 9.2 of this report.

The sensitivity map is a rough scale estimate of sensitivity on the site, and these areas will be subject to survey and ground-truthing during the EIA phase of the project. These potentially sensitive areas will, therefore, be further investigated and assessed through detailed specialist studies (including field surveys) during the EIA phase.

In order to connect the wind farm to the power grid, an overhead power line will be required to be established from the wind farm substation to the selected connection point on the electricity grid. It is proposed that one overhead power line (400 kV) will connect the substation to the electricity distribution network/grid. Two options for connection are being considered as follows:

- » Directly to the Gromis substation from the on-site substation
- » Turning into the Juno - Gromis power line (this is a recently authorised power line located to the east of the site, with construction planned to commence shortly)

The alternate routes for the power line (as mapped in figure 2) as identified will be comparatively assessed in the EIA Phase and a preferred alternative recommended for implementation.

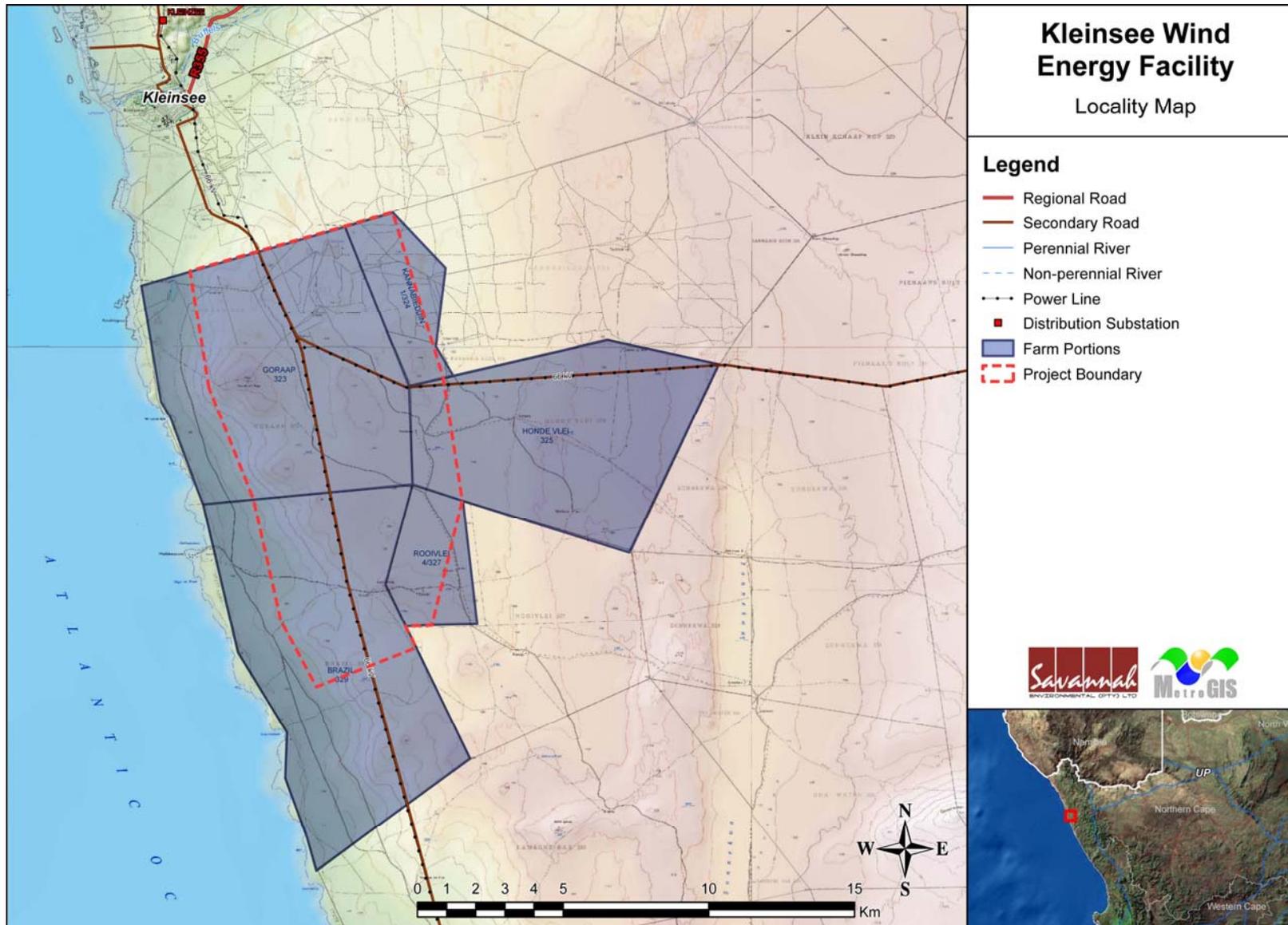


Figure 1: Locality map showing the study area for the establishment of the Kleinzee 300MW Wind Farm

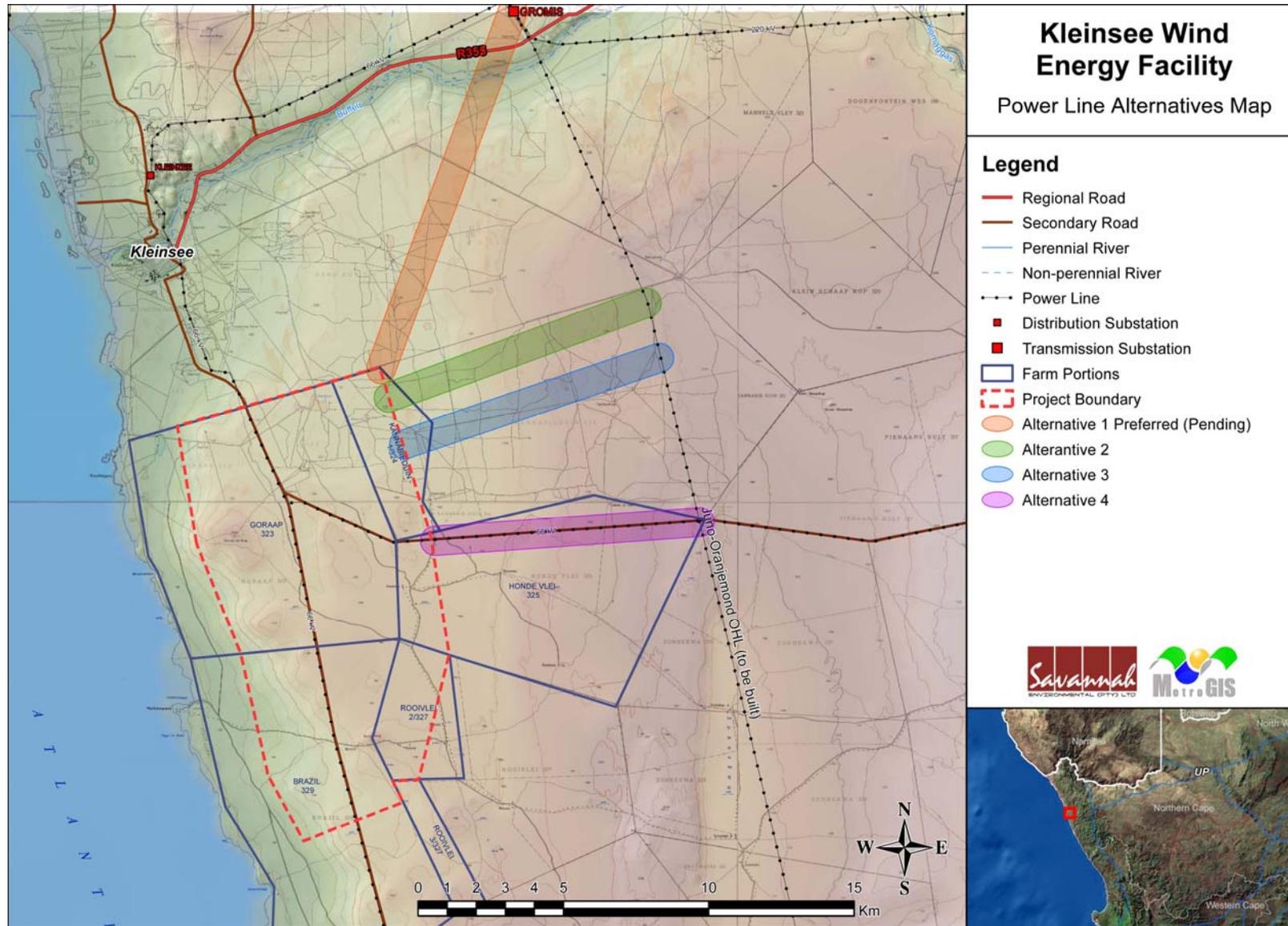


Figure 2: Map indicating proposed corridors for power line construction – alignments to be investigated in detail in the EIA Phase

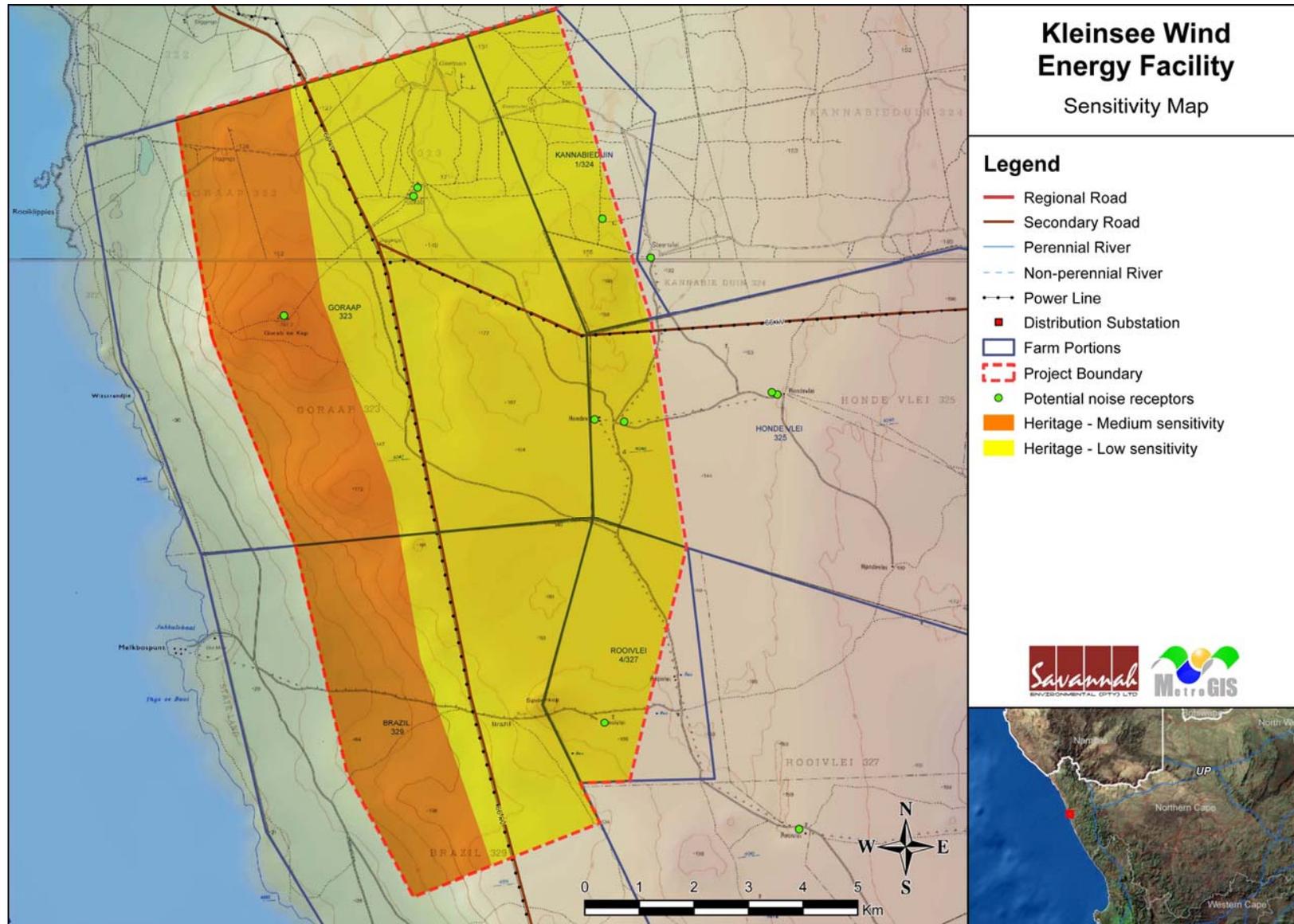


Figure 3: Environmental Sensitivity Map for the proposed Kleinzee 300 MW Wind Farm, south of Kleinsee, in the Northern Cape

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DEFINITIONS AND TERMINOLOGY

Alternatives: Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.

Ambient sound level: The reading on an integrating impulse sound level meter taken at a measuring point in the absence of any alleged disturbing noise at the end of a total period of at least 10 minutes after such meter was put into operation.

Betz Limit: It is the flow of air over the blades and through the rotor area that makes a wind turbine function. The wind turbine extracts energy by slowing the wind down. The theoretical maximum amount of energy in the wind that can be collected by a wind turbine's rotor is approximately 59%. This value is known as the Betz Limit

Cumulative impacts: Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

Cut-in speed: The minimum wind speed at which the wind turbine will generate usable power.

Cut-out speed: The wind speed at which shut down occurs.

Direct impacts: Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity (e.g. noise generated by blasting operations on the site of the activity). These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable

Disturbing noise: A noise level that exceeds the ambient sound level measured continuously at the same measuring point by 7 dB or more.

'Do nothing' alternative: The 'do nothing' alternative is the option of not undertaking the proposed activity or any of its alternatives. The 'do nothing'

alternative also provides the baseline against which the impacts of other alternatives should be compared.

Endangered species: Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Endemic: An "endemic" is a species that grows in a particular area (is endemic to that region) and has a restricted distribution. It is only found in a particular place. Whether something is endemic or not depends on the geographical boundaries of the area in question and the area can be defined at different scales.

Environment: the surroundings within which humans exist and that are made up of:

- i. the land, water and atmosphere of the earth;
- ii. micro-organisms, plant and animal life;
- iii. any part or combination of (i) and (ii) and the interrelationships among and between them; and
- iv. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental Impact: An action or series of actions that have an effect on the environment.

Environmental impact assessment: Environmental Impact Assessment (EIA), as defined in the NEMA EIA Regulations and in relation to an application to which scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of that application.

Environmental management: Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

Environmental management plan: An operational plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its ongoing maintenance after implementation.

Generator: The generator is what converts the turning motion of a wind turbine's blades into electricity

Indigenous: All biological organisms that occurred naturally within the study area prior to 1800

Indirect impacts: Indirect or induced changes that may occur as a result of the activity (e.g. the reduction of water in a stream that supply water to a reservoir that supply water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.

Interested and Affected Party: Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups and the general public.

Nacelle: The nacelle contains the generator, control equipment, gearbox and anemometer for monitoring the wind speed and direction.

Rare species: Taxa with small world populations that are not at present Endangered or Vulnerable, but are at risk as some unexpected threat could easily cause a critical decline. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range. This category was termed Critically Rare by Hall and Veldhuis (1985) to distinguish it from the more generally used word "rare".

Red data species: Species listed in terms of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species, and/or in terms of the South African Red Data list. In terms of the South African Red Data list, species are classified as being extinct, endangered, vulnerable, rare, indeterminate, insufficiently known or not threatened (see other definitions within this glossary).

Regional Methodology: The Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) have developed a guideline document 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). The methodology proposed within this guideline document is intended to be a regional level planning tool to guide planners and decision-makers with regards to appropriate areas for wind energy development (on the basis of planning, environmental, infrastructural and landscape parameters).

Rotor: The portion of the wind turbine that collects energy from the wind is called the rotor. The rotor converts the energy in the wind into rotational energy to turn

the generator. The rotor has three blades that rotate at a constant speed of about 15 to 28 revolutions per minute (rpm).

Significant impact: An impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment.

Tower: The tower, which supports the rotor, is constructed from tubular steel. It is approximately 80 m tall. The nacelle and the rotor are attached to the top of the tower. The tower on which a wind turbine is mounted is not just a support structure. It also raises the wind turbine so that its blades safely clear the ground and so it can reach the stronger winds at higher elevations. Larger wind turbines are usually mounted on towers ranging from 40 to 80 m tall. The tower must be strong enough to support the wind turbine and to sustain vibration, wind loading and the overall weather elements for the lifetime of the wind turbine.

Wind power: A measure of the energy available in the wind.

Wind rose: The term given to the diagrammatic representation of joint wind speed and direction distribution at a particular location. The length of time that the wind comes from a particular sector is shown by the length of the spoke, and the speed is shown by the thickness of the spoke.

Wind speed: The rate at which air flows past a point above the earth's surface.

ABBREVIATIONS AND ACRONYMS

BID	Background Information Document
CBOs	Community Based Organisations
CDM	Clean Development Mechanism
CSIR	Council for Scientific and Industrial Research
CO ₂	Carbon dioxide
D	Diameter of the rotor blades
DAFF	Department of Forestry and Fishery
DENC	Northern Cape Department of Environmental Affairs and Nature Conservation
DEA	National Department of Environmental Affairs
DME	Department of Minerals and Energy
DOT	Department of Transport
DWA	Department of Water Affairs
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
GIS	Geographical Information Systems
GG	Government Gazette
GN	Government Notice
GWh	Giga Watt Hour
Ha	Hectare
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IEP	Integrated Energy Planning
km ²	Square kilometres
km/hr	Kilometres per hour
kV	Kilovolt
m ²	Square meters
m/s	Meters per second
MW	Mega Watt
NEMA	National Environmental Management Act (Act No 107 of 1998)
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act (Act No 25 of 1999)
NGOs	Non-Governmental Organisations
NIRP	National Integrated Resource Planning
NWA	National Water Act (Act No 36 of 1998)
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
SDF	Spatial Development Framework

INTRODUCTION

CHAPTER 1

Eskom Holdings Limited (SOC) is proposing the establishment of a wind farm and associated infrastructure on an identified site which is located approximately 6 km south of the mining town of Kleinsee in the Northern Cape Province, within the Nama Khoi Local Municipality. This proposed project will be referred to as the Kleinsee 300 MW Wind Farm. This development is proposed to comprise a cluster of up to 200 wind turbines (typically described as a wind energy facility or a wind farm) to be constructed over an area of approximately 8 682 ha in extent.

The nature and extent of the proposed facility, as well as potential environmental impacts associated with the construction, operation and decommissioning phases of a facility of this nature is explored in more detail in this Final Scoping Report. The Scoping Report consists of eleven sections:

- » **Chapter 1** provides background to the proposed wind farm project and the environmental impact assessment
- » **Chapter 2** provides the strategic context for energy planning in South Africa
- » **Chapter 3** describes wind energy as a power option and provides insight to technologies for wind turbines
- » **Chapter 4** provides a description of the processes followed in the determination of acceptable sites for the development of the proposed Kleinsee 300MW Wind Farm Project
- » **Chapter 5** outlines the process which was followed during the Scoping Phase of the EIA process, including the consultation program that was undertaken and input received from interested parties
- » **Chapter 6** describes the existing biophysical and socio-economic environment
- » **Chapter 7** describes the activities associated with the project (project scope)
- » **Chapter 8** presents the evaluation of environmental impacts
- » **Chapter 9** presents the conclusions of the scoping evaluation
- » **Chapter 10** describes the Plan of Study for EIA
- » **Chapter 11** provides a list of references and information sources used in undertaking this Scoping Study.

1.1. The Need for the Proposed Project

Internationally there is increasing pressure on countries to increase their share of renewable energy generation due to concerns such as climate change and the need to reduce the dependence upon fossil fuels, such as oil and coal for energy and thus reduce the volume of greenhouse gasses emitted into the atmosphere. Grid connected renewable energy is currently the fastest growing sector in the

global energy market, and wind energy is the most economic of the sources of renewable energy. Installed global wind capacity was in the order of 90GW in 2008, with total world installed capacity having doubled since 2004.

The need to expand electricity generation capacity in South Africa is based on **national policy** and informed by on-going strategic planning undertaken by the Department of Energy (DoE) and the National Energy Regulator of South Africa (NERSA). The South African Government has recognised the need to diversify the mix of energy generation technologies within the country, and also to reduce the country's reliance on fossil fuel derived power generation. As a result, and in order to meet the long-term goal of a sustainable renewable energy industry, the South African Government has set a target of 17GW renewable energy contribution to new power generation capacity by 2030. This is to be produced mainly from biomass, **wind**, solar and small-scale hydro. In response to Government's commitments, and as part of its Climate Change Strategy, Eskom plans to include at least 1 600 MW of renewable energy within the electricity generation mix (*extract from Eskom's Climate Change Commitment - The 6 Point Plan*). The purpose of the proposed Kleinzee 300 MW Wind Farm project is to add new capacity for generation of renewable energy to the national electricity mix and to aid in meeting this goal.

Local level issues are now being considered within **site-specific studies** and assessment through the EIA process in order to delineate areas of sensitivity within the broader area. A preliminary layout of the components of the wind farm has been developed by Eskom and will be further assessed in the EIA phase of the project. Once environmentally constraining factors have been determined through the EIA process, and site-specific wind data is available from wind monitoring on site, the layout of the wind turbines and associated infrastructure can be appropriately planned. Specialist software is available to assist developers in selecting the optimum position for each turbine before the project is constructed. This layout will then inform the positioning of other infrastructure such as the internal substation and access roads, and other ancillary infrastructure.

The scope of the proposed Kleinzee 300 MW Wind Farm project, including details of all elements of the project for each of the three development phases (for the construction, operation and decommissioning phases) is discussed in more detail in Chapter 7.

1.2. Background to the Project

As a precursor to initiating an Environmental Impact Assessment (EIA) process, Eskom embarked on a wind resource research programme, as well as a site identification and selection process to determine areas suitable for wind energy

development in South Africa. Meteorological conditions are critically important when considering the siting of wind turbines and identifying ideal wind farm sites. Ultimately, the success of the facility is dependent on the available wind resource of a particular site – i.e. wind speed, turbulence, spatial and temporal variations in the wind climate, and how the wind resource is affected by terrain.

According to the South African Wind Resource Database compiled by the National Department of Minerals and Energy (DME), the Council for Scientific and Industrial Research (CSIR) and Eskom, the West Coast south of Kleinsee has been identified to experience some of the highest wind speeds in South Africa. Eskom studied this area further and is confident that the potential for the wind resource on the West Coast will support the development of a wind farm. In addition, this area further supports other technical requirements for a wind farm in terms of land availability and accessibility, and accessibility of the electricity grid to meet transmission integration requirements for a facility of this nature.

In 2009 and 2010, Eskom undertook a regional site identification and selection process (refer to Chapter 4 for details of the site identification process) in the South Western region of South Africa to determine and delineate suitable sites for commercial wind energy development. In order to assist in addressing the challenge of ensuring that wind energy projects meet economic (including technical), social and environmental sustainability criteria, the study was based on the Western Cape Provincial guidelines document 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) developed by the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP).

The regional site identification process aimed to determine and delineate areas suitable for wind energy development and included the consideration of sites/areas of special environmental importance and planning criteria, as well as issues relating to landscape character, value, sensitivity and capacity. These aspects were then balanced with technical constraining factors affecting the siting of a wind farm, including the wind resource (wind potential diminishing with distance from the coastline), land availability, accessibility and existing grid infrastructure.

It was acknowledged that a proactive identification of a location/site appropriate for the introduction of wind energy technology would enhance the viability of the project and inform the scope of the required Environmental Impact Assessment.

1.3. Project Overview

Through the regional site identification process, a broader area falling within the Nama Khoi Local Municipality on the West Coast (depicted on Figure 1.1) was identified by Eskom (in conjunction with the EIA consultants) as being potentially suitable for wind energy development. This area was put forward for consideration within an EIA. This area (~8 682ha in extent) comprises the following farms:

- » RE of Brazil 329
- » RE of Goraap 323,
- » RE of Honde Vlei 325,
- » RE of Kannabieduin 324,
- » Portion 4 of Rooivlei 327 (refer to Figure 1.1).

The overarching objective for the wind farm planning process is to maximise electricity production through **exposure to the wind resource**, while minimising infrastructure, operational and maintenance costs, as well as **social and environmental impacts**. As **local level environmental and planning issues** were not assessed in sufficient detail through the regional level site identification process, these issues must now be considered within **site-specific studies** and assessments through the EIA process in order to delineate areas of sensitivity within the broader site and ultimately inform the placement of the wind turbines and associated infrastructure on a site.

The wind farm is proposed to accommodate between **150 and 200 turbines**. The performance of the turbines is determined by disturbances to the wind resource, which requires that they are appropriately spaced. The turbines and associated infrastructure is, therefore, required to be positioned over an area of approximately 8 682ha.

The construction of the facility is proposed to be phased, with the each phase of the project planned to generate up to 150 MW (between 75 to 100; 1.5 –3 MW industry standard turbines). The total facility would, however, not exceed 200 turbines on the proposed site.

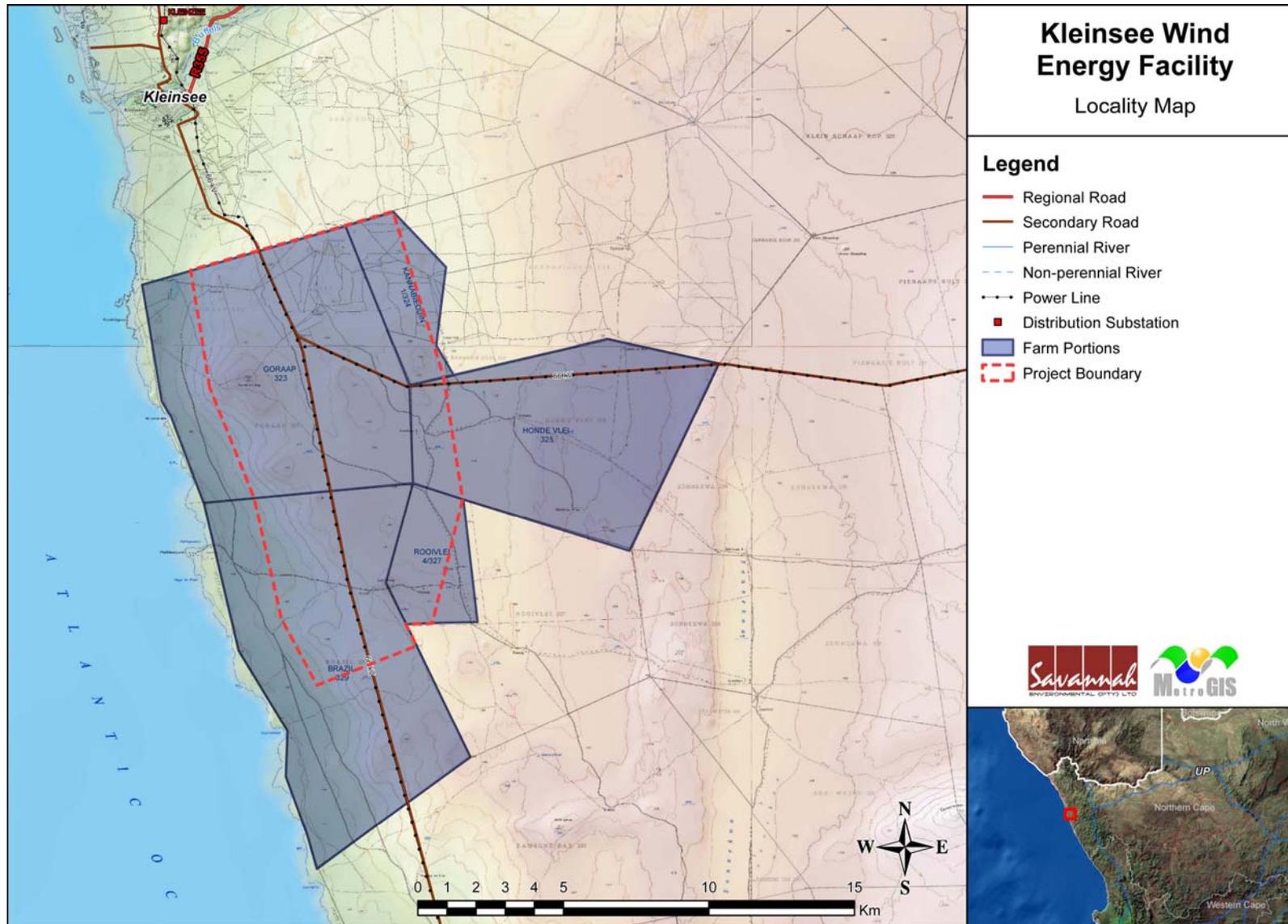


Figure 1.1: Locality map showing the study area for the establishment of the Kleinsee 300MW Wind Farm

The infrastructure associated with the total Wind farm would, therefore, include:

- » A cluster of between **150 and 200 wind turbines** to be constructed over an area of ~ **8 682 ha** in extent
- » **Concrete foundations** to support the turbine towers
- » **Cabling** between the turbines to be lain underground
- » An on-site **substation** to facilitate the connection between the facility and the electricity grid
- » An **overhead power line** (400kV) feeding into Eskom's electricity grid at Gromis Substation (Gromis Substation is situated approximately 16 km from the proposed site)
- » Internal **access roads** between wind turbines
- » **Borrow pits** within the site for the construction of access roads
- » **Office/Workshop** area for operations, maintenance and storage
- » **Information centre**
- » A possible **desalination plant**² to de-salt water to be used for the construction phase

The scope of the proposed wind farm project, including details of all elements of the project (for the construction, operation and decommissioning phases) is discussed in detail in Chapter 7.

Specialist software is available to assist developers in selecting the optimum position for each turbine before the project is constructed. This layout will then inform the positioning of other infrastructure such as access roads and substation/s. The preliminary positioning or detailed layout of the components of this wind plant will be developed at the EIA phase of the project. Final placement will be informed by the outcomes of the EIA as well as from the results of the on-site wind monitoring.

1.4. Requirement for an Environmental Impact Assessment Process

The proposed wind farm is subject to the requirements of the EIA Regulations published in terms of Section 24(5) of the National Environmental Management Act (NEMA, Act No. 107 of 1998). This section provides a brief overview of the EIA Regulations and their application to this project.

NEMA is the national legislation that provides for the authorisation of "listed activities". In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these activities must be considered, investigated, assessed and reported on to the competent authority that has been charged by NEMA with the responsibility of granting environmental authorisations. As this is

² ² To be investigated as a possible water supply source

a proposed electricity generation project and thereby considered to be of national importance, the National Department of Environmental Affairs (DEA) is the competent authority and the Northern Cape Department of Environment and Nature Conservation (DENC) will act as the commenting authority. An application for authorisation has been accepted by DEA under application reference number **12/12/20/2212**.

The need to comply with the requirements of the EIA Regulations ensures that decision-makers are provided the opportunity to consider the potential environmental impacts of a project early in the project development process and to assess if potential environmental impacts can be avoided, minimised or mitigated to acceptable levels. Comprehensive, independent environmental studies are required in accordance with the EIA Regulations to provide the competent authority with sufficient information in order to make an informed decision. Eskom Holdings Limited (SOC) appointed Savannah Environmental (Pty) Ltd as the independent **Environmental Consultants** to conduct the EIA process for the proposed project.

An EIA is an effective planning and decision-making tool for the project developer as it allows for the identification and management of potential environmental impacts. It provides the opportunity for the developer to be forewarned of potential environmental issues, and allows for resolution of the issues reported on in the Scoping and EIA Reports as well as dialogue with **Interested and Affected Parties** (I&APs).

In terms of sections 24 and 24D of NEMA, as read with Government Notices R543 and R545, both Scoping and EIA processes are required as the proposed project includes the following "listed activities" in terms of GN R544; R545 and 546 (GG No 33306 of 18 June 2010).

Relevant Notice	Activity No	Description of listed activity	Applicability to the project
Government Notice R544, 18 June 2010	9	The construction of facilities or infrastructure exceeding 1000 metres in length for the bulk transportation of water, sewage or storm water – (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more	Ablution facilities and drinking water will be required at the site office for the operational staff.
Government Notice R544, 18 June 2010	10	The construction of facilities or infrastructure for the transmission and distribution of electricity – (i) outside urban areas or	A 400kV overhead power line will be used to connect the wind farm to the Gromis

Relevant Notice	Activity No	Description of listed activity	Applicability to the project
		industrial complexes with a capacity of more than 33 but less than 275kV; or (ii) inside urban areas or industrial complexes with a capacity of 275kV or more.	substation.
Government Notice R544, 18 June 2010	11	The construction of: (i) canals; (ii) channels; (iii) bridges; (iv) dams; (v) weirs; (vi) bulk stormwater outlet structures; (vii) marinas; (viii) jetties exceeding 50 square metres in size (ix) slipways exceeding 50 square metres in size (x) buildings exceeding 50 square metres in size; or (xi) infrastructure or structures covering 50 square metres or more Where such construction occurs within a watercourse or within 32 metres of a watercourse, measures from the edge of a watercourse, excluding where such construction will occur behind the development setback line.	Applicability to be confirmed at EIA stage.
GN 544, 18 June 2010	13	The construction of facilities or infrastructure for the storage, or for the storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 80 but not exceeding 500 cubic metres.	The onsite storage of diesel and fuel in containers for construction machinery and vehicles. Applicability to be confirmed at EIA stage.
Government Notice R544, 18 June 2010	22	The construction of a road, outside urban areas, With a reserve wider than 13,5 metres, or Where no road reserve exists where the road is wider than 8 metres	External and internal access roads between turbines need to be constructed. Temporary roads during construction could be up to 13 m in width.

Relevant Notice	Activity No	Description of listed activity	Applicability to the project
Government Notice R545, 18 June 2010	1	The construction of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more.	Eskom is proposing the establishment of a wind farm up to 300 MW.
Government Notice 545, 18 June 2010	3	The construction of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic meters.	The onsite storage of diesel and fuel in containers for construction machinery and vehicles. Applicability to be confirmed at EIA stage.
Government Notice R545, 18 June 2010	15	Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more; except where such physical alteration takes place for (i) Linear development activities or (ii) Agriculture or afforestation where activity 16 in this schedule will apply.	The facility is proposed to be established within an area of ~8 682 ha in extent.
Government Notice GN 546, 18 June 2010	1	The construction of billboards exceeding 18 square metres in size outside urban or mining areas or outside industrial complexes. (vi) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.	Applicability to be confirmed at EIA stage.
Government Notice R546, 18 June 2010	2	The construction of reservoirs for bulk water supply with a capacity of more than 250 cubic metres. (iii)(dd) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.	Applicability to be confirmed at EIA stage.
Government Notice R546, 18 June 2010	4	The construction of a road wider than 4 metres with a reserve less than 13,5 metres (ii)(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.	Applicability to be confirmed at EIA stage.

Relevant Notice	Activity No	Description of listed activity	Applicability to the project
Government Notice R546, 18 June 2010	10	The construction of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres. (ii)(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.	Applicability to be confirmed at EIA stage.
Government Notice R546, 18 June 2010	12	The clearance of an area of 300 square metres or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation. (b) within critical biodiversity areas identified in bioregional plans.	Applicability to be confirmed at EIA stage.
Government Notice R546, 18 June 2010	13	The clearance of an area of 1 hectare or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation.	Applicability to be confirmed at EIA stage.

This report documents the scoping evaluation of the potential environmental impacts of the proposed construction and operation of the proposed Kleinzee 300 MW Wind Farm project. This scoping study forms part of the EIA process and was conducted in accordance with the requirements of the EIA Regulations in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998).

1.5. Objectives of the Scoping Phase

The Scoping Phase of the EIA process refers to the process of identifying potential issues associated with the proposed project, and defining the extent of studies required within the EIA Phase. This is achieved through an evaluation of the proposed project, involving the project proponent, specialists with experience in EIAs for similar projects, and a public consultation process with key stakeholders that includes both government authorities and interested and affected parties (I&APs).

In accordance with the EIA Regulations, the main purpose of the Scoping Phase is to focus the environmental assessment in order to ensure that only potentially significant issues, and reasonable and feasible alternatives are examined in the EIA Phase. The Draft Scoping Report provided stakeholders with an opportunity

to verify that the issues they have raised through the public consultation process to date have been captured and adequately considered, and provides a further opportunity for additional key issues for consideration to be raised. This Final Scoping Report incorporates all issues and responses raised during the public review of the Draft Scoping Report prior to submission to DEA.

1.6. Details of Environmental Assessment Practitioner and Expertise to conduct the Scoping and EIA

Savannah Environmental was contracted by Eskom Holdings Limited (SOC) as an independent consultant to undertake an Environmental Impact Assessment (EIA) for the proposed project, as required by the NEMA EIA Regulations. Neither Savannah Environmental, nor any of the specialist sub-consultants on this project are subsidiaries of or affiliated to Eskom Holdings Limited (SOC). Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed project.

Savannah Environmental is a specialist environmental consulting company providing a holistic environmental management service, including environmental assessment and planning to ensure compliance and evaluate the risk of development; and the development and implementation of environmental management tools. Savannah Environmental benefits from the pooled resources, diverse skills and experience in the environmental field held by its team.

The Savannah Environmental team have considerable experience in environmental impact assessments and environmental management, and have been actively involved in undertaking environmental studies, for a wide variety of projects throughout South Africa, including those associated with electricity generation. Savannah Environmental is a specialist environmental consulting company providing holistic environmental management services, including environmental impact assessments and planning to ensure compliance and evaluate the risk of development; and the development and implementation of environmental management tools. Savannah Environmental benefits from the pooled resources, diverse skills and experience in the environmental field held by its team.

The EAPs from Savannah Environmental who are responsible for this project are:

- » Jo-Anne Thomas - a registered Professional Natural Scientist and holds a Master of Science degree. She has 14 years of consulting experience in the environmental field. Her key focus is on strategic environmental assessment and advice; management and co-ordination of environmental projects, which includes integration of environmental studies and environmental processes into larger engineering-based projects and ensuring compliance to legislation

and guidelines; compliance reporting; the identification of environmental management solutions and mitigation/risk minimising measures; and strategy and guideline development. She is currently responsible for the project management of EIAs for several renewable energy projects across the country.

- » Alicia Govender – the principle author of this report, holds an Honours Bachelor of Science degree in Environmental Management and has 4 years’ experience in environmental management. She is currently the responsible EAP for several renewable energy projects and other EIAs across the country.

In order to adequately identify and assess potential environmental impacts associated with the proposed project, Savannah Environmental has appointed the following specialist sub-consultants to conduct specialist impact assessments:

Specialist	Area of Expertise
David Hoare of David Hoare Consulting cc	Terrestrial Fauna
Dave McDonald of BergWind Botanical Surveys	Vegetation
Rob Simmons	Avifauna
Werner Marais of Animalia zoological and ecological consultation	Bats
Johan van der Waals of Terrasoil Science	Geology, soils and agricultural potential
Lourens du Plessis of MetroGIS	Visual impacts and GIS mapping
Jayson Orton of ACO	Heritage / Archaeology
John Pether	Palaeontology
Morne de Jager of Menco (M2 Environmental Connections cc)	Noise
Tony Barbour of Tony Barbour Consulting and Research	Social Impact

Refer to Appendix A for the curricula vitae for Savannah Environmental and the specialist sub-consultants team.

STRATEGIC CONTEXT FOR ENERGY PLANNING

CHAPTER 2

2.1. Strategic Electricity Planning in South Africa

The need to expand electricity generation capacity in South Africa is based on national policy and informed by on-going strategic planning undertaken by the Department of Energy (DoE). The hierarchy of policy and planning documentation that support the development of renewable energy projects such as wind energy facilities is illustrated in Figure 2.1. These policies are discussed in more detail in the following sections, along with the provincial and local policies or plans that have relevance to the development of the proposed wind energy facility.

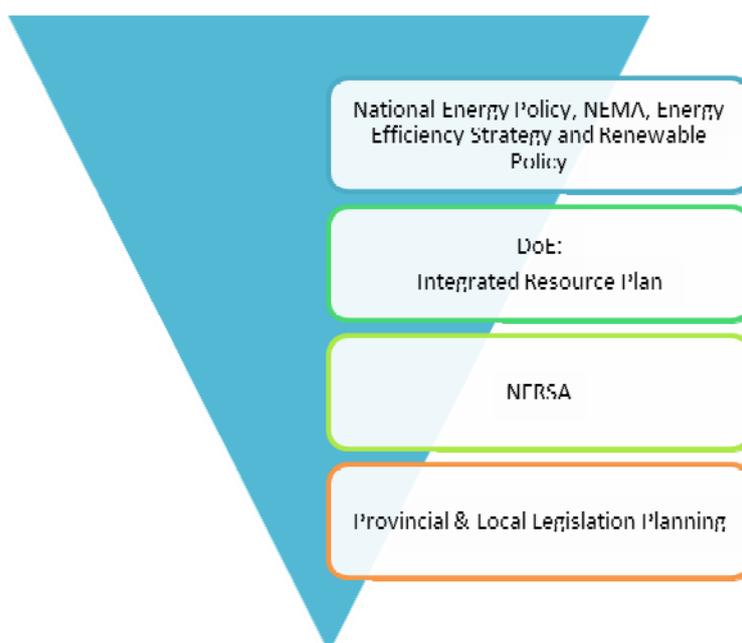


Figure 2.1: Hierarchy of electricity policy and planning documents

2.1.1. *White Paper on the Energy Policy of the Republic of South Africa, 1998*

Development within the energy sector in South Africa is governed by the White Paper on a National Energy Policy (the National Energy Policy), published by DME in 1998. This White Paper identifies five key objectives for energy supply within South Africa, i.e.:

- » increasing access to affordable energy services;
- » improving energy sector governance;
- » stimulating economic development;

- » managing energy-related environmental impacts; and
- » securing supply through diversity.

Furthermore, the National Energy Policy identifies the need to undertake an Integrated Energy Planning (IEP) process and the adoption of a National Integrated Resource Planning (NIRP) approach. Through these processes, the most likely future electricity demand based on long-term southern African economic scenarios can be forecasted, and provide the framework for South Africa (and Eskom) to investigate a whole range of supply and demand side options.

2.1.2. Renewable Energy Policy in South Africa

Internationally there is increasing development of the use of renewable technologies for the generation of electricity due to concerns such as climate change and exploitation of resources. In response, the South African government ratified the United Nations Framework Convention on Climate Change (UNFCCC) in August 1997 and acceded to the Kyoto Protocol, the enabling mechanism for the convention, in August 2002. In addition, national response strategies have been developed for both climate change and renewable energy.

Investment in renewable energy initiatives, such as the proposed wind energy facility, is supported by the National Energy Policy (DME, 1998). This policy recognises that renewable energy applications have specific characteristics which need to be considered. The Energy Policy is *"based on the understanding that renewables are energy sources in their own right, and are not limited to small-scale and remote applications, and have significant medium- and long-term commercial potential."* In addition, the National Energy Policy states that *"Renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future"*.

The White Paper on Renewable Energy (DME, 2003) supplements the Energy Policy, and sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa. It also informs the public and the international community of the Government's vision, and how the Government intends to achieve these objectives; and informs Government agencies and organs of their roles in achieving the objectives.

The support for the 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 from a fuel resource perspective (i.e. the cost of fuel in generating electricity from such technology); more so when social and environmental costs are taken into account. In spite of this range of resources, the National Energy

Policy acknowledges that the development and implementation of renewable energy applications has been neglected in South Africa.

Government policy on renewable energy is therefore 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.

In order to meet the long-term goal of a sustainable renewable energy industry, the South African Government has set the following 10-year target for renewable energy: *"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% (1 667 MW) of the estimated electricity demand (41 539 MW) by 2013"* (DME, 2003).

The White Paper on Renewable Energy states *"It is imperative for South Africa to supplement its existing energy supply with renewable energies to combat Global Climate Change which is having profound impacts on our planet."*

In order assist Government in meeting its target, Eskom is investigating potential renewable energy projects, which include a Concentrated Solar Thermal project in the Northern Cape, as well as the several wind energy facilities.

2.1.3. Final Integrated Resource Plan, 2010 - 2030

The Energy Act of 2008 obligates the Minister of Energy to develop and publish an integrated resource plan for energy. Therefore, the Department of Energy (DoE), together with the National Energy Regulator of South Africa (NERSA) has compiled the Integrated Resource Plan (IRP) for the period 2010 to 2030. The objective of the IRP is to develop a sustainable electricity investment strategy for generation capacity and transmission infrastructure for South Africa over the next twenty years. The IRP is intended to:

- » Improve the long term reliability of electricity supply through meeting adequacy criteria over and above keeping pace with economic growth and development;

- » Ascertain South Africa's capacity investment needs for the medium term business planning environment;
- » Consider environmental and other externality impacts and the effect of renewable energy technologies; and
- » Provide the framework for Ministerial determination of new generation capacity (inclusive of the required feasibility studies).

The objective of the IRP is to evaluate the security of supply, and determine the least-cost supply option by considering various demand side management and supply-side options. The IRP also aims to provide information on the opportunities for investment into new power generating projects.

The outcome of the process confirmed that coal-fired options are still required over the next 20 years and that additional base load plants will be required from 2010. The first and interim IRP was developed in 2009 by the Department of Energy. The initial four years of this plan was promulgated by the Minister of Energy on 31 December 2009, and updated on 29 January 2010. The Department of Energy released the Final IRP in March 2011, which was accepted by Parliament at the end of March. This Policy-Adjusted IRP is recommended for adoption by Cabinet and subsequent promulgation as the final IRP. In addition to all existing and committed power plants (including 10 GW committed coal), the plan includes 9.6 GW of nuclear; 6.3 GW of coal; 17.8 GW of renewables (including 8,4GW solar); and 8.9 GW of other generation sources.

2.2. Eskom's Climate Change and Renewable Energy Strategies

Eskom's core business is in the generation and transmission (transport) of electricity. Eskom is responsible for the provision of reliable and affordable power to its South African consumers, and currently generates approximately 95% of the electricity used in the country. Therefore the reliable provision of electricity by Eskom is critical for industrial development and related employment in the region and therefore a contributing factor to the overall challenge of poverty alleviation and sustainable development in South Africa. Electricity, by nature, cannot be stored and therefore must be used as it is generated. Therefore, electricity is generated in accordance with supply-demand requirements, and must be efficiently transmitted from the point of generation to the end-user.

If Eskom is to meet its mandate and commitment to supply the ever-increasing needs of end-users, it has to plan, establish and expand its infrastructure of generation capacity and transmission power lines on an on-going basis. With current energy and electricity demands within the country projected to continue increasing, new investments in electricity generation and transmission capacity are required. Eskom is currently expanding its electricity generation capacity through the construction of additional power stations and major power lines. In

addition to these, other electricity generation projects are being investigated. Since the capacity expansion programme started in 2005, an additional 4453.5 MW has already been commissioned. The plan is to deliver an additional 16 304MW in power station capacity by 2017. Ultimately Eskom will double its capacity to 80 000MW by 2026 (www.eskom.co.za). In line with Government's targets for renewable energy, Eskom plans to include at least 1600MW of renewable energy (wind and solar) within the electricity generation mix (*extract from Eskom's Climate Change Commitment - The 6 Point Plan*).

Eskom has developed a renewable energy strategy which outlines a number of focus areas, including research, demonstration and development opportunities. The establishment of a wind energy facility a potential to qualify as a CDM project based on the United Nation Framework Convention on Climate Change (UNFCCC) requirements. The proposed wind energy facility has a potential to reduce air emissions (including CO₂, SO_x, NO_x), water demand and waste generation (in the form of ash) compared to what will occur without the introduction of renewable energy technology.

In addition, Eskom has developed a Climate Change Strategy in order to contribute to global efforts to combat climate change while ensuring the sustainability of the economy, environment and society. This strategy supports investment in renewable energy technologies as part of the power generation mix for the country. Eskom's Climate Change Strategy unpacks its commitment to climate change challenge in 6 key focal areas:

1. **Diversification** of the generation mix to lower carbon emitting technologies
2. **Energy efficiency** measures to reduce demand and greenhouse gas and other emissions
3. **Adaptation** to the negative impacts of climate change
4. **Innovation** through research, demonstration and development
5. **Investment** through carbon market mechanisms
6. **Progress** through advocacy, partnerships and collaboration

Renewable energy technologies which have been evaluated (and still being investigated) by Eskom include wind, solar, wave, tidal, ocean current, biomass and hydro. Through the South African Bulk Renewable Energy Generation (SABRE-Gen) programme, a vehicle was established to enable the evaluation of multi-MW, grid connected generation. The initiatives all follow the same functional structure: namely the identification of promising options, an assessment of the financial and economic viability as well as resource potential in the country, the implementation of demonstration projects to conduct operational research, and the provision of strategies for the uptake and sustainable deployment of the technologies where feasible.

Eskom commissioned the Klipheuvel Wind Energy Demonstration Facility (north of Durbanville) in February 2003. Research at this facility has focused on how available wind energy technologies interact with the South African environment and has highlighted unique factors that can impact performance.

2.3. Provincial and Local Level Developmental Policy

2.3.1. Northern Cape Growth and Development Strategy (2004-2014)

The Northern Cape Provincial Growth and Development Strategy (NCPGDS; 2004 - 2014) notes that the most significant challenge that the government and its partners in growth and development are confronted with is the **reduction of poverty**. All other societal challenges that the province faces emanate predominantly from the effects of poverty. The NCPGDS notes that the only effective way to reduce poverty is through long-term sustainable economic growth and development. The sectors where economic growth and development can be promoted include:

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

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

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

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

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

Of specific relevance to the Kleinzee Wind Farm proposal, the NCPGDS makes reference to the need to ensure the availability of inexpensive energy. The section notes that in order to promote economic growth in the Northern Cape the

availability of electricity to key industrial users at critical localities at rates that enhance the competitiveness of their industries must be ensured. At the same time, the development of new sources of energy through the promotion of the adoption of energy applications that display a synergy with the province's natural resource endowments must be encouraged. In this regard the NCPGDS notes "the development of (renewable) energy sources could be some of the means by which new economic opportunity and activity is generated in the Northern Cape". The NCPGDS also highlights the importance of close co-operation between the public and private sectors in order for the economic development potential of the Northern Cape to be realised. The proposed project will support the government developmental objectives that include potential for localisation in the area it will operate in.

The NCPGDS also highlights the importance of enterprise development, and notes that the current levels of private sector development and investment in the Northern Cape are low. In addition, the province also lags in the key policy priority areas of SMME Development and Black Economic Empowerment (BEE).

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

2.3.2. Nama Khoi Local Municipality 2011/2012 IDP Revision

The Municipal Systems Act (Act 32 of 2000) requires each Municipality to compile an Integrated Development Plan (IDP) for its relevant municipal area. The IDP is meant to provide the overarching strategic framework for the sustainable long-term management of the relevant municipality. As such, it is meant to inform all development planning and policy within that municipality. Once adopted by Council, the IDP binds and commits the relevant Municipality in the exercise of its executive authority, unless the IDP conflicts with national or provincial legislation.

The Act requires the drafting of a 5-year planning period IDP, as well as for subsequent annual reviews of performance and evolved conditions with regard to the strategic objectives identified in the 5-year plan. However, the most recent Nama Khoi IDP appears to have been approved in 2004. The following key

aspects are of specific relevance to the proposed wind energy facility and local (i.e. receiving) context.

The developmental policy contained in the Nama Khoi Local Municipality (NKLM) IDP is underpinned by the national Strategic Plan for Local Government 2006-2011³, the Northern Cape Provincial Growth and Development Strategy (see Section 2.3.1. above), the national Accelerate and Shared Growth Initiative – South Africa (2006-2014) (ASGISA), and the 2009 national Local Government Turn Around Strategy (re. service delivery challenges and financially sustainable local government).

Socio-economic developmental planning in the NKLM is further underpinned by the objectives of national Medium-term Strategic Framework, namely:

1. Speeding up growth and transforming the economy to create decent work and sustainable livelihoods;
2. A massive programme to build economic and social infrastructure;
3. A comprehensive rural development strategy linked to land and agrarian reform and food security;
4. To strengthen the skills and human resource base;
5. To improve the health profile of all South Africans;
6. To intensify the fight against crime and corruption;
7. To build cohesive, caring and sustainable communities;
8. Pursuing African advancement and enhanced international cooperation;
9. Sustainable Resource Management and use;
10. Building a developmental state including improvement of public services and strengthening democratic institutions.

Of specific relevance to the proposed Kleinzee WEF, the IDP notes that mining used to form the backbone of the economy, but that tourism is currently seen as the “new frontier” for economic development in the municipal area (NKLM Draft 2011/12 IDP).

The IDP makes no mention of renewable energy projects or policy pertaining thereto. The project may however support objectives 1 and 2 of the national Medium-term Strategic Framework as listed above.

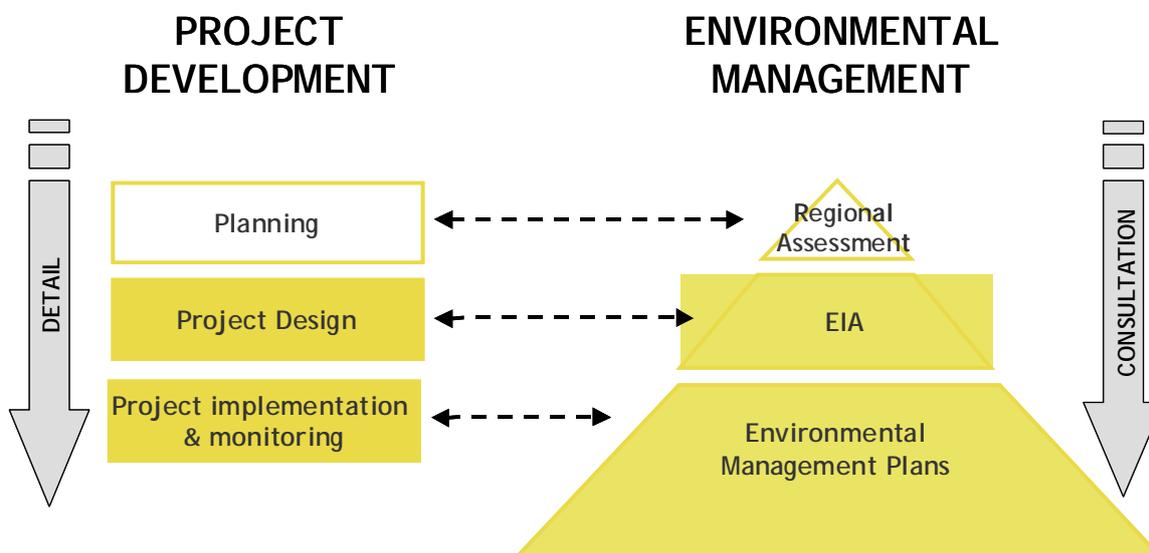
³ The SPLG 2006-2011 identified 5 national Key Performance Areas – or KPA – to guide reporting in the drafting of IDP documents and to monitor (and adjust, where applicable) annual municipal delivery performance against set developmental goals in the relevant KPAs.

2.4. Project Planning and the site-specific Environmental Impact Assessment

Eskom Generation's planning process is based on anticipated electricity demand, rather than immediate load requirements in order to timeously supply the anticipated increased demand in the country. This is due to the long lead-time process of acquiring the necessary permissions to construct such infrastructure from DEA and the National Energy Regulator of South Africa (NERSA), and negotiations with landowners, and power generation infrastructure purchase, delivery and ultimately construction.

In terms of the EIA Regulations under NEMA, a Scoping and EIA report (including an environmental management programme (EMP)) are required to be compiled for this proposed project. The EIA is considered as an effective planning and decision-making tool in the planning process of a new power generation facility. It allows potential environmental consequences resulting from a technical facility during its establishment and its operation to be identified and appropriately managed through project design and implementation. The level of detail at a site-specific level is refined through the process, and allows for resolution of potential issue(s) through dialogue with affected parties.

The relationship between project development and the environmental assessment and management process is depicted in the figure below.



The project planning process for the Kleinzee Wind Energy Facility has included a detailed site selection process which was confirmed for environmental suitability by Savannah Environmental through a Regional Assessment process. This site selection process is detailed in Chapter 4 of this Scoping Report.

WIND ENERGY AS A POWER GENERATION OPTION

CHAPTER 3

Wind energy is firmly established as a mature technology for electricity generation, with a reported 194.4 GW installed base worldwide (reported by the Global Wind Energy Association (GWEC), December 2010). It is one of the fastest growing electricity generating technologies with installed capacity increasing by ~10 000 MW annually, and features in energy plans worldwide. Use of wind for electricity generation is essentially a non-consumptive use of a natural resource, and produces an insignificant quantity of greenhouse gases in its life cycle. A wind energy facility also qualifies as a Clean Development Mechanism (CDM) project (i.e. a financial mechanism developed to encourage the development of renewable technologies) as it meets all international requirements in this regard. The proposed wind energy facility has great potential to reduce harmful greenhouse gases and other particulate emissions (including CO₂, SO_x, NO_x), water demand and waste generation (in the form of ash) compared to what will occur without the introduction of renewable energy technology.

Environmental pollution and the emission of CO₂ from the combustion of fossil fuels constitute a threat to the environment. The use of fossil fuels is reportedly responsible for ~70% of greenhouse gas emissions worldwide. The climate change challenge needs to include a shift in the way that energy is generated and consumed. Worldwide, many solutions and approaches are being developed to reduce emissions. However, it is important to acknowledge 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 also indirect 'priceless' project cost such as impacts on the environment. Renewable energy is considered a 'clean source of energy' with the potential to contribute greatly to a more ecologically, socially and economically sustainable future. The challenge now is ensuring wind energy projects are able to meet all economic, social and environmental sustainability criteria.

3.1. Investigations into Wind Energy for South Africa

In February 2003, Eskom commissioned the Klipheuvel Wind Energy Demonstration Facility north of Durbanville in the Western Cape. Research at this facility has focused on how the technology interacts with the South African environment and has highlighted unique factors that can impact performance. The research information collected ranges from production statistics, daily operational requirements, detailed condition monitoring and national resource understanding and analysis. This 3.2 MW installation generates about 4 GWh

annually with an availability of 90% and an energy utilisation factor (Capacity Factor) of 16%.

The demonstration facility has been a major success and results of the research has provided Eskom with valuable technical and strategic information pertaining to utilising wind as a source of energy, and has provided guidance with regards to the establishment of a large scale commercial facility.



Figure 3.1: Photograph of the existing three turbines at the Klipheuvel Demonstration Facility, Durbanville

As a part of Eskom's wind research programme a national wind atlas for South Africa was compiled (in conjunction with the DoE and the CSIR for the South African Renewable Resource Database wind atlas project (which is currently being developed)). Areas of high potential for future commercial wind farm development were identified, and high-accuracy meteorological measurement stations are to be erected at these sites for wind monitoring.

Based on the lessons learnt from the Klipheuvel pilot demonstration facility as well as the analyses on Eskom's measured wind data, Eskom have determined that a full-scale commercial wind energy facility can successfully be established in South Africa. The construction of such a commercial facility is now being proposed on the West Coast on a site to the south of Kleinsee in the Northern Cape (refer to Chapter 4 for more details on the siting of this facility).

3.2. The Importance of the Wind Resource for Energy Generation

Wind energy has the attractive attribute that the fuel is free. The economics of a wind energy project crucially depend on the wind resource at the site. Detailed and reliable information about the speed, strength, direction, and frequency of

the wind resource is vital when considering the installation of a wind energy facility, as the wind resource is a critical factor to the success of the installation.

Wind speed is the rate at which air flows past a point above the earth's surface. Average annual wind speed is a critical siting criterion, since this determines the cost of generating electricity. With a doubling of average wind speed, the power in the wind increases by a factor of 8, so even small changes in wind speed can produce large changes in the economic performance of a wind farm (for example, an increase of average wind speed from 22 km/hr to 36 km/hr (6 m/s to 10 m/s) increases the amount of energy produced by over 130%). Wind turbines can start generating at wind speeds of between 10 km/hr to 15 km/hr (~3 m/s to 4 m/s), with nominal wind speeds required for full power operation varying between ~45 km/hr and 60 km/hr (~12.5 m/s to 17 m/s). Wind speed can be highly variable and is also affected by a number of factors, including surface roughness of the terrain.

Wind power is a measure of the energy available in the wind.

Wind direction at a site is important to understand, but it is not critical in site selection as wind turbine blades automatically turn to face into the predominant wind direction at any point in time.

South Africa can be considered as having a moderate wind resource as compared to Northern Europe (Scandinavia), Great Britain and Ireland, New Zealand and Tasmania where wind industries are already established. Typical annual wind speeds range from 15 km/hr to 25 km/hr (4 m/s to 7 m/s) around South Africa's southern, eastern and western coastlines (with more wind typically along the coastline). This relates to an expected annual energy utilisation factor of between 15% and 30%, the value depending on the specific site selected. It is commonly accepted that wind speeds of 25 km/hr to 30 km/hr (7 m/s to 8 m/s) or greater are required for a wind energy facility to be economically viable in Europe.

When considering recorded annual energy utilisation factors for wind energy facilities internationally, it is evident that the performance of a South African facility would be in line with international trends (refer Table 3.1 below).

Table 3.1: Record of Annual Energy Utilisation Factors

Location	Average Capacity Factor
UK	29%
Rural Germany	16%
Denmark	24%
Klipheuwel Demonstration facility – South Africa	16%*

*Actual Performance over a period of 3 years

In comparison, actual wind measurements (over a period of 3 years) at the proposed site applied to typical wind turbine performance has indicated that a wind energy facility on the West Coast would perform as well as international facilities, with an energy utilisation factor of 26%. Climatic variation may impact this production figure by as much as 30% on a year-on-year basis (both negative and positive).

The wind speed measured at a meteorological station is also affected by the local topography (extending to a few tens of kilometres from the station) or surface roughness. The effect of height variation/relief in the terrain is seen as a speeding-up/slowing-down of the wind due to the topography. Elevation in the topography exerts a profound influence on the flow of air, and results in turbulence within the air stream, and this also has to be taken into account in the placement of turbines.



Figure 3.3: Illustration of the effect of relief on air flow

A wind resource measurement and analysis programme must be conducted for the site proposed for development, as only measured data will provide a robust prediction of the facility's expected energy production over its lifetime.

The placement of a wind energy facility, and in fact the actual individual turbines must, therefore, consider the following technical factors:

- » Predominant wind direction, wind strength and frequency
- » Distance from coast, where wind moving over the land mass results in a loss of wind energy (and ultimately a loss in production)
- » Topographical features or relief affecting the flow of the wind (e.g. causing shading effects and turbulence of air flow)
- » Effect of adjacent turbines on wind flow and speed – specific spacing is required between turbines in order to reduce the effects of wake turbulence.

Wind turbines typically need to be spaced approximately 2 to 3xD apart, and 5 to 7xD where a turbine is behind another (D = the diameter of the rotor blades). This is required to minimise the induced wake effect the turbines might have on each other. Considering a typical 3 MW capacity turbine whose rotors are up to 140 m in diameter, each turbine would be separated by approximately 280 m to 420 m. The erection of turbines in parallel rows one behind another would

require a distance between rows of 700 m to 980 m. Once a viable footprint for the establishment of the wind energy facility has been determined (through the consideration of both technical and environmental criteria), the micro-siting of the turbines on the site will be determined using industry standard software systems, which will automatically consider the spacing requirements.

3.3. What is a Wind Turbine and How Does It Work

The kinetic energy of wind is used to turn a wind turbine to generate electricity. A wind turbine typically consists of **three rotor blades** and a **nacelle** mounted at the tip of a tapered **steel tower**. The mechanical power generated by the rotation of the blades is transmitted to the generator within the nacelle via a gearbox and drive train.

Turbines are able to operate at varying speeds. The amount of energy a turbine can harness depends on both the wind velocity and the length of the rotor blades. It is anticipated that the turbines utilised for the proposed Kleinzee Wind Farm on the West Coast will have a hub height of ~140 m, and a rotor diameter of ~140 m (i.e. each blade up to 65 m in length with hub having diameter of up to 10m). These turbines would be capable of generating in the order of between 1.5 - 3 MW each (in optimal wind conditions).

3.3.1. Main Components of a Wind Turbine

The turbine consists of the following major components:

- » The tower
- » The rotor blades
- » The nacelle
- » The foundation

The tower

The tower, which supports the rotor, is constructed from tubular steel. It is approximately 90-140 m in height. The nacelle and the rotor are attached to the top of the tower.

The tower on which a wind turbine is mounted is not just a support structure. It also raises the wind turbine so that its blades safely clear the ground and so it can reach the stronger winds at higher elevations. The tower must be strong enough to support the wind turbine and to sustain vibration, wind loading and the overall weather elements for the lifetime of the wind turbine.

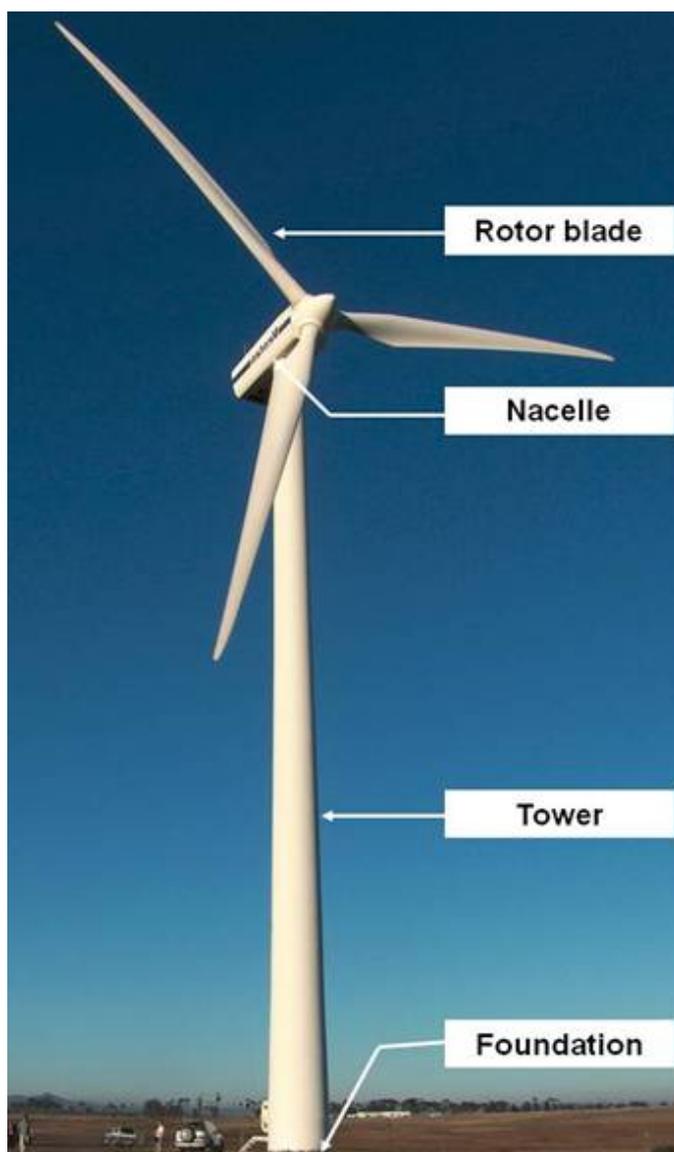


Figure 3.4: Illustration of the main components of a wind turbine

The Rotor

The portion of the wind turbine that collects energy from the wind is called the rotor. The rotor converts the energy in the wind into rotational energy to turn the generator. The rotor has three blades that rotate at a constant speed of about 15 to 28 revolutions per minute (rpm). The speed of rotation of the blades is controlled by the nacelle, which can turn the blades to face into the wind ('yaw control'), and change the angle of the blades ('pitch control') to make the most use of the available wind.

The rotor blades function in a similar way to the wing of an aircraft, utilising the principles of **lift** (Bernoulli's Law). When air flows past the blade, a wind speed and pressure differential is created between the upper and lower blade surfaces. The pressure at the lower surface is greater and thus acts to "lift" the blade. When blades are attached to a central axis, like a wind turbine rotor, the lift is

translated into rotational motion. Lift-powered wind turbines are well suited for electricity generation.

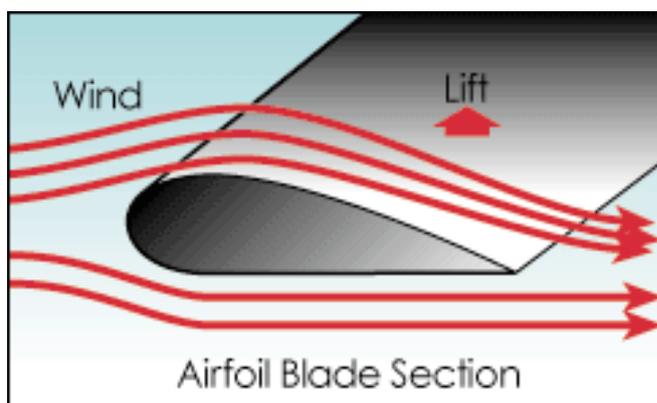


Figure 3.5: Illustration of the principle of lift

The rotation of the rotor blades produces a characteristic 'swishing' sound as the blades pass in front of the tower roughly once a second. The other moving parts, the gearbox and generator, cannot be heard unless the observer is physically inside the turbine tower.

The tip-speed is the ratio of the rotational speed of the blade to the wind speed. The larger this ratio, the faster the rotation of the wind turbine rotor at a given wind speed. Electricity generation requires high rotational speeds. Lift-type wind turbines have optimum tip-speed ratios of around 4 to 5.

The nacelle

The nacelle contains the generator, control equipment, gearbox and anemometer for monitoring the wind speed and direction (as shown in Figure 3.6).

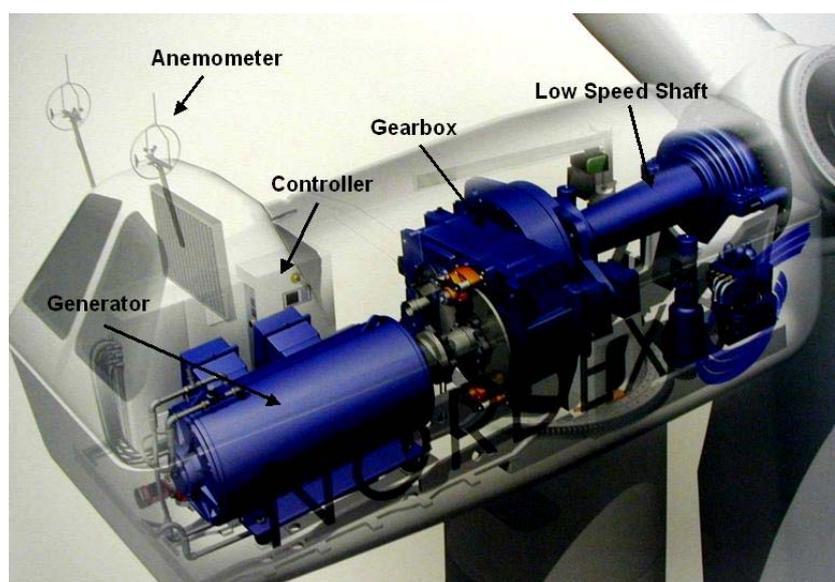


Figure 3.6: Detailed structure of a nacelle of a horizontal axis turbine

The **generator** is what converts the turning motion of a wind turbine's blades into electricity. Inside this component, coils of wire are rotated in a magnetic field to produce electricity. The generator's rating, or size, is dependent on the length of the wind turbine's blades because more energy is captured by longer blades.

The foundation

The foundation is used to secure each wind turbine to the ground. These structures are commonly made of concrete and are designed for vertical loads (weight) and lateral loads (wind).

3.3.2. Operating Characteristics of a Wind Turbine

A turbine is designed to operate continuously, unattended and with low maintenance for more than 20 years or >120 000 hours of operation. Once operating, a wind farm can be monitored and controlled remotely, with a mobile team for maintenance, when required.

The **cut-in speed** is the minimum wind speed at which the wind turbine will generate usable power. This wind speed is typically between 10 and 15 km/hr (~3 m/s and 4 m/s).

At very high wind speeds, typically over 90 km/hr (25 m/s), the wind turbine will cease power generation and shut down. The wind speed at which shut down occurs is called the **cut-out speed**. Having a cut-out speed is a safety feature which protects the wind turbine from damage. Normal wind turbine operation usually resumes when the wind drops back to a safe level.

3.3.3. Understanding the Betz Limit

It is the flow of air over the blades and through the rotor area that makes a wind turbine function. The wind turbine extracts energy by slowing the wind down. The theoretical maximum amount of energy in the wind that can be collected by a wind turbine's rotor is approximately 59%. This value is known as the Betz Limit. If the blades were 100% efficient, a wind turbine would not work because the air, having given up all its energy, would entirely stop. In practice, the collection efficiency of a rotor is not as high as 59%. A more typical efficiency is 35% to 45%. A wind energy system (including rotor, generator etc) does not exhibit perfect efficiencies, and will therefore deliver between 10% and 30% of the original energy available in the wind (between 20% to 25% being typical for modern systems).

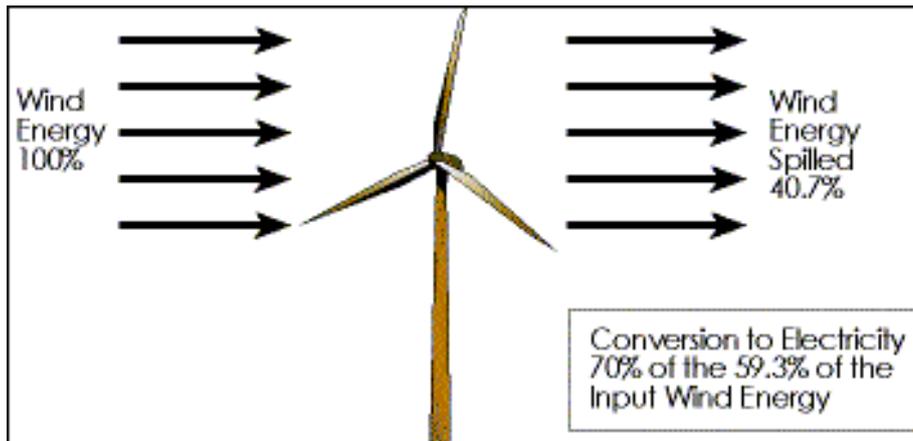


Figure 3.7: Illustration of the principle of the Betz Limit

DETERMINATION OF ACCEPTABLE SITES FOR THE DEVELOPMENT OF A WIND ENERGY FACILITY NEAR KLEINZEE

CHAPTER 4

Eskom commissioned the Klipheuwel Wind Energy Demonstration Facility, north of Durbanville, as a research facility in February 2003. As discussed in Chapter 3, the demonstration facility has provided Eskom with valuable research results pertaining to the utilisation of wind as a source of energy in South Africa, and has provided guidance with regards to the establishment of a large-scale commercial facility.

4.1. Identification of the West Coast Area for further Investigation

The goal set by Eskom is for the construction of an additional 500MW over and above the 200MW recently authorised at the Skaapvlei site on the West Coast.

Eskom identified five broad geographic regions at a strategic level for investigation and the identification of specific sites for further investigation. A site identification and selection process to determine sites suitable for wind energy development was undertaken by Eskom and the EIA consulting team during the period 2009 to 2010. This site selection process was based on the methodology developed and recommended by the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) within their guideline document 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). The sites identified through this process were then considered by Eskom in terms of technical criteria (including aspects such as ease /feasibility of grid connection, site access and ⁴land availability). Following this, two sites were identified, based on Regional Assessment undertaken (March 2010), for further investigation for the establishment of wind energy facilities, i.e. the proposed Kleinzee 300MW Wind Farm south of Kleinsee on the West Coast of the Northern Cape (the subject of this report) and the proposed Aberdeen Wind Farm on a site near Aberdeen in the Eastern Cape Province (assessed within a separate EIA process).

Wind data which informed the identification of these sites was obtained by Eskom through modelled wind data procured from external sources. A wind resource measurement and analysis programme must be conducted for the sites proposed for development, as only on-site measured data will provide a robust prediction of the facility's expected energy production over its lifetime (the importance of the wind resource for energy generation is also discussed in Chapter 3). As such,

⁴ Amount of land available for development

Eskom are in the process of erecting a wind monitoring station at these identified sites.

This chapter provides the outcomes of the regional assessment and technical considerations specific to the study area on the West Coast, and provides results which indicate the suitability of specific area/s for wind energy siting and development. A separate EIA process is being undertaken to assess the potential impacts that may result from the Aberdeen 200MW Wind Farm in the Eastern Cape (DEA Ref no. 12/12/20/2211).

4.2. Methodology in Determining Areas Considered Acceptable for the Development of a Wind Energy Facility within the Identified Study Area

The regional assessment study undertaken was based on the guidelines and findings of the Proposed Regional Methodology (Report 5) of the Western Cape Provincial Government guideline document for wind energy development (Western Cape Provincial Government, May 2006). The methodology proposed within this guideline document is intended to be a **regional level planning tool** to guide planners and decision-makers with regards to appropriate areas for wind energy development (on the basis of planning, environmental, infrastructural and landscape parameters). The area identified as suitable through this study would then be considered at a **site-specific level** through an environmental impact assessment. The use of this methodology to identify a potential site for development is supported by the competent authority for the project (i.e. Department of Environmental Affairs, DEA).

In summary, the Regional Methodology guideline includes methods for the assessment and delineation of areas appropriate for wind energy development, including the use of appropriate 'negative' and 'positive' buffer zones (suitable to the South African context) to build in cumulative impact concerns, and the incorporation of landscape issues relating to landscape character, value, sensitivity and capacity. The approach and methodology followed for this assessment within the study area are detailed below.

It is important to note that the Provincial guideline document focuses on environmental and planning issues in determining potentially acceptable sites for development. The consideration of technical factors, such as the availability of wind resources⁵, proximity to the electricity grid, and site access requirements is considered important, as the technical drivers (and ultimately the technical viability of the project) are critical. Without considering this technical input, the areas identified through following the Regional Methodology are recognised as areas appropriate for development, and not specifically for development of a Wind

⁵ Discussed further in Chapter 3

Energy Facility. Therefore, these technical considerations were considered by Eskom for this study area in parallel with the regional assessment.

In undertaking the Regional Assessment, three main steps were followed.

4.2.1. STEP 1: Review of the Methodology proposed by DEA&DP's guideline document

The proposed methodology, as set out by the Western Cape Provincial Government document: *Strategic Initiative to Introduce Commercial Land Based Wind Energy Development to the Western Cape* is a regional planning tool for the determination of acceptable areas of suitability for wind energy development (on the basis of planning, environmental, infrastructural and landscape parameters). This methodology was revisited to ensure an understanding of the requirements for following the methodology. Consideration was given to the type of data required, the approach to be followed, and the criteria/parameters which may be required to be tailored for the area under investigation.

The vision of the strategic initiative is to develop and establish a policy on the implementation of a methodology to be used for the identification of areas suitable for the establishment of wind energy development, and is supported by the following objectives:

- » To facilitate the practical implementation of wind energy generation technology in a manner that meets the principles of the White Paper on Energy Policy for South Africa.
- » To introduce wind energy developments in a coordinated and sustainable manner (this guideline methodology is accepted by national DEA as an appropriate site identification tool and as such can be applied countrywide).
- » To encourage responsible and rational wind energy developments which are beneficial to the community at large.
- » To discourage investment of time and money in sites which could potentially be unsuitable from an environmental and planning perspective.
- » To increase support for and interest in alternative renewable energy sources.
- » To provide policy guidance in terms of the environmental impact assessment process.

4.2.2. STEP 2: Undertaking the Regional Assessments, based on the Regional Methodology proposed by DEA&DP's guideline document

As previously indicated, the regional assessment undertaken was based on the methodology outlined in Report 5 of the DEA&DP guideline: *Proposed Regional Methodology*. As thresholds developed to address environmental concerns vary significantly between localities due to varying geographical, biophysical and

cultural characteristics (including salient natural features, land uses and demography), degree of landscape modification, approaches to forward planning etc., those proposed within the methodology were revisited. As a result, the thresholds used within this regional assessment included some variation, omissions and additions to the specific methodology provided within the DEA&DP guideline, with a rationale for each variation provided (refer to Section 4.3). This is primarily due to the differing nature of the DEA&DP study area and the study areas proposed by Eskom.

4.2.3. STEP 3: Consideration of technical criteria

The results from the two steps above were considered by Eskom (the developer) together with issues of a technical nature to determine whether a wind energy facility can be sited in a particular area. The technical considerations included, *inter alia*:

- » Wind potential and wind resources
- » Relevance of topography on wind resources
- » Specialist input
- » Electrical distribution and access to the electricity transmission and distribution grid
- » Land availability
- » Accessibility to the area
- » Financial feasibility
- » Regulatory requirements

These factors are not specifically addressed through the Regional Methodology assessment. The technical considerations were integrated with the regional assessment findings, and the final physical sites for investigation in the EIA phase were identified and defined. The technical factors/criteria are discussed in further detail in Section 4.4 of this report.

4.3. Approach in Determining Areas Considered Acceptable for the Development of a Wind Energy Facility within the Identified Study Area

4.3.1. Input Data Layers

The regional assessment has, as its basis, the following broad input components:

- » Regional Methodology: based on Geographic Information System composite map data layers (both criteria-based and subjective)
- » Elements of a **Criteria Based Assessment**: including environmental, planning and infrastructure criteria.

- » Elements of a **Landscape Based Assessment**: incorporating character analysis, sensitivity, value and capacity considerations.

Data layers were sourced for both the Criteria Based Assessment and the Landscape Character Assessment for each area under investigation. This was undertaken in accordance with the data layers utilised for the DEA&DP study. The thresholds prescribed by this document were adhered to in most cases, unless otherwise specified - in which case a motivation/rationale for the deviation is stated.

The input components resulted in various layers of information, which were merged using Geographical Information Systems (GIS) to form a combined dataset (based on a rating system related to criteria importance or landscape sensitivity) which defined **preferred areas/zones for development** based on environmental and planning criteria.

Table 4.1 outlines the basic information used in the GIS mapping assessment.

Table 4.1: Information used in the GIS Mapping

Name	Note	Source	Scale
Layer 1			
Wetlands	The National Wetland Map (Version II)	DWA	1:50 000
Ramsar sites		DEA	1:50 000
Rivers		DWA	1:250 000
National Parks and Viewshed Protection Zones		SANParks	1:50 000
Mountain Catchments	MCA_boundaries	Nature Conservation Board	1:50 000
Provincial Nature Reserves	NPAs_beta_v1_2007	SANBI	1:50 000
Private Nature Reserves		Nature Conservation Board	1:50 000
Conservancies		Nature Conservation Board	1:50 000
Biosphere Reserves		Nature Conservation Board	1:50 000
World Heritage Sites		DEA	1:50 000
Important Bird Areas	Received from EWT	Birdlife SA (suspected original source)	1:50 000
Layer 2			
Mountains, ridges and hills	Captured from a detailed digital terrain model	MetroGIS	1:50 000

Name	Note	Source	Scale
	(20m contour interval)		
Layer 3			
Residential & mining/ industrial areas	National Land Cover 2000	CSIR/ARC	1:50 000
Layer 4			
Coastal buffer	Generated	MetroGIS	1:50 000
Layer 5			
Local/major airports		Surveyor General	1:50 000
Telecommunication towers		CAA	1:50 000
Layer 6			
Transmission/ distribution lines		Eskom	1:50 000
Railway lines		Surveyor General	1:50 000
Layer 7			
Roads		Surveyor General	1:50 000
Layer 8 (a, b and c)			
Landscape based assessment	Derived from analyses and overlays	MetroGIS	1:50 000
Composite			
Preferred areas for development	Composite of all criteria	MetroGIS	1:50 000

All the datasets were generated and mapped by MetroGIS. (Refer to Layers 1 - 8 and Figure 4.1 for the resulting mapped data).

4.3.2. Results of the Regional Assessment

The following maps provide the results of the Regional Assessment undertaken for the Kleinsee area. It is important to note that an area labelled as Area 7 is indicated on each map. This point is indicative of the position of the site identified through the Regional Assessment area and is included on the maps for reference and orientation purposes only. This point is not meant to indicate the actual site under investigation but rather just provides an indication of the region of investigation in the Regional Assessment phase of the process.

Criteria Based Assessment Data Layers

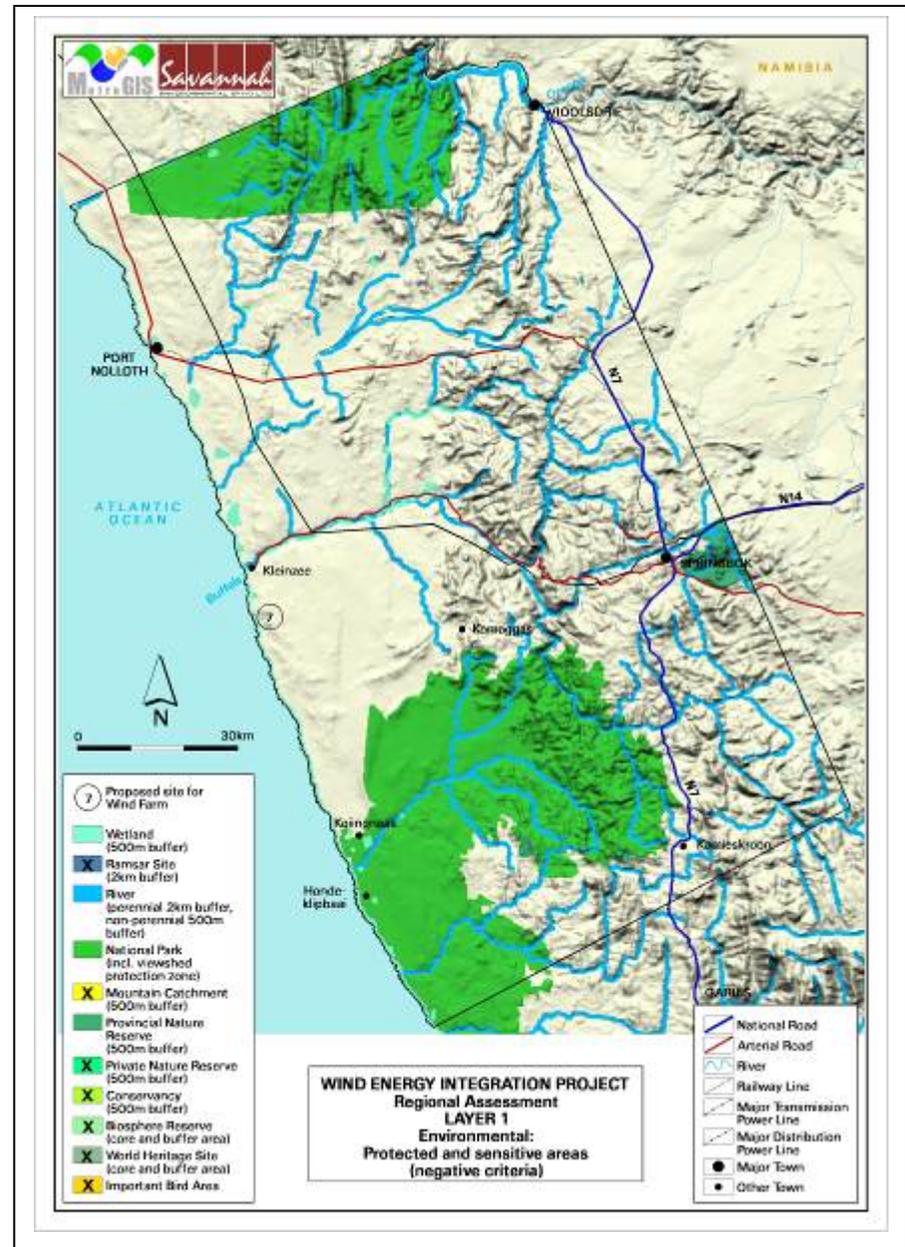
Environmental Criteria

» *Protected and Sensitive Areas (Layer1)*

The information contained in **Layer 1** is focused on Environmental Criteria that would be negatively affected by the development of a wind energy facility (i.e. negative constraints to wind energy development). These include protected and environmentally sensitive areas within the study area including biosphere reserves, conservancies and nature reserves. All these categories are mapped as negative criteria for the development of a wind energy facility and have separate buffer zones. The buffers are used to define exclusionary zones around these protected and sensitive areas. A 2 km buffer around major wetlands was observed as these are sensitive avian areas, other wetlands were assigned 500 m buffers. With regards to rivers, a buffer of 2 km from perennial rivers and 500 m from non-perennial rivers was used. A viewshed protection zone (as calculated by SANParks) was also included for national parks – the zone where development will be visible from within the park.

It is important to note that biosphere reserves have separate areas: core, buffer and transitional. Generally no development is allowed in the core area but certain developments may be permitted in the buffer and transition areas.

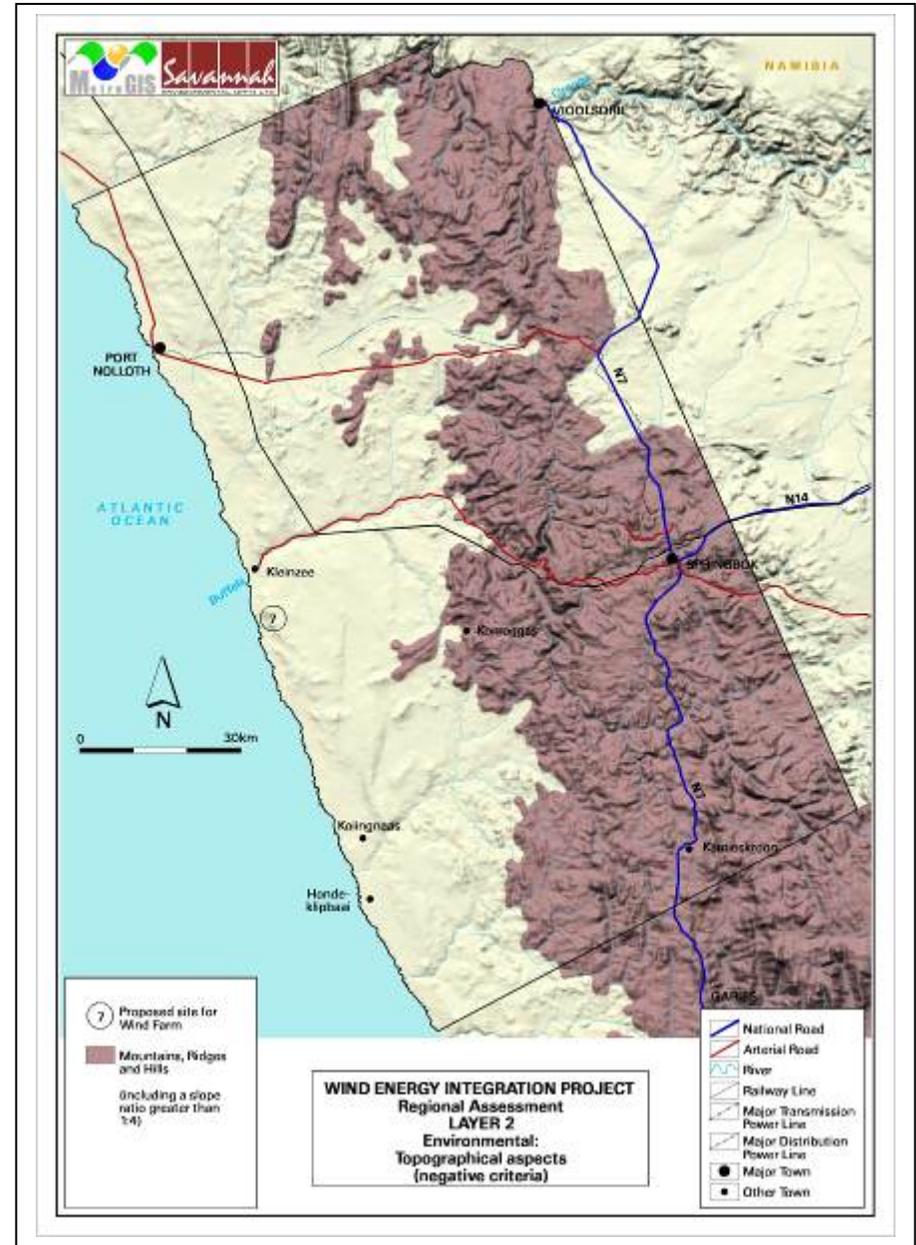
It can be seen from the adjacent map that **no constraints** in terms of protected and sensitive areas were identified to the south of Kleinsee where the proposed site is located).



» *Topographical (Layer 2)*

Layer 2 illustrates topographical information (Environmental Criteria) that are negative constraints for the development of a wind energy facility. This data includes elevation above sea level (areas above the 150 m range were recorded as a negative) and slope, where slopes with a gradient steeper than 1:4 were not preferred/not considered as ideal locations for development. This layer has an important influence on landscape character types as, in addition to exclusionary buffers around or on ridgelines, mountains and hills, the analysis should seek to determine coastal and inland plains, as well as foothill landscape types which may have positive locational attributes for wind turbines. In addition to elevation, this map layer also utilises slope (greater than 1:4) to determine significant topographical features, and defines ridgelines as a fundamental exclusionary layer due to visual impact concerns of wind turbines breaking skylines.

It can be seen from the adjacent map that **no constraints** in terms of topography were identified to the south of Kleinsee.

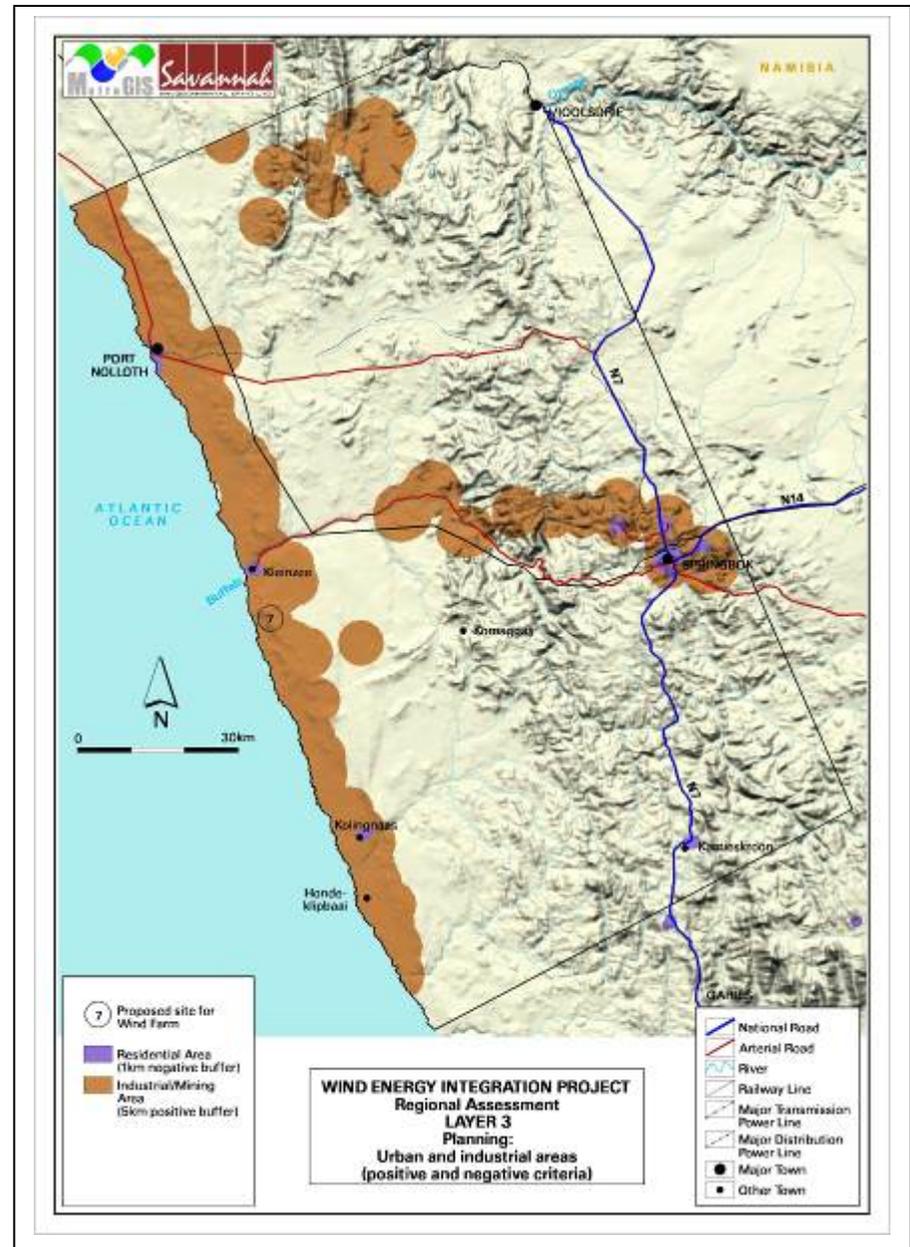


Planning Criteria

» *Urban and Industrial Areas (Layer 3)*

Layer 3 illustrates input layers pertaining to planning: urban and industrial criteria (as per the DEA&DP guideline). For urban residential areas a 1 km buffer was applied. Industrial areas were assigned a 5km **positive buffer** as these are already disturbed and developed landscapes and therefore the siting of the proposed wind energy facility near industrial areas is generally preferred.

It can be seen from the adjacent map that **the area to the south of Kleinsee falls within a positive buffer area** as a result of mining activities in this area.



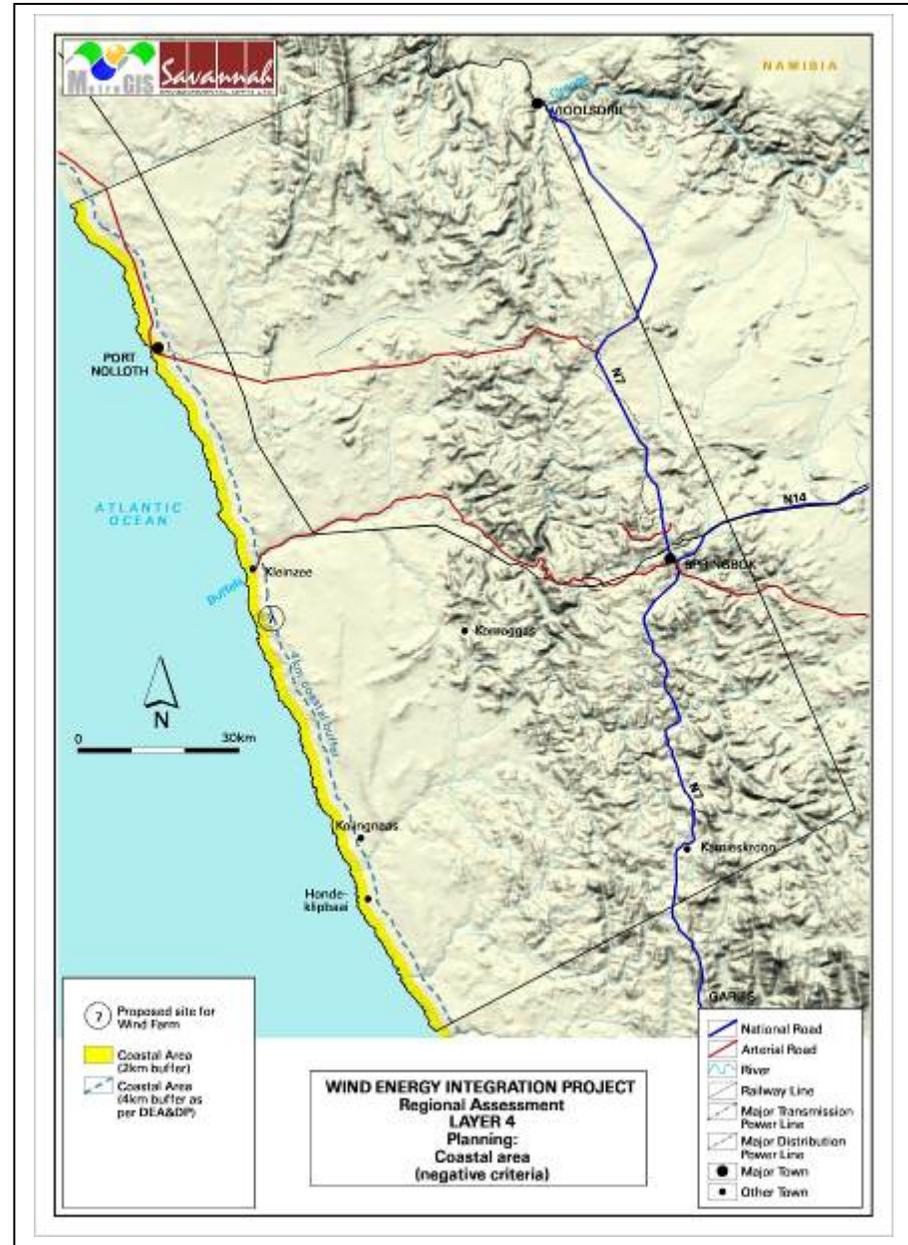
» *Coastal Areas (Layer 4)*

Layer 4 deals with Planning Criteria specifically aimed at managing and protecting the South African coastline as an important landscape feature. The Regional Methodology guideline acknowledges that coastlines are typically areas of high wind resource, but also usually of high environmental and aesthetic value. This guideline document states that “in order not to arbitrarily exclude the entire coastline by means of a somewhat crude exclusionary buffer, it is proposed in the final recommended regional method that areas may be excluded from the coastal buffer due to lower scenic value”.

Much of the West Coast coastline within the study area is of a rural nature. The coastline is characterised by areas of greater ‘scenic value’, where striking natural features occur. Layer 4 reflects a 2 km coastal buffer from the high water mark as used in previous regional assessments undertaken by the project team. The 4 km buffer zone (as indicated in the DEA&DP guideline document) has also been included.

The buffer areas indicated demarcate ‘negative’ areas, and it is acknowledged that the intention of DEA&DP is to limit large scale development in close proximity to the coastline in order to minimise the potential for compromising the future potential for the coast.

It can be seen from the adjacent map that **parts of the area** to the south of Kleinsee would be **constrained** by the proximity to the coast.



Infrastructural Criteria

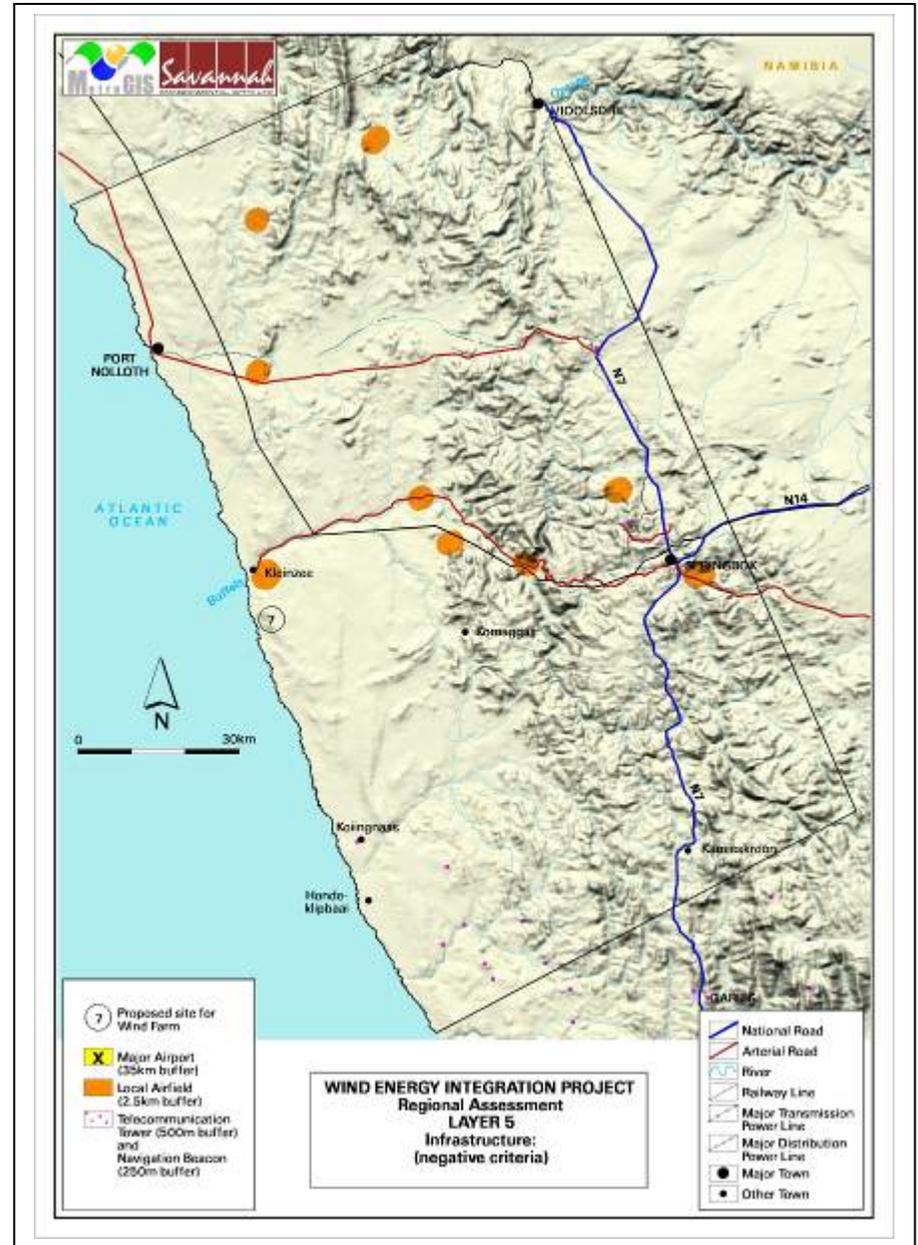
» *Airports and Security Sites (Layer 5)*

Layer 5 includes infrastructure criteria that would be negatively affected by the development of a Wind Energy Facility. A 35 km buffer around major airports and a 3 km buffer around local airfields are applicable for this study due to wind turbines affecting radar devices. However development **may be allowed** within a 35 km buffer area of an airport depending on the exact location and layout of the wind energy facility, through negotiation with the Civil Aviation Authority.

» *Other Infrastructure (Layer 5)*

A 500m buffer around cell masts or communication towers and a 250m buffer around radio and navigation beacons were recommended in the DEA&DP document.

It can be seen from the adjacent map that **no constraints** in terms of airports and security sites were identified for the proposed development site, although there is a local airfield close to Kleinsee which could become a potential issue depending on the flight paths associated with this facility.



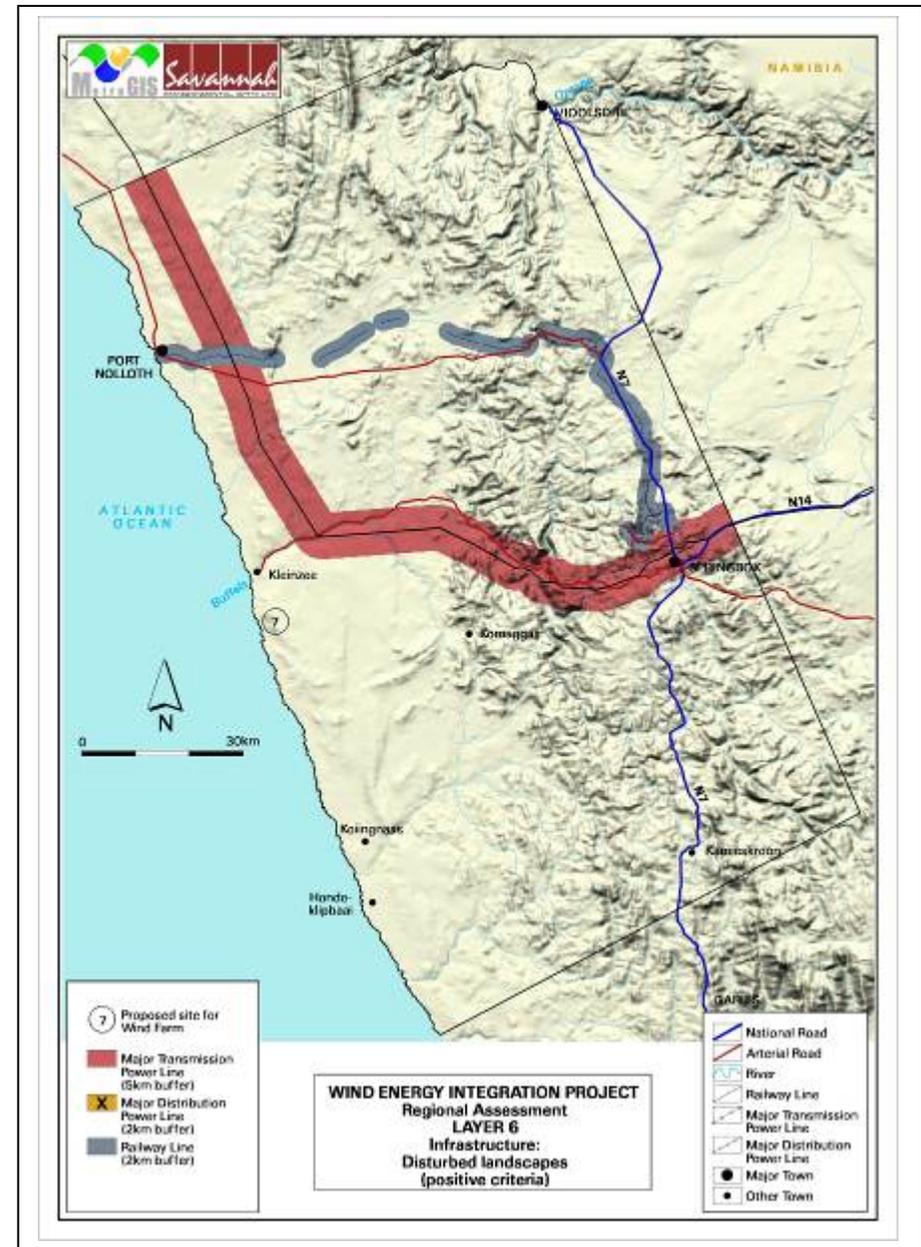
Landscape Based Assessment

Infrastructural Criteria

» *Vertical and Disturbed Landscapes (Layer 6)*

Positive criteria for the development of a wind energy facility were identified in the form of vertically disturbed landscape corridors within the study areas. As opposed to the previous negative map layers, this is a positive (inclusionary) map layer that recognises "vertical and disturbed" landscapes as a primary-level criterion for location of wind energy developments from a landscape perspective. The intent of inclusionary buffers is the location of wind energy developments as close as possible to landscapes that are already compromised by vertical structures such as power lines. A 5 km positive buffer for transmission power lines and a 2 km positive buffer for smaller distribution power lines were used. Situating the development near power lines is also regarded as being positive from a technical perspective. Situating the development within 2km of landscapes disturbed by railway lines is also considered to be a positive. These features are shown on **Layer 6**.

It can be seen from the adjacent map that the proposed site to the south of Kleinsee is located some distance from transmission and distribution infrastructure.

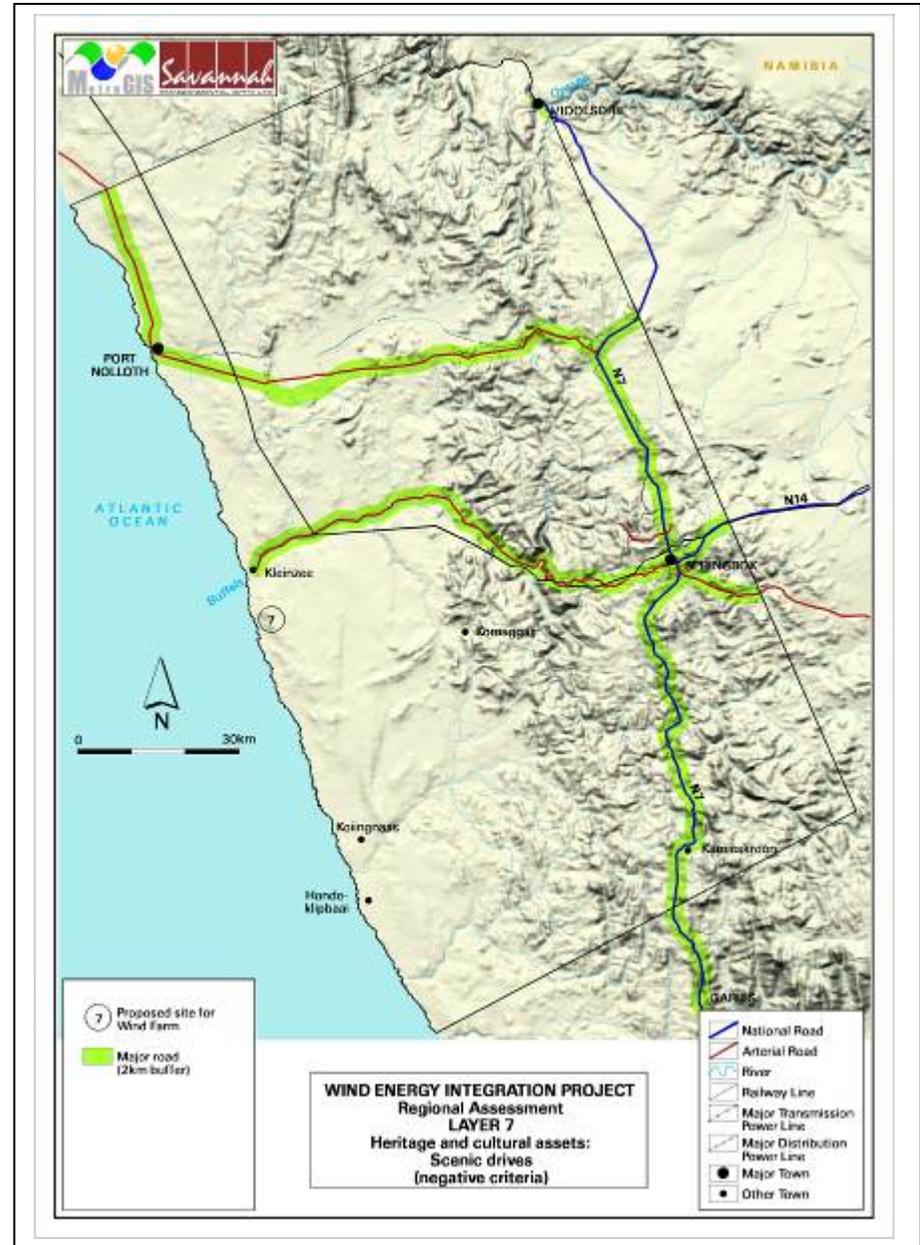


Landscape and Cultural Criteria

» *Scenic Drives and Heritage Sites (Layer 7)*

Layer 7 in the DEA&DP study refers to the delineation of heritage and cultural assets, as well as scenic drives and cultural routes, as negative criteria. No specific information regarding heritage sites within the study areas was available at the time of undertaking this assessment. Specific sites of heritage value would, however, be identified during a site-specific EIA and would be demarcated as potentially sensitive areas within the proposed development site, depending on their level of significance. As it is difficult to assess routes which could potentially have scenic value associated with them, and as no specific information regarding scenic routes within the study area was available at the time of undertaking the assessment, a simple 2 km negative buffer was used around all major roads. This is inclusive of most of the possible scenic routes in the study areas.

It can be seen from the adjacent map that the proposed site to the south of Kleinsee is located some distance from major roads in the area.



Visual Assessment and Landscape Character

» *Landscape Character and Visual Assessment (Layer 8)*

A landscape-based assessment was completed according to the methodology as set out in *Report 3: Methodology 2* of the DEA&DP guideline report, and is aimed at defining landscape character types and their relative visual sensitivity and capacity to absorb wind energy facility development.

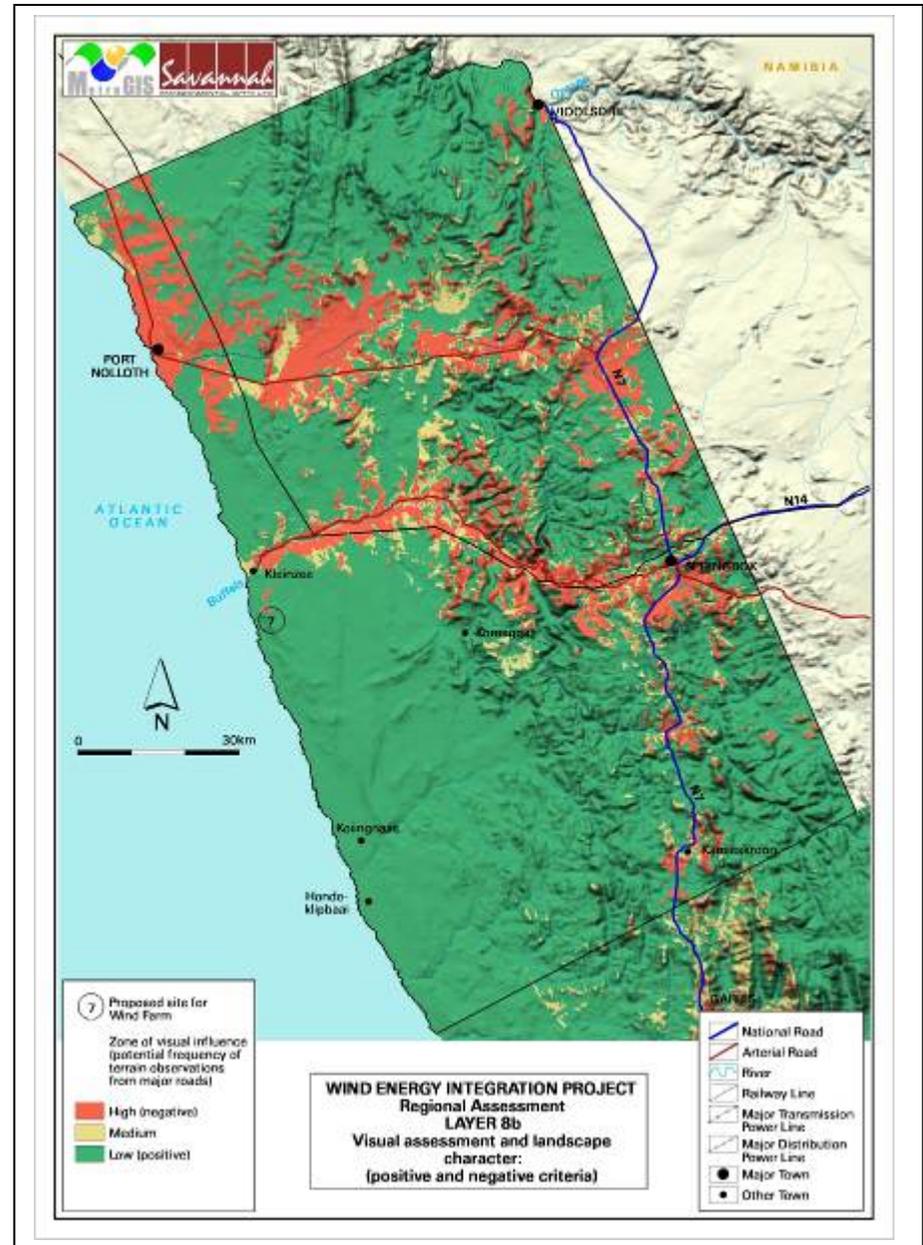
Layer 8a indicates areas that have been permanently transformed, predominantly by agricultural and mining practises. Other areas that are indicated as 'Predominantly Natural' include areas considered to be natural vegetation and/or land cover types with varying levels of disturbance (e.g. from grazing practices) that are not considered as severe as the transformed areas. 'Predominantly Natural' areas are not mapped as ultimate negative areas in the final mapping overlays. This is due to the broad scale at which this data is available. In this regard, areas mapped as being predominantly natural may, in reality, be largely disturbed. This can only be determined at a site-specific level during the EIA process or through a site-specific survey of the proposed development area. Potentially sensitive areas on the site would be demarcated at the EIA stage for consideration in the layout design of the facility.

From the adjacent map it can be seen that the majority of the area to the south of Kleinsee is indicated as being predominantly natural at this scale. However, it is known that mining activities have been undertaken in this area, although the extent of disturbance on this proposed site have not yet been established.



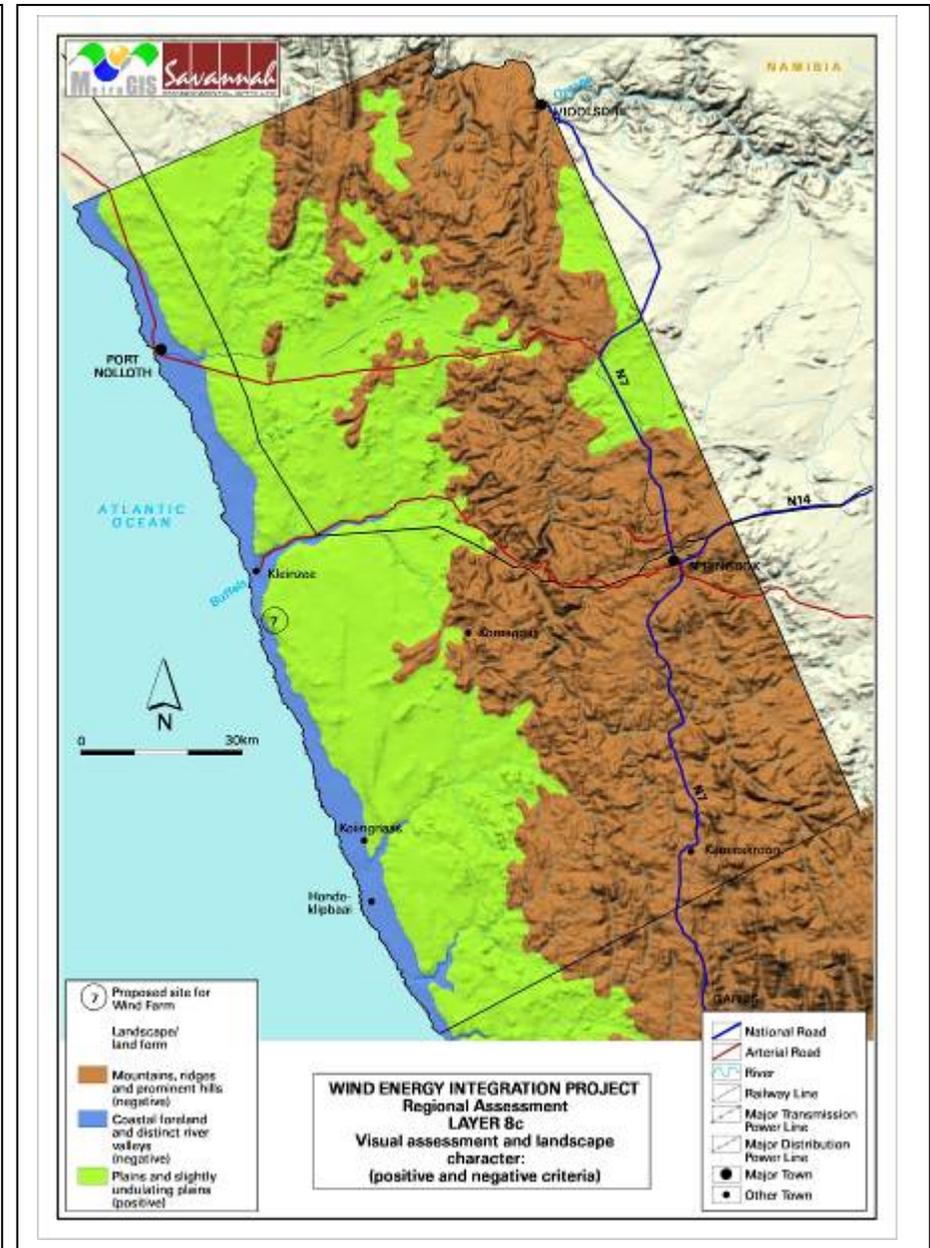
Layer 8b is a composite of the results of visibility analyses undertaken from vantage points along roads within the study area. The resultant index identifies areas that are more frequently exposed to both the national and provincial roads (highly visible areas); areas exposed to either the national road or the provincial roads (visible areas) and areas that are not exposed to any of the major roads within the study area.

From the adjacent map it can be seen that the area to the south of Kleinsee is indicated as being within a zone of low visual influence.



Layer 8c shows the major topographical units within the study area, identifying negative/sensitive units (river valleys, mountains, hills and coastal forelands) and open landscapes (positive units) in the form of large plains.

From the adjacent map it can be seen that the majority of the area to the south of Kleinsee is located within an area indicated as plains and slightly undulating plains. The areas closest to the coast are however located within the coastal foreland area.

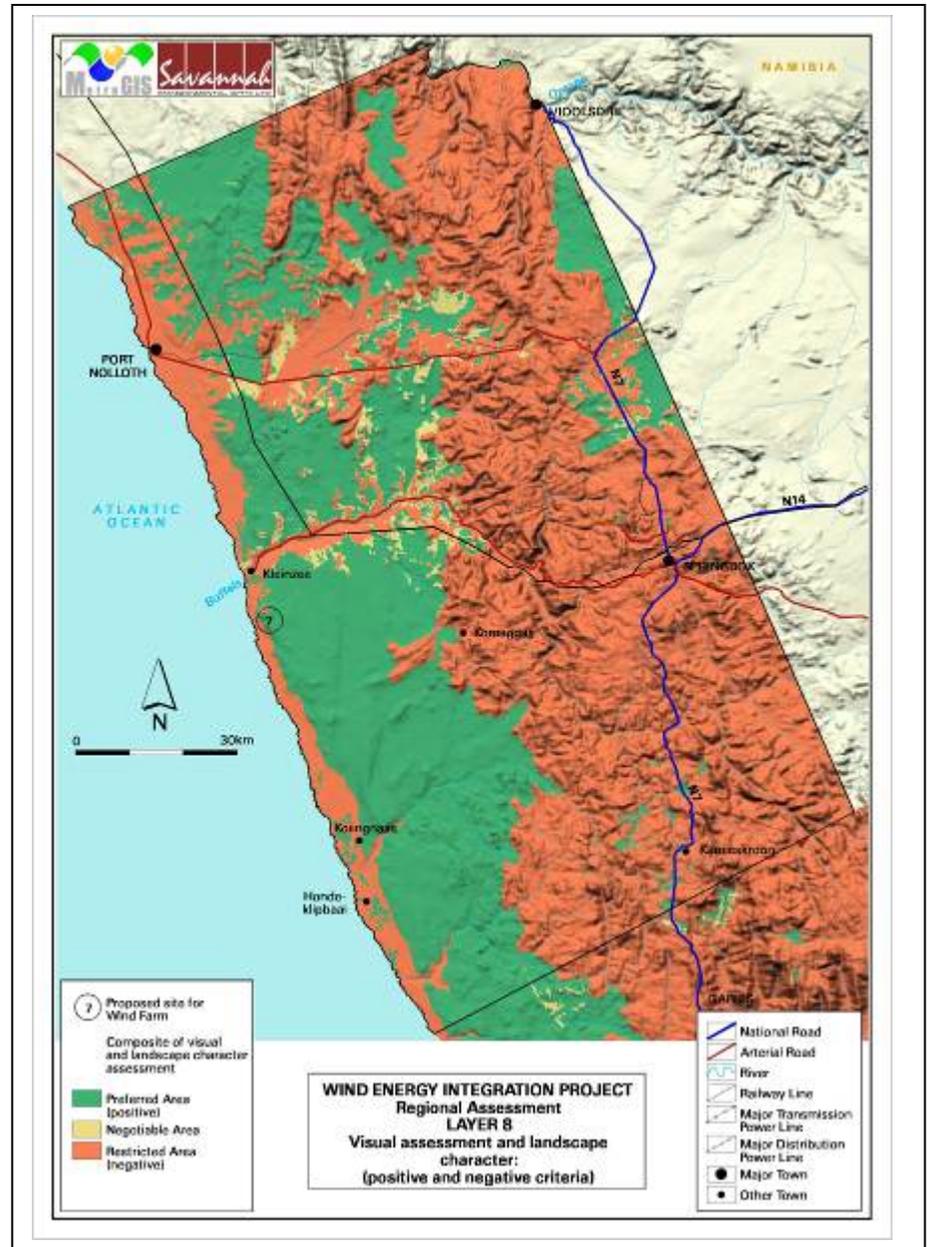


Layer 8 shows the composite result of the Landscape Character and Visual Assessment as *Preferred Areas*, *Negotiable Areas* and *Restricted Areas* for development.

The results displayed on Layer 8 are a composite of a criteria assessment of three input data categories, namely: vegetation/land cover, zone of visual influence and land form/topography. The input data categories were assessed in order to form positive or negative criteria that would aid in determining the landscape character and ultimately areas where development would be acceptable or areas where development would be unacceptable. The following table broadly indicates the positive or negative criteria per input category.

Input Category	Positive Criteria	Negative Criteria
Vegetation/Land Cover (Source: NLC2000)	Areas largely transformed by agriculture, mining, etc.	Areas with predominantly natural vegetation
ZVI Viewshed Analysis	Areas largely hidden from main transport routes (national and provincial roads)	Areas that are highly exposed from major transport routes
Land Form/Topography	Large plains	Mountains and hills, coastal forelands and river valleys/estuaries

From the adjacent map it can be seen that the majority of the area to the south of Kleinsee is located within an area indicated as being preferred. The area closest to the coast is indicated as being restricted due to this area being located within the coastal foreland area.



Composite Result - Preferred Areas for Development

The resultant composite of all the input criteria is illustrated in **Figure 4.1**. This map indicates **preferred areas for development** within all the study areas as various combinations of positive and negative criteria. The table below indicates the possible combinations (based on the DEA&DP study) that resulted in the preferred areas for development index that is displayed in the map legend.

No.	Description	Preference
1	Areas with more than 1 negative criteria	Highly restricted
2	Areas with one negative criteria	Restricted
3	Neutral areas (no positive or negative criteria)	Negotiable
4	Areas with one positive criteria (and no negative criteria)	Preferred
5	Areas with more than one positive criteria (and no negative criteria)	Highly preferred

The rating system utilised in the regional assessments takes a more 'risk adverse approach' than that put forward by the DEA&DP guideline. The rating system used assumes that a criteria rated as negative would always override a criteria rated as positive.

Definition of the terms used to define the level of preference:

- » **Highly Preferred / Preferred:** Low landscape value with a high to low capacity for change. Wind energy facility development may be possible, subject to site level assessment.
- » **Negotiable:** Low to high landscape values, but with a high capacity to absorb change. Wind energy development in these areas may be possible, subject to site level assessment.
- » **Restricted / High Restricted:** High value landscapes combined with low capacity of landscape to adapt to change. These areas should be restricted from wind energy facility development.

Figure 4.1 also shows the most favourable potential areas for development of a wind energy facility from an environmental perspective. The area has been identified by Eskom in line with the outcomes of the regional assessment, combined with technical considerations and feasibility (refer to section 4.4). The proposed methodology, as set out by the Western Cape Provincial Government guideline document for wind energy development also allows for the consideration of technical criteria, when available and relevant, particularly wind resource data. These have been considered by Eskom in the identification of a proposed site for development. It can be seen from the map which follows that the majority of the proposed site falls within *preferred* and *highly preferred* areas for development in terms of the results of the Regional Assessment. The area along the coastline is

indicated as being *restricted* due to the coastal buffer zone. The site is considered to be environmentally acceptable from the results of the Regional Assessment, and it is considered reasonable and feasible for further investigations to be undertaken on this site.

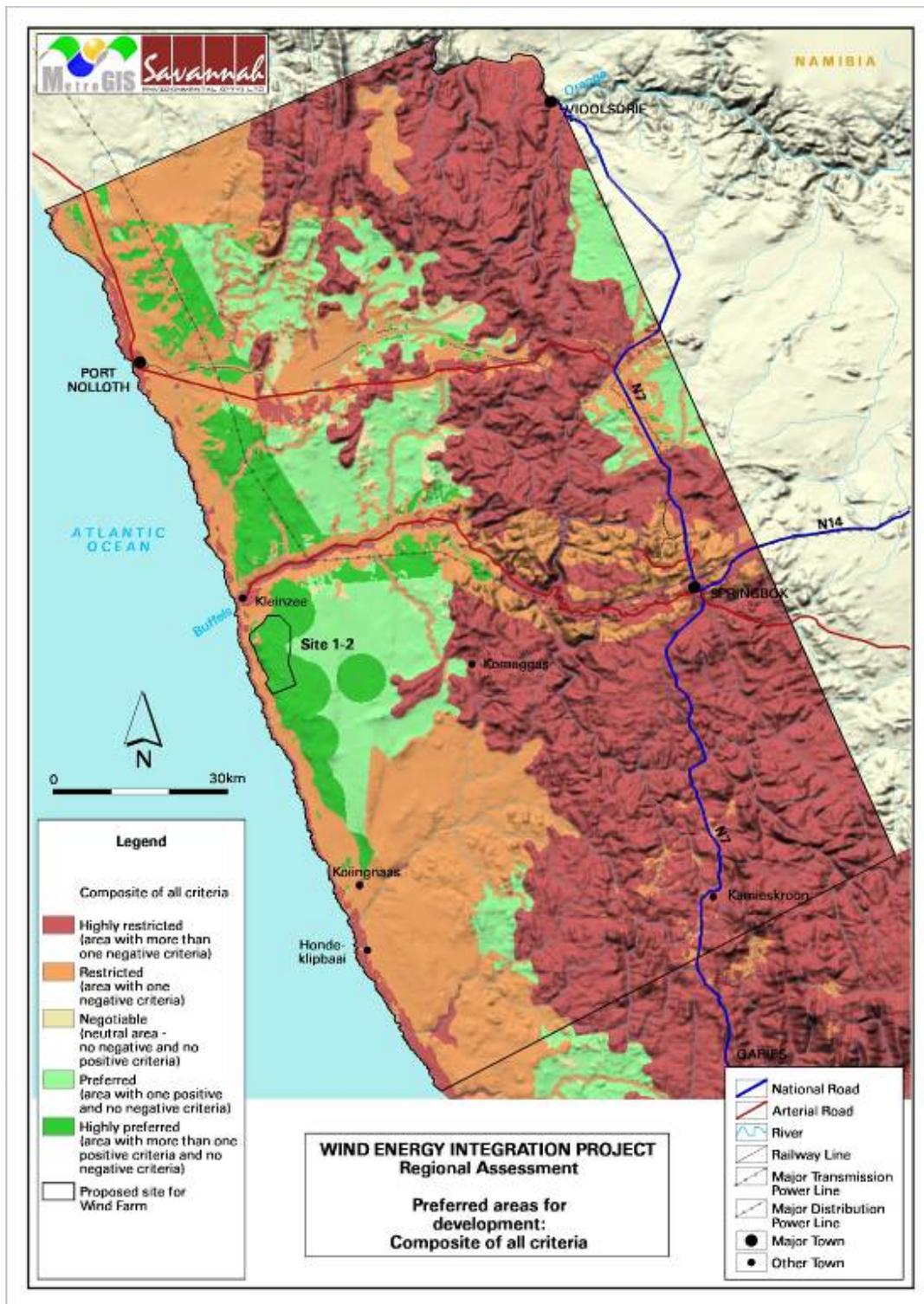


Figure 4.1: Composite map of all criteria of the Regional Assessment indicating the location of the proposed development site (indicated as Sites 1 and 2)

4.4. Discussion of Technical Factors Affecting the Placement of a Wind Energy Facility

The placement of a wind energy facility is highly dependent on technical factors – that is the available wind resource and the terrain. The technical considerations must, therefore, be weighed against other considerations (including environmental considerations) in the determination of a feasible site for the establishment of a viable wind energy facility.

4.4.1. Wind Resource Data and its Relevance to Wind Energy Facilities

The wind speed measured at a meteorological station is determined mainly by two factors:

- » the overall weather systems, which usually have an extent of several hundred kilometres, and
- » the nearby topography, extending to a few tens of kilometres from the station.

The importance of these factors is discussed in further detail in Chapter 3.

Strictly speaking, the direct use of measured wind speed data for wind resource calculations results in power estimates that are representative only for the actual position and height of the wind-measuring instruments. The application of measured wind speed statistics to wind energy resource calculations in a region therefore requires methods for the transformation of wind speed statistics. Great effort at an international level has gone into the development of simulation tools to estimate resource and terrain dependency, resulting in a comprehensive set of models for the horizontal and vertical extrapolation of meteorological data and the estimation of wind resources. The models are based on the physical principles of flows in the atmospheric boundary layer and they take into account the effect of different surface conditions, shading/sheltering effects due to hills or elevated topography, terrain roughness and relief, vegetation and other obstacles, as well as the modification of the wind imposed by the specific variations of the height of ground around the meteorological station in question. Specialised software (WA_sP - developed by Risø in Denmark), is used by Eskom in the analysis of wind and terrain data on the west coast.

4.4.2. The Terrain and its Relevance to Wind Energy Facilities

The terrain on the west coast can be described as land with an open appearance of roughness length 0,05 m, as defined by the following:

- » Terrain class I, i.e. water areas, open farmland, etc.

- » Nearby sheltering obstacles such as cliff faces, dunes and valleys.
- » Terrain height variations (topography), the most important factor in the study area.

The effect of height variation/relief in the terrain is seen as a speeding-up/slowing-down of the wind due to the topography. These effects of terrain height variations on the wind profile can most clearly be demonstrated by the well-known results from the international field experiments at the Askervein Hill on the Isle of South Uist in the Hebrides (Taylor and Teunissen, 1987; Salmon et al, 1987). Figure 4.2 shows a perspective plot of the Askervein Hill. The line along which measurements of wind speed and direction were recorded is indicated by the meteorological towers in Figure 4.2.

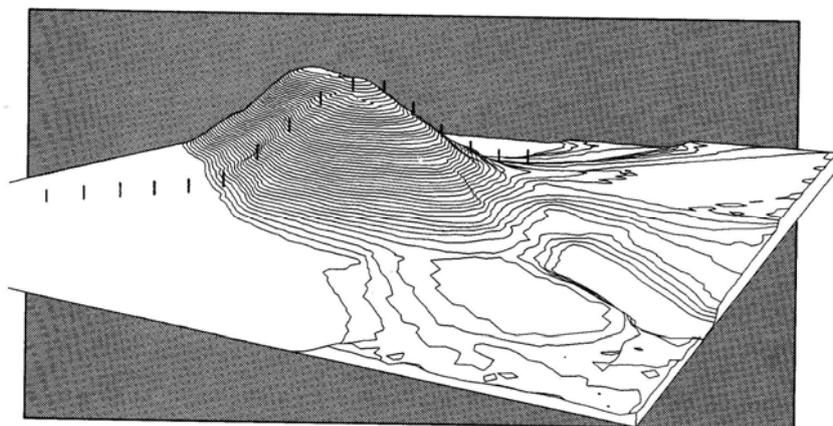


Figure 4.2: Perspective plot of the Askervein Hill

The experimental data recorded is illustrated in Figure 4.4 with the relative speed-up/slow-down (ΔS) at 10 m above ground level plotted against the distance from the crest. The relative speed variation ΔS is defined as:

$$\Delta S = \frac{u_2 - u_1}{u_1} \quad (1)$$

where u_2 and u_1 are the wind speeds at the same height above ground level at the top of the hill and over the terrain upstream of the hill, respectively.

From the results the following can clearly be seen:

- » The speed-up at the crest is 80% as compared with the undisturbed upstream mean wind speed.
- » The negative speed-up (slow-down) in the front and lee of the elevated ground/hill is 20% to 40% as compared with the undisturbed upstream mean wind speed.

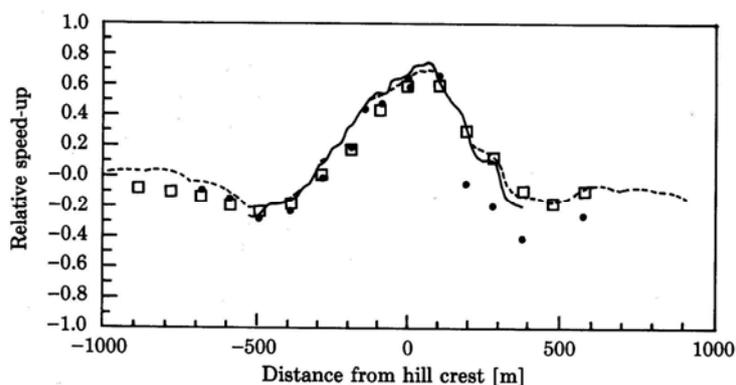


Figure 4.3: Relative speed-up ratios for flow over the Askervein hill at 10m above ground level. Measurements are indicated by dots and results from the orographic model by squares

If R is defined as the characteristic radius of the elevated ground/hill, typically at the half-width diameter with h the height an approximate expression for ΔS can be found in Jensen *et al.* (1984):

$$\Delta S = 2 \frac{h}{R} \quad (2)$$

It is evident from the above example that elevated ground/hills exert a profound influence on the flow of air, and this has to be taken into account in the placement of turbines. It is often difficult (and impossible in complicated terrain) to apply simple formulas such as Equation 2. For this reason, it is necessary to determine the wind resource at specific locations and then in most cases to use a numerical fluid dynamic model for the calculations as found typically in WA_sP.

4.4.3. Consideration of Technical Factors

The identified area as indicated in Figure 4.1 is, in terms of the results of the Regional Assessment, a preferred area for development. The placement of a wind energy facility in this area must, however, consider the following technical factors:

- » Predominant wind direction
- » Distance from coast
- » Obstruction obscuring the wind farm in the topography (dunes etc. causing shading effects and turbulence of air flow)
- » Land - size and availability for layout
- » Effect of adjacent turbines – minimum spacing (due to wake turbulence)
- » Practicality of layout (underground electrical infrastructure length and interlinking roads)

Based on the consideration of the above factors, as well as the outcomes of the Regional Assessment process (which considers environmental and planning criteria), a potentially feasible site for further investigation has been identified (refer to Figure 4.4).

4.5. Identification of a Site for Investigation in the EIA Process

Following the regional assessment, it was Eskom's intention to proceed with an EIA process for the proposed wind energy facility. As this Regional Assessment and consideration of technical factors has guided Eskom to site/locate their proposed facility within an area/zone of preference (as per the regional methodology followed), no alternative locations/sites will be required to be considered through the EIA process.

The demarcated area is an indicative area (approximately 8 682 ha.in extent) considered to be favourable/most viable for the development of a large-scale Wind Energy Facility. This area comprises the following farm portions:

- » RE of Brazil 329
- » RE of Goraap 323,
- » RE of Honde Vlei 325,
- » RE of Kannabieduin 324,
- » Portions 4 of Rooivlei 327 (refer to Figure 4.2).

The demarcated area is considerably larger than that area required for the facility (as only ~10% of the proposed site will be disturbed by the proposed wind energy facility), which allows for a degree of flexibility in turbine placement to accommodate both technical factors (wind resource and/or lie of the land) and environmental factors (sensitive environmental receptors). This broader area (as reflected in Figure 4.4) has been considered within this Final Scoping Report.

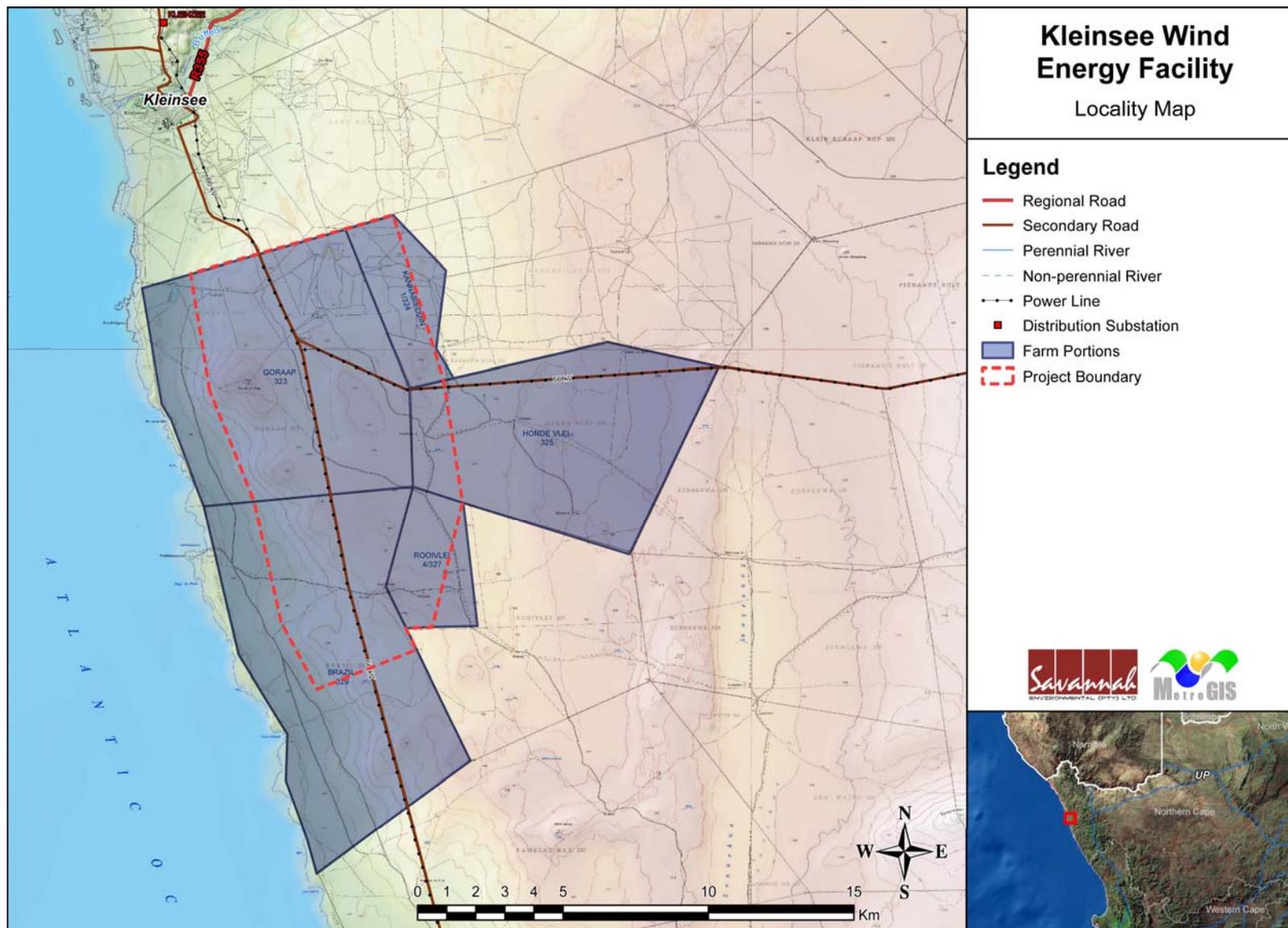


Figure 4.4: Locality map showing the study area for the establishment of the Kleinsee 300MW Wind Farm

APPROACH TO UNDERTAKING THE SCOPING PHASE

CHAPTER 5

An Environmental Impact Assessment (EIA) refers to the process involving the identification and assessment of direct, indirect and cumulative environmental impacts associated with a proposed project. The EIA process comprises two Phases: a **Scoping Phase** and an **EIA Phase**. The Scoping Phase culminates in the submission of a Scoping Report to the Department of Environmental Affairs as the competent authority for review and acceptance before proceeding onto the EIA Phase of the process. The EIA Phase culminates in the submission of an Environmental Impact Report (EIR), including an Environmental Management Programme (EMP), to the competent authority for review and decision-making.

The phases of the EIA process are as follows:



Figure 5.1: The four phases of the EIA process

The Scoping Phase for the proposed Kleinzee 300MW Wind Farm has been undertaken in accordance with the EIA Regulations GNR543, published in Government Notice 33306 of 18 June 2010, in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No. 107 of 1998). This **Final Scoping Report** aimed to identify and describe potential environmental impacts associated with the proposed project and to define the extent of the specialist studies required within the EIA process. This was achieved through an evaluation of the proposed project involving specialists (with expertise relevant to the nature of the project and the study area), the project proponent, as well as a consultation process with key stakeholders, relevant government authorities and **interested and affected parties (I&APs)**. This chapter outlines the process which was followed during the Scoping Phase of the EIA process and outlines the applicable legislation for the proposed project.

5.1. Objectives of the Scoping Phase

The Scoping Phase aims to:

- » Describe the **baseline/affected environment** prior to development.
- » **Identify potential environmental and social impacts** (both positive and negative) associated with the construction and operation phases of the proposed development, through a desktop review of existing baseline data and specialist studies.
- » Make **recommendations regarding more detailed studies** required in the EIA phase of the process.
- » Provide **interested and affected parties** with an opportunity to have **input** on the proposed project through consultation and review of the Draft Scoping Report.
- » Provide the authorities with **sufficient information** in order to make a decision regarding the scope of issues to be addressed in the EIA process, as well as regarding the scope and extent of specialist studies that will be required as part of the EIA Phase.

Within this context, the objectives of this Scoping Phase are to:

- » Describe the **scope** and **nature** of the proposed development.
- » Describe the reasonable and feasible project-specific **alternatives** to be considered through the EIA process, including the 'no-go' option.
- » Identify and evaluate key **environmental issues or impacts** associated with the proposed project and, through a process of broad-based consultation with I&APs and stakeholders and desk-top specialist studies, identify those issues to be assessed in more detail in the EIA Phase of the EIA process.
- » Conduct an open, participatory and transparent **public involvement process** and facilitate the inclusion of I&AP and stakeholder concerns regarding the proposed project in the decision-making process.

5.2. Regulatory and Legal Context

The regulatory hierarchy for an energy generation project of this nature consists of three tiers of authority which exercise control through both statutory and non-statutory instruments – that is National, Provincial and Local levels.

As wind energy developments are multi-sectoral, encompassing economic, spatial, biophysical, and cultural dimensions, various statutory bodies are likely to be involved in the approval process for the proposed facility.

5.2.1. Regulatory Hierarchy

At the National Level, the main regulatory agencies are:

- » *Department of Energy*: This department is responsible for policy relating to all energy forms, including renewable energy, and are responsible for forming and approving the IRP (Integrated Resource Plan for Electricity). Wind energy is considered under the White Paper for Renewable Energy (2003) and the Department undertakes research in this regard. It is the controlling authority in terms of the Electricity Regulation Act (Act No 4 of 2006).
- » *National Energy Regulator of South Africa (NERSA)*: This body is responsible for regulating all aspects of the electricity sector, and will ultimately issue licenses for wind energy developments to generate electricity.
- » *Department of Environmental Affairs (DEA)*: This department is responsible for environmental policy and is the controlling authority in terms of NEMA and the EIA Regulations. The DEA is the competent authority for this project, and charged with granting the relevant environmental authorisation.
- » *The South African Heritage Resources Agency (SAHRA)*: The National Heritage Resources Act (Act No 25 of 1999) and the associated provincial regulations provides legislative protection for listed or proclaimed sites, such as urban conservation areas, nature reserves and proclaimed scenic routes.
- » *Civil Aviation Authority (CAA)*: This department is responsible for aircraft movements and radar, which are aspects that influence wind energy development location and planning.
- » *South African National Roads Agency (SANRAL)*: This agency of the Department of Transport is responsible for all National road routes.
- » *Department of Water Affairs (DWA)*: This department is responsible for effective and efficient water resources management to ensure sustainable economic and social development.
- » *Department of Forestry and Fishery (DAFF)*: This department the custodian of South Africa's agriculture, fisheries and forestry resources and is primarily responsible for the formulation and implementation of policies governing the Agriculture, Forestry and Fisheries Sector.

At the Provincial Level, the main regulatory agencies are:

- » *Provincial Government of the Northern Cape – Department of Environment and Nature Conservation (DENC)*: This department is the commenting authority for this project.
- » *Department of Transport and Public Works (Northern Cape)*: This department is responsible for roads and the granting of exemption permits for the conveyance of abnormal loads on public roads.
- » *Ngwao Boswa ya Kapa Bokone (Northern Cape Heritage Authority)*: This body is responsible for all heritage related issues in the Northern Cape Province.

- » *The Department of Agriculture:* This department is responsible for all matters which affects agricultural land.

At a local level, the local and municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. The Nama Khoi Local Municipality was identified as having jurisdiction over the area in which the proposed facility is foreseen to be established. The Nama Khoi Local Municipality also forms part of the Namakwa District Municipality. Both of these municipalities will be consulted with throughout the EIA process.

There are also numerous non-statutory bodies and environmental lobby groups that play a role in various aspects of planning and the environment that will influence wind energy development.

5.2.2. Legislation and Guidelines that have informed the preparation of this Scoping Report

The following legislation and guidelines have informed the scope and content of this Final Scoping Report:

- » National Environmental Management Act (Act No. 107 of 1998)
- » EIA Regulations, published under Chapter 5 of the NEMA (GNR R543 in Government Gazette 33306 of 18 June 2010)
- » Guidelines published in terms of the NEMA EIA Regulations, in particular:
 - * Companion to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2010 (Draft Guideline; DEA, 2010)
 - * Public Participation in the EIA Process (DEA, 2010)
 - * Integrated Environmental Management Information Series (published by DEA)
- » International guidelines – the Equator Principles and the International Finance Corporation and World Bank Environmental, Health, and Safety Guidelines for Wind Energy (2007)

Several other Acts, standards or guidelines have also informed the project process and the scope of issues evaluated in the Scoping Phase and to be addressed in the EIA Phase. A listing of relevant legislation is provided in Table 5.1. A more detailed review of legislative requirements applicable to the proposed project will be included in the EIA Phase.

Table 5.1: Initial review of relevant policies, legislation, guidelines and standards applicable to the proposed Kleinzee 300MW Wind Farm

Legislation	Applicable Sections
National Legislation	
Constitution of the Republic of South Africa (Act No 108 of 1996)	<ul style="list-style-type: none"> » Bill of Rights (S2) » Environmental Rights (S24) – i.e. the right to an environment which is not harmful to health and well-being » Rights to freedom of movement and residence (S22) » Property rights (S25) » Sufficient water (s27.1.b) » Access to information (S32) » Right to just administrative action (S33) » Recognition of international agreements (S231)
National Environmental Management Act (Act No 107 of 1998)	<ul style="list-style-type: none"> » National environmental principles (S2), providing strategic environmental management goals and objectives of the government applicable throughout the Republic to the actions of all organs of state that may significantly affect the environment » NEMA EIA Regulations (GN R543 of 18 June 2010) published in terms of Chapter 5 of the NEMA » Public Participation (S2) » The requirement for potential impact on the environment of listed activities must be considered, investigated, assessed and reported on to the competent authority (S24 – Environmental Authorisations) » Duty of Care (S28) requiring that reasonable measures are taken to prevent pollution or degradation from occurring, continuing or recurring, or, where this is not possible, to minimise & rectify pollution or degradation of the environment » Procedures to be followed in the event of an emergency incident which may impact on the environment (S30) » Appeals against decisions made by authorities (S43)
Environment Conservation Act (Act No 73 of 1989)	<ul style="list-style-type: none"> » National Noise Control Regulations (GN R154 dated 10 January 1992)
National Heritage Resources Act (Act No 25 of 1999)	<ul style="list-style-type: none"> » Stipulates assessment criteria and categories of heritage resources according to their significance (S7) » Provides for the protection of all archaeological

Legislation	Applicable Sections
	<p>and palaeontological sites, and meteorites (S35)</p> <ul style="list-style-type: none"> » Provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority (S36) » Lists activities which require developers any person who intends to undertake to notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development (S38) » Requires the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction (S44)
National Environmental Management: Biodiversity Act (Act No 10 of 2004)	<ul style="list-style-type: none"> » Provides for the MEC/Minister to list ecosystems which are threatened and in need of protection (S52) – none have as yet been published » Provides for the MEC/Minister to identify any process or activity in such a listed ecosystem as a threatening process (S53) - none have as yet been published » A list of threatened & protected species has been published in terms of S 56(1) - Government Gazette 29657. » Three government notices have been published, i.e. GN R 150 (Commencement of Threatened and Protected Species Regulations, 2007), GN R 151 (Lists of critically endangered, vulnerable and protected species) and GN R 152 (Threatened or Protected Species Regulations).
National Environmental Management: Air Quality Act (Act No 39 of 2004)	<ul style="list-style-type: none"> » National, provincial and local ambient air quality standards (S9 - 10 & S11) » Listed Activities (S21) » Atmospheric Emissions Licenses (S22) » Measures in respect of dust control (S32) – no regulations promulgated as yet » Measures to control noise (S34) - no regulations promulgated as yet
Conservation of Agricultural Resources Act (Act No 43 of 1983)	<ul style="list-style-type: none"> » Prohibition of the spreading of weeds (S5) » Classification of categories of weeds & invader plants (Regulation 15 of GN R1048) & restrictions in terms of where these species may occur » Requirement & methods to implement control measures for alien and invasive plant species (Regulation 15E of GN R1048)

Legislation	Applicable Sections
	» Soil protection/conservation, and erosion control
National Water Act (Act No 36 of 1998)	<ul style="list-style-type: none"> » National Government is the public trustee of the Nation's water resources (S3) » Entitlement to use water (S4) – entitles a person to use water in or from a water resource for purposes such as reasonable domestic use, domestic gardening, animal watering, fire fighting and recreational use, as set out in Schedule 1 » Duty of Care to prevent and remedy the effects of pollution to water resources (S19) » Procedures to be followed in the event of an emergency incident which may impact on a water resource (S20) » Definition of water use (S21) » Requirements for registration of water use (S26 and S34) » Definition of offences in terms of the Act (S151)
Water Services Act (Act No 108 of 1997)	» No person may dispose of industrial effluent except in a manner approved by the water services provider (S7)
Aviation Act (Act No 74 of 1962)	<ul style="list-style-type: none"> » 13th amendment of the Civil Aviation Regulations (CARs) 1997 » The Minister of Transport has under section 22(1) of the Aviation Act, 1962 made the regulations in the Schedule hereto. » Obstacle limitations and marking outside aerodrome or heliport - CAR Part 139.01.33
National Environmental Management Waste Act (Act No 59 of 2008)	<ul style="list-style-type: none"> » Waste management measures » Regulations and schedules (Schedule A & B) » Listed activities requiring waste licenses (including the storage and disposal of general and hazardous waste) » Waste disposal practices (S20) » Contamination
National Forests Act (Act No 84 of 1998)	<ul style="list-style-type: none"> » Protected trees » Conservation of forests
National Roads Act (Act No 7 of 1998)	» Policy concerning use and management of national roads.
Provincial legislation	
Northern Cape Growth and Development Strategy (2004-2014)	» Considers reduction of poverty within the Northern Cape through long-term sustainable economic growth and development
Northern Cape Nature Conservation Act, No. 9 of 2009	» This Act provides for the sustainable utilisation of wild animals, aquatic biota and plants; provides for the implementation of the Convention on

Legislation	Applicable Sections
	<p>International Trade in Endangered Species of Wild Fauna and Flora; provides for offences and penalties for contravention of the Act; provides for the appointment of nature conservators to implement the provisions of the Act; and provides for the issuing of permits and other authorisations. Amongst other regulations, the following may apply to the current project:</p> <ul style="list-style-type: none"> * Boundary fences may not be altered in such a way as to prevent wild animals from freely moving onto or off of a property. * Aquatic habitats may not be destroyed or damaged. * The owner of land upon which an invasive species is found (plant or animal) must take the necessary steps to eradicate or destroy such species. <p>» The Act provides lists of protected species for the Province.</p>
Guideline Documents	
South African National Standard (SANS) 10328, Methods for environmental noise impact assessments in terms of NEMA No. 107 of 1998	<p>» Prediction of impact that noise emanating from a proposed development would have on occupants of surrounding land by determining the rating level.</p> <p>» Noise limits are based on the acceptable rating levels of ambient noise contained in SANS 10103</p>
Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads	<p>» Outlines the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits</p>
The White Paper on Renewable Energy (2003)	<p>» National targets for renewable energy generation</p>
Nama Khoi Local Municipality 2011/2012 Revision	<p>» to provide the overarching strategic framework for the sustainable long-term management of the relevant municipality</p>

5.3. Methodology for the Scoping Phase

The Scoping Phase has been undertaken in accordance with the EIA Regulations published in Government Notice 33306 of 18 June 2010, in terms of NEMA. Key tasks undertaken within the scoping phase are discussed in more detail below.

5.3.1. Authority Consultation and Application for Authorisation in terms of GN No R543 of 2010

As this is an energy generation project, and Eskom is a State Owned Company (SOC), the National Department of Environmental Affairs (DEA) is the competent authority for this application. As the project falls within the Northern Cape Province, the Department of Environment and Nature Conservation, Northern Cape (DENC) will act as the commenting authority for the application. Consultation with both these authorities has been undertaken throughout the Scoping process and has included the following:

- » Pre-application consultation with DEA regarding the proposed project and the Scoping/EIA processes to be undertaken.
- » Submission of an application for authorisation to DEA with a copy submitted to DENC. This application was accepted and reference number **12/12/20/2212** was allocated; acceptance was granted to continue with the Scoping Phase.

A record of all authority consultation undertaken prior to and within the Scoping Phase is included within Appendix B.

5.3.2. Public Participation Process

The aim of the public participation process is primarily to ensure that information containing all relevant facts in respect of the application is made available to potential stakeholders and I&APs. Furthermore, participation by potential I&APs is facilitated in such a manner that all potential stakeholders and I&APs are provided with a reasonable opportunity to comment on the application. And lastly, all comments received from stakeholders and I&APs are recorded, which serve to further direct the specialist studies and the EIA process.

Key steps in the public participation included:

1. Identification of I&APs and establishment of the I&AP Database

Identification of I&APs was undertaken by **Sustainable Futures ZA** (specialist public participation consultant) through existing contacts and databases, recording responses to site notices and newspaper advertisements as well as through the process of networking. The key stakeholder groups identified include:

- * Provincial and local government departments (including DEA, DENC, SAHRA, DWA, DAFF, SANRAL, etc.)
- * Government structures (including the provincial roads authority, municipal planning departments, etc)

- * Nama Khoi Local Municipality and Namakwa District Municipality
- * Potentially affected and neighbouring landowners and tenants
- * Local authorities
- * Conservation authorities
- * CBOs and other NGOs.

The I&AP details were recorded within an I&AP database (refer to Appendix C for a listing of I&APs). The database will be updated on an on-going basis during the EIA process.

2. Distribution Background Information Documents and Reply Forms

In order to provide information regarding the proposed project and the EIA process, a background information document (BID) and reply form for the project was compiled (refer to Appendix E). The BID was distributed to identified stakeholders and I&APs, and additional copies were made available at public venues within the broader study area. BIDs were distributed as follows:

- * Namaqua National Park
- * "Die Houthoop" with one of the ward councillors for the Springbok area- Veronica van Dyk (Nama Khoi Local Municipality)
- * Magda van Wyk at De Beers Mine in Kleinsee
- * Springbok: Namakwa District Municipality (Office of the Municipal Manager)
- * Nama Khoi Local Municipality - Maureen Auret assistant to Aubrey Baartman
- * Willem Goedeman- ward councillor for Springbok/ Kleinsee area
- * Komaggas community
- * Buffelsrivier community
- * Eskom Distribution division

3. Site Notices

Site advertisements were posted at various accessible locations throughout the study area and included locations on-site, on accessible farm portions; and in the town of Kleinsee itself (refer to Appendix D).

The following site notices were placed around the study area:

A3 notices:

- * Honde Vlei farm- gate
- * Goraap – gate
- * Brazil-gate
- * Spar at Kleinsee

A4 notices:

- * Stuck on pillar outside FNB in Kleinsee
- * Stuck on the Door of Komaggas Mini Mart
- * Notice board of Komaggas Polisie diens
- * Notices and fliers left at the Nama Khoi Local Municipality

Fliers:

- * 140 fliers were left at the Kleinsee post office for each post box
- * Some fliers were left at the coffee shop next to FNB bank at Kleinsee

4. Newspaper Advertisements

In order to notify and inform the public of the proposed project and invite members of the public to register as I&APs; the project and EIA process was advertised in the following newspapers as follows:

- * Die Burger: 15 April 2011
- * Die Namakwalander: 15 April 2011
- * Die Namakwa Kletz: May 2011 publication

A second round of newspaper adverts informing the public of the public meeting was also placed in "Die Burger" (29th September 2011) and "Die Namakwalander" (29th September 2011) (refer to Appendix D).

5. Meetings with stakeholders

The public participation process has been structured in a manner which allows for consultation with I&APs at various levels and with different stakeholder groups.

Stakeholders were invited to attend a public meeting held on 13 October 2011. Focus group meetings were held with key stakeholders. The following focus group meetings took place on 13 October 2011:

- * Komaggas community and ward councillor
- * Buffelsrivier community and ward councillor

In order to facilitate comments on the Draft Scoping Report, a **Public feedback meeting** was held before the release of the Draft Scoping Report on 13 October 2011, at the Kleinsee Recreational Hall.

(Refer to Appendix E for all minutes of meetings)

6. Other forms of Public Involvement

In addition to the newspaper advertisements and site notices, key stakeholders and registered I&APs were notified in writing of the commencement of the EIA process. These parties included, *inter alia*:

- * Relevant parties from municipalities potentially affected (directly or indirectly) by the proposed project
- * Potentially affected landowners
- * Organs of state having jurisdiction in respect of any aspect of the activity, including:
 - Department of Energy
 - Department of Water Affairs
 - NERSA
 - Department of Agriculture, Fisheries and Forestry (DAFF)
 - South African Heritage Resources Agency
 - Ngwao Boswa ya Kapa Bokone
 - Conservation authorities (WESSA etc.)
 - Department of Transport and Public Works (Northern Cape) and various municipal roads departments
 - South African National Roads Agency
 - Northern Cape Department of Agriculture Land Reform and Rural Development Civil Aviation Authority
 - Nama Khoi Local Municipality
 - Namakwa District Municipality

Through consultation with key stakeholders and I&APs, issues for inclusion within the issues-based scoping study were identified and confirmed. In order to accommodate the varying needs of stakeholders and I&APs within the study area, as well as capture their views, issues and concerns regarding the project, various opportunities were provided for I&APs to have their issues noted following the release of this Final Scoping Report for public review; this would include:

- * One-on-one consultation meetings (for example with the directly affected landowner);
- * Telephonic consultation sessions (consultation with various parties from the EIA project team, including the public participation consultant, lead EIA consultant as well as specialist consultants); and
- * Written, faxed or e-mail correspondence.

Networking with I&APs will continue throughout the duration of the Scoping and EIA processes.

5.3.3. Identification and Recording of Issues and Concerns

Issues and concerns raised by I&APs during the Scoping Phase were consolidated in a **Comments and Response Report** (a comments and response report is attached to this final scoping report containing comments from the focus group and public meetings held prior to the release of the draft scoping report and comments received during the public review period of the draft scoping report—refer to appendix E2). The Comments and Response Report includes responses from members of the EIA project team and/or the project developer to either indicate how the issues will be addressed in the EIA Phase, or to provide clarification. Where issues are raised that the EIA team considers beyond the scope and purpose of this EIA process, clear reasoning for this view will be provided.

5.3.4. Evaluation of Issues Identified through the Scoping Process

Potential direct and indirect environmental impacts that are identified within the Scoping Phase have been evaluated through desk-top studies. In evaluating potential impacts, Savannah Environmental has been assisted by the following specialist consultants:

Specialist	Area of Expertise	Refer Appendix
David Hoare of David Hoare Consulting cc	Terrestrial Fauna	Appendix F
Dave McDonald of BergWind Botanical Surveys	Vegetation	Appendix G
Rob Simmons	Avifauna	Appendix H
Johan van der Waals of Terrasoil Science	Geology, soils and agricultural potential study)	Appendix I
Werner Marais of Animalia	Bat	Appendix J
Lourens du Plessis of MetroGIS	Visual	Appendix K
Jayson Orton of ACO	Heritage / Archaeology	Appendix L
John Pether	Palaeontology	Appendix M
Morne de Jager of Menco (M2 Environmental Connections cc)	Noise	Appendix N
Tony Barbour of Tony Barbour Consulting and Research	Social Impact	Appendix O

In order to evaluate issues and assign an order of priority, it was necessary to identify the characteristics of each potential issue/impact:

- » *the nature*, which includes a description of what causes the effect, what will be affected and how it will be affected

- » *the extent*, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development) or regional

The evaluation of the issues resulted in a statement regarding the potential significance of the identified issues, as well as recommendations regarding further studies required within an EIA (refer to Appendices F – O).

5.3.5. Public Review of Draft Scoping Report and Feedback Meeting

This was the previous stage of the Scoping Phase; the Draft Scoping Report was made available for public review from **12 December 2011 – 30 January 2012** at the following locations:

- » www.savannahsa.com
- » www.eskom.co.za/eia
- » Kleinsee Tourism centre
- » Buffelsrivier office of the Nama Khoi Municipality
- » Komaggas office of the Nama Khoi Municipality
- » Springbok Public Library

5.3.6. Final Scoping Report

This is the current and final stage in the Scoping Phase which entails the capturing of responses from I&APs on the Draft Scoping Report in order to refine the draft scoping report. It is this final report upon which the decision-making environmental authorities provide comment, recommendations and acceptance to undertake the EIA Phase of the process.

DESCRIPTION OF THE AFFECTED ENVIRONMENT

CHAPTER 6

This section of the Final Scoping Report provides a description of the environment from a desktop perspective that may be affected by the proposed Kleinzee 300MW Wind Farm located south of Kleinsee in the Northern Cape Province. 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 be directly or indirectly affected by, or could affect, the proposed development have been described. This information has been sourced from both existing information available for the area as well as collected field data undertaken by specialists who have a working knowledge of the area, and aims to provide the context within which this EIA is being conducted. A more detailed description of each aspect of the affected environment is included within the specialist scoping reports contained within Appendices F - O.

6.1 Regional Setting

At a broad scale the study area is located in Namaqualand in the Nama Khoi Local Municipality of the Northern Cape Province. The survey area lies between 29° 42' 28" and 29° 51' 30" south and 17° 04' 01" and 17° 10' 45" east, 75 km west of the town of Springbok. The site falls within the quarter degree grids 2917CA and 2917CC, and is situated along the West Coast of South Africa within 2 km of the coastline.

At a more site-specific scale the wind farm study area is located approximately 6 km south of the small town of Kleinsee within the De Beers Diamond Mine area on the coast of Namaqualand, inland of Melkbospunt, Jakkalsbaai and Thys se Baai. Large parts of the region are mine-owned, and as a result, significant diamond mining activities are evident, especially within a 7km band along the coast.

Other than the mining activity, industrial infrastructure within the region includes a network of distribution power lines, a distribution substation in Kleinsee and the Gromis Transmission Substation. A 400kV transmission line will link the Kleinzee 300MW Wind Farm to the Gromis Substation that is approximately 16 km north-east of the proposed development site.

The Namaqua National Park lies approximately 45km to the south east and is therefore outside of the study area (and not shown on the maps in the visual assessment- refer to Appendix K). Of relevance, however, is the location of the

proposed Wind Farm within an area demarcated as a *Priority Natural Area* by the SANParks Planning Department (Refer to Figure 6.2).

The greater region is generally seen as having a high scenic value and high tourism value potential. It is well known for its scenic natural beauty (West Coast as a whole) and annual wild flower displays (Namaqualand)⁶. This occurs once a year between July and October, depending on a number of environmental factors, but mainly the occurrence and duration of rainfall. The length of the display is also highly variable, and depends on the rainfall.

Within this scenic context, it is noteworthy that the mining areas along the coastline are significantly disturbed and visually apparent due to the scale and nature of the surface based mining. In this respect the visual quality of the receiving environment is already impacted upon to some extent.

6.2 Location of the Study Area

The location of the proposed area for the development of the Wind Farm includes portions (parts of) of the following farms:

- » RE of Brazil 329
- » RE of Goraap 323,
- » RE of Honde Vlei 325,
- » RE of Kannabieduin 324,
- » Portion 4 of Roivlei 327

The proposed power line linking the facility to the grid is proposed between the site and the Gromis substation located approximately 16km to the north. Four alternative corridors have been proposed by Eskom for investigation through this EIA process. These proposed power line corridors cross both De Beers owned land and privately-owned land.

⁶ Namaqualand stretches from the small town of Garies in the south to the Orange River to the north, its western border is the wild Atlantic coast, the remote town of Pofadder marks the eastern border (<http://www.discoverthecape.com/namaqualand/flower-route.html>)

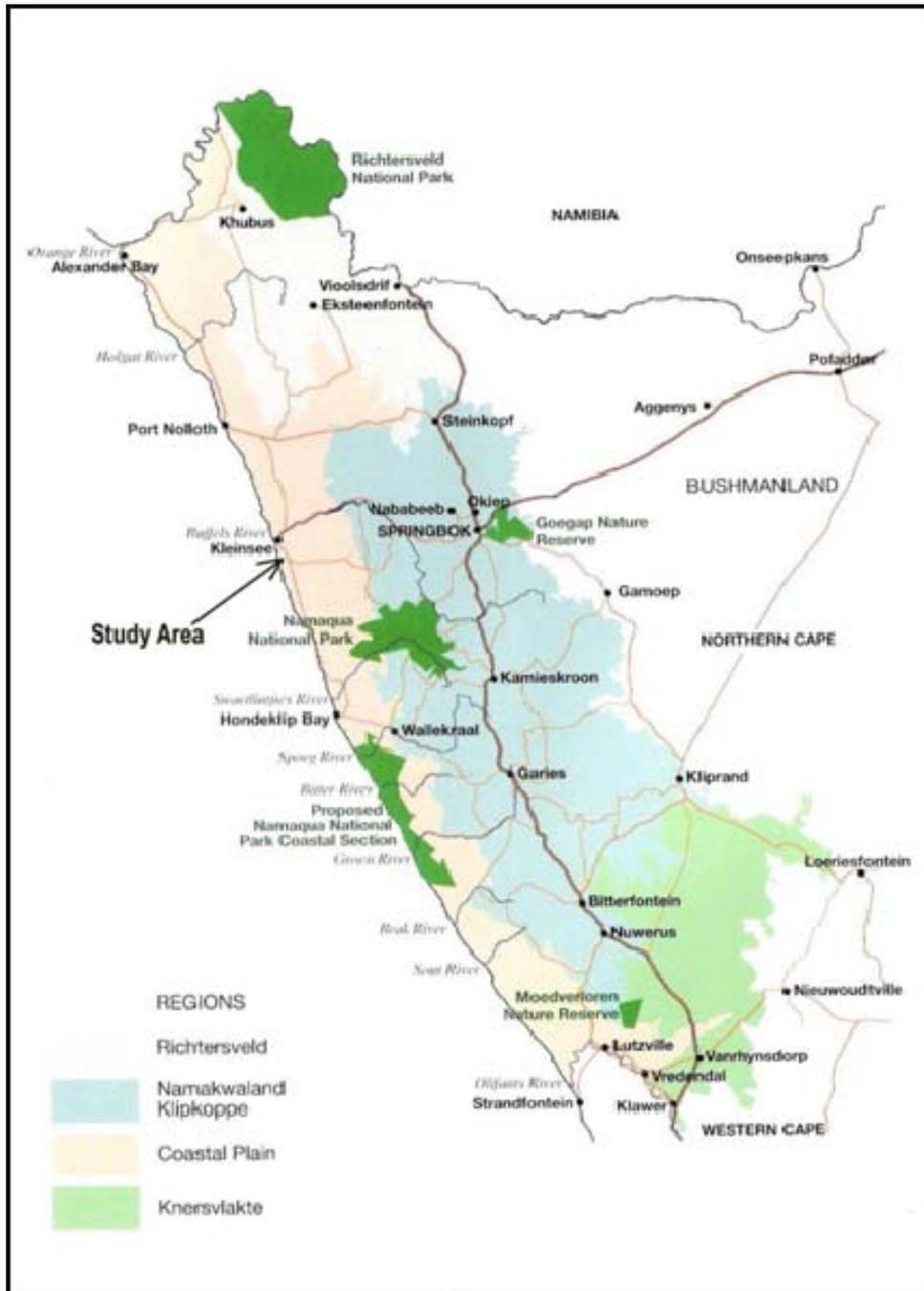


Figure 6.1: Broad regions of Namaqualand after Le Roux (2005), showing the position of the study area within a regional context.

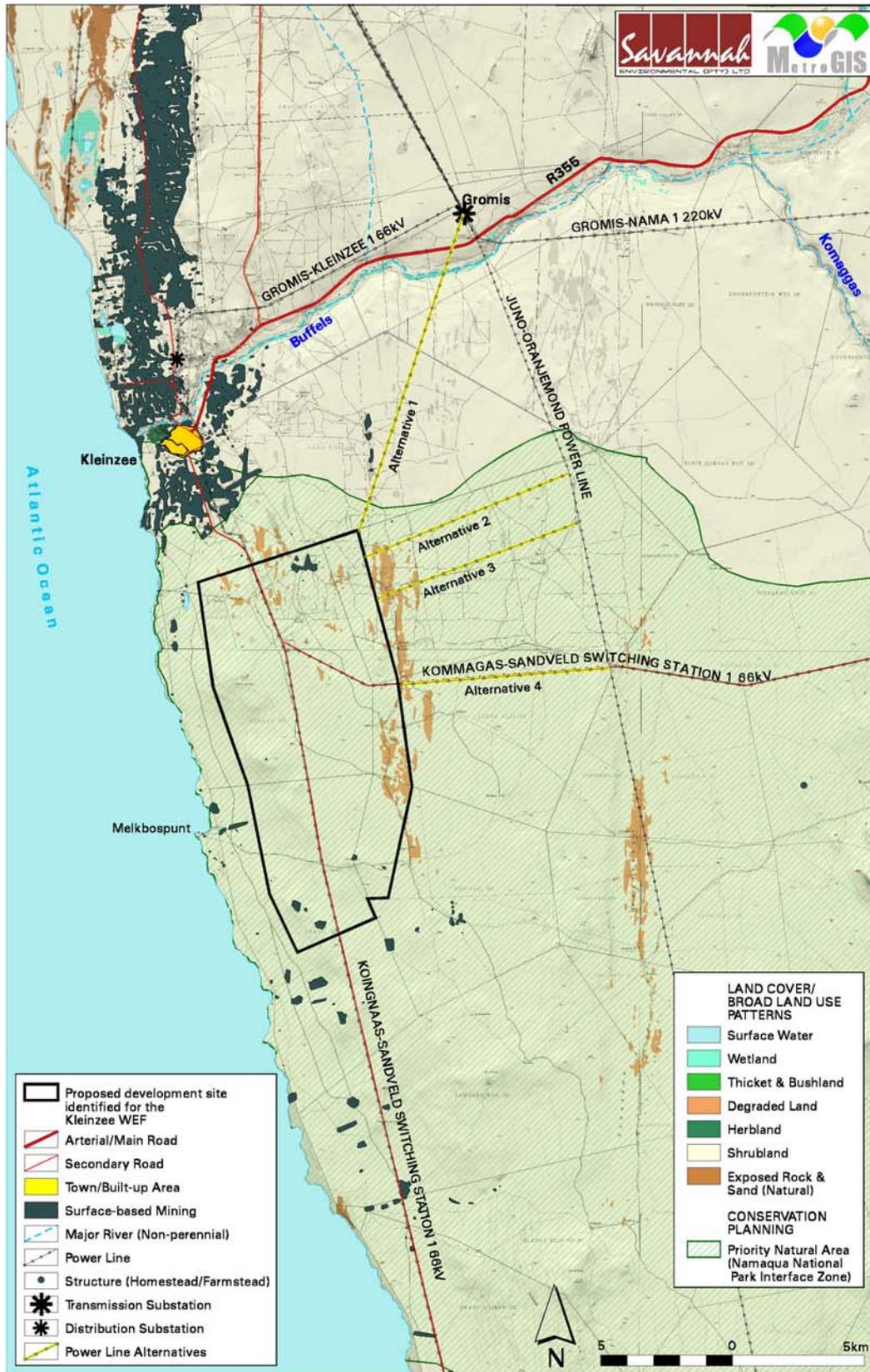


Figure 6.2: Land cover/land use map

6.3 Site access

The proposed site is essentially only accessible from the N7 (via Garies or Springbok). The N7 links Cape Town in the south to Noordoewer (Namibian border) in the north. North of Noordoewer, the N7 continues north to Windhoek as the B1. The road is of crucial importance to the economies of the West Coast and Namaqualand regions, as well as that of Namibia. At Springbok the N7 links up with the N15, which provides a link with Upington to the west (and ultimately the Gauteng Province). Springbok is located approximately 558 km north of Cape Town (N7), and ~450 km north of Saldanha (port).

Kleinsee may be accessed from the N7 via one of three possible routes (refer to Figure 6.3):

- » R355, via Springbok (~97 km). This constitutes the most direct tarred route to Kleinsee;
- » Kommagas gravel road off the R355. This would constitute the shortest route from the N7 to Kleinsee and the proposed wind energy facility site;
- » Combination of (mainly gravel) roads from Garies (off the N7), via Hondelikhbaai and Koingnaas. This constitutes the most direct road link to the harbours of Cape Town and Saldanha via the N7. Garies is located approximately 176 km south-east of Kleinsee (by road).

An overview of the study area road network is provided in Figure 6.3 below.

6.4 Geology and Topography

The study site is situated in an area with relatively gentle topography. The terrain type of the region is described as *slightly undulating plains*. Low hills are present in the far east of the study area, and to a lesser extent in the north (Refer to Figure 6.4). The general slope in the area is from east to west down towards the coastline. On the site itself, there is a slight rise in the north-central part of the site, before falling again towards the sea. The elevation on site varies from 49m to 160 m above sea level. There are no drainage lines on site and the site is characterised by aeolian sands that overly marine sediments. The main characteristic therefore is the sandy nature of the soils with north-south running dune features.



Figure 6.3: Road network of the study area and surrounds

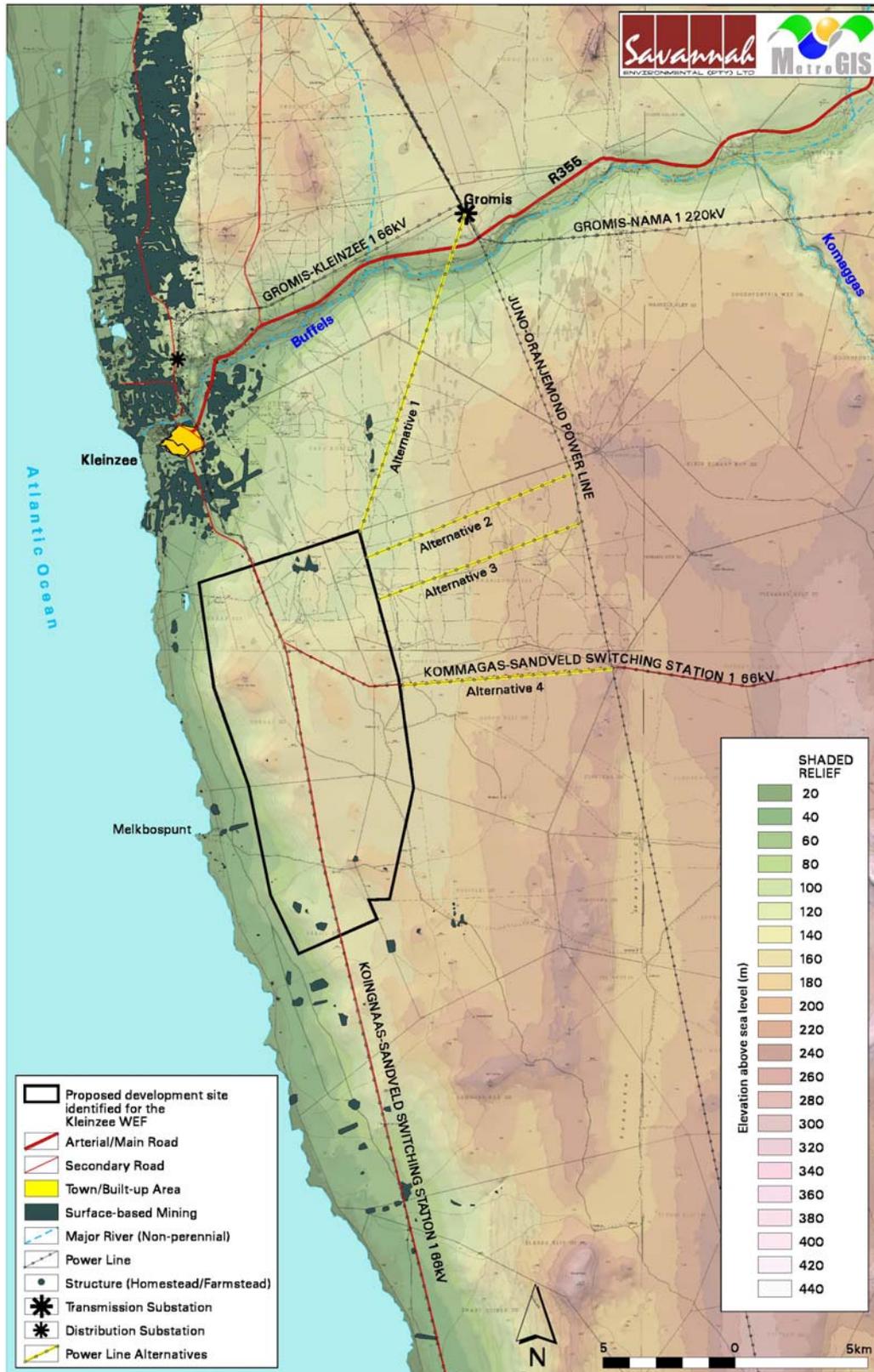


Figure 6.4: Shaded relief map (indicating the location of the proposed facility and the topography and elevation above sea level) of the study area.

6.5 Climatic Conditions

The Namaqualand coastal region is arid and experiences winter rainfall (rainfall occurs from May to August). A rainfall gradient from the coast to inland has been described for the area south of Kleinsee where mean annual precipitation is 75 mm on the coast increasing to 160 mm in the inland uplands. This information is extrapolated from meteorological data collected at Koingnaas, ~60km south of the study area (Burger 2007 in Arcus Gibb 2008).

A rainfall graph for Kleinsee obtained from www.worldweatheronline.com (Figure 6.7) indicates that Kleinsee experiences 98 mm rainfall per annum which agrees more closely with the figures quoted by Le Roux (2005).

The mean maximum temperature does not vary much throughout the year whereas there is slightly greater amplitude in mean minimum temperature (Figure 6.8). This is due to the proximity to the Atlantic Ocean and the effect of the Benguela Current with regular fog occurring over the coastal zone. However, there are extremes with summer temperatures as high as 40°C having been recorded at Koingnaas (November 2006) and regularly above 30°C away from the coast inland from the farm Brazil. Winter temperatures can fall to 4°C (Koingnaas, June 2006).

Temperatures can also be influenced by easterly berg wind conditions (off shore flow) in winter when the temperature may exceed 35°C.

The prevailing surface winds are mostly from the south and south-east in the summer when winds are strong and speeds can exceed 10 m/s. Strong winds can also occur from the west and north-west, mainly in winter.

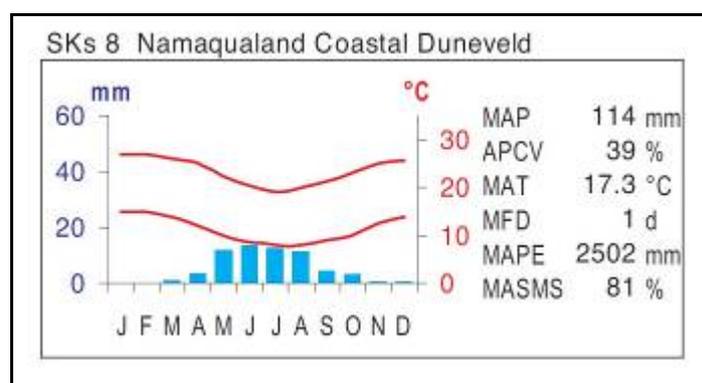


Figure 6.5: Climate diagram for Namaqualand Coastal Duneveld (from Mucina et al. 2006).

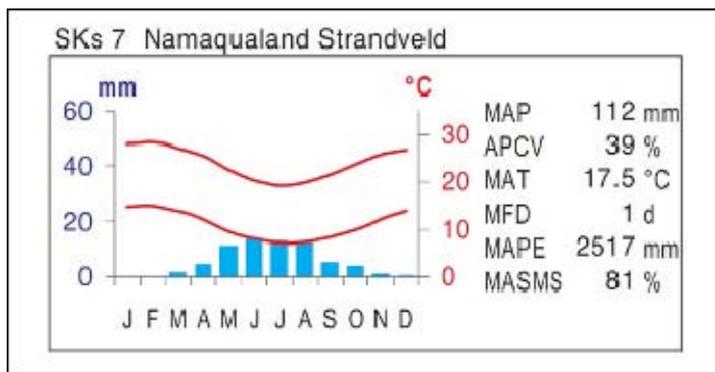


Figure 6.6: Climate diagram for Namaqualand Strandveld (from Mucina et al. 2006).

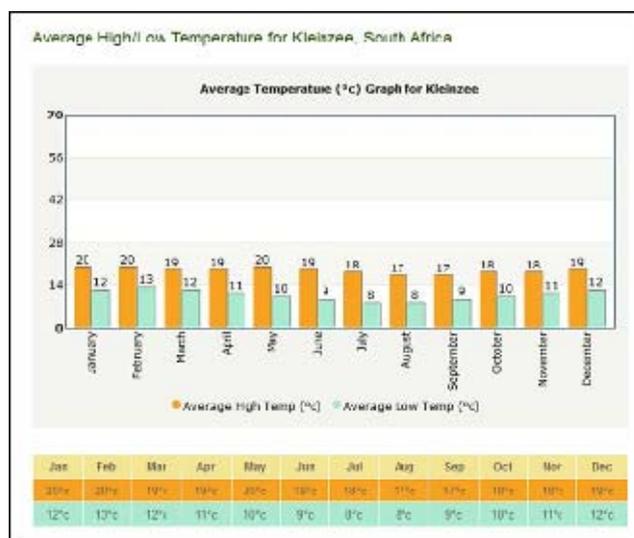


Figure 6.7: Average monthly temperatures for Kleinzee (source: <http://www.worldweatheronline.com/weather-averages/South-Africa/2610093/Kleinzee/2614644/info.aspx>)

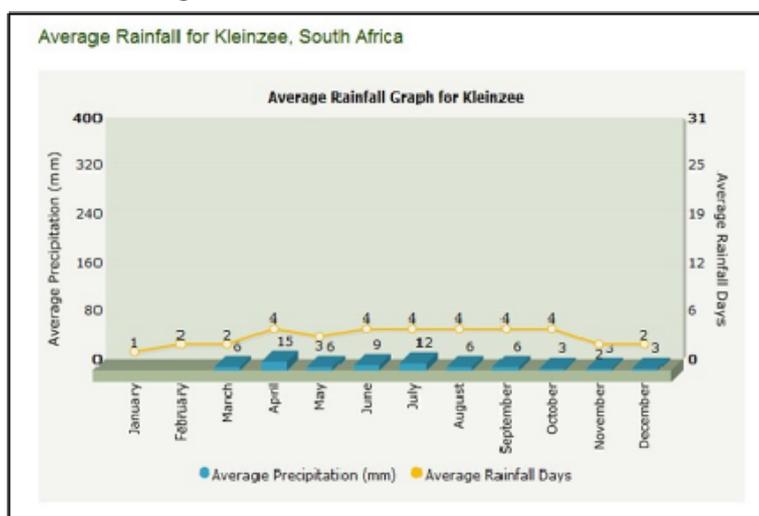


Figure 6.8: Average monthly rainfall for Kleinzee (source: <http://www.worldweatheronline.com/weather-averages/South-Africa/2610093/Kleinzee/2614644/info.aspx>)

6.6 Hydrology

The non-perennial, westward flowing Buffels River and its tributary, the Komaggas River are the main hydrological features within the study area. The Buffels River bypasses the site some 7 km to the north.

6.7 Soil types

The site falls into the **Ai13** and **Hb80** land types (Land Type Survey Staff, 1972 - 2006) (Refer to **Figure 6.9** for the land type map of the area).

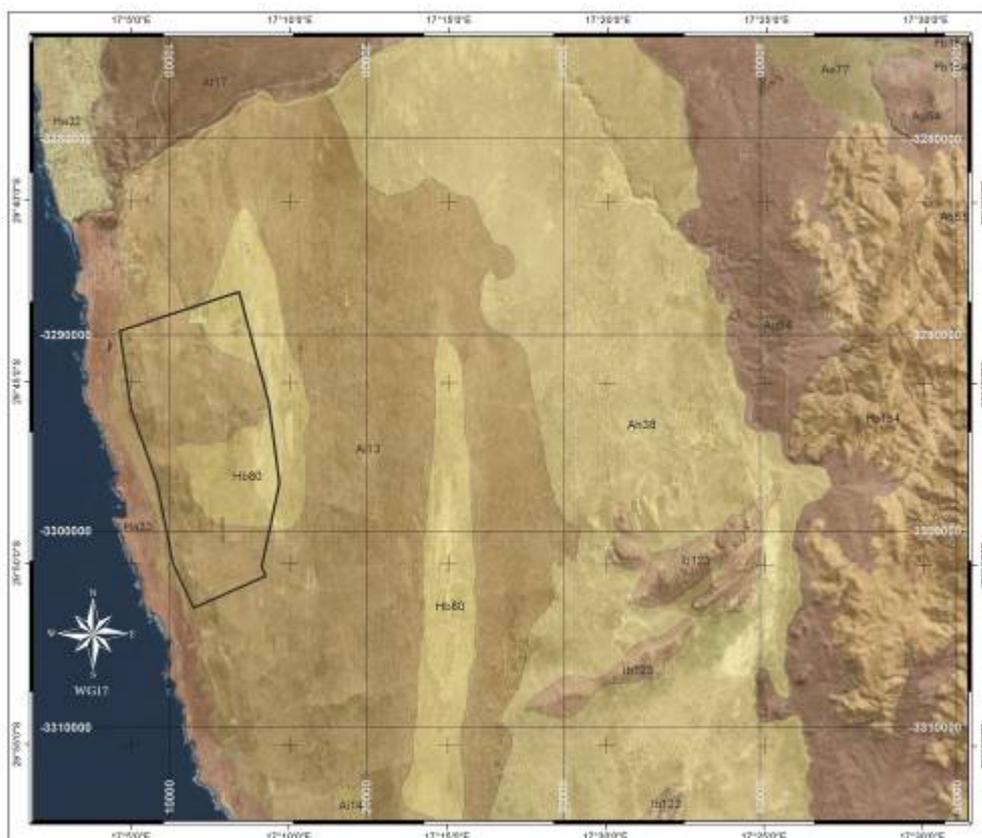


Figure 6.9: Land type map of the survey site for the proposed Kleinzee 300MW Wind Farm

Below follows a brief description of the land type in terms of soils, land capability, land use and agricultural potential.

Land Type Ai13

Soils: Mainly light to yellow-brown coloured sands ranging from high base status to calcareous. Soils are of variable depth and shallow soils overlying hard rock and calcrete layers occur throughout.

Land capability and land use: Exclusively extensive grazing due to climatic constraints.

Agricultural potential: Very low potential due to the low rainfall (less than 100 mm per year)

Land Type Hb80

Soils: Mainly light to yellow-brown coloured sands ranging from high base status to calcareous. Soils are of variable depth and shallow soils overlying hard rock and calcrete layers occur throughout.

Land capability and land use: Exclusively extensive grazing due to climatic constraints.

Agricultural potential: Very low potential due to the low rainfall (less than 100 mm per year).

6.8 Agricultural Potential

The agricultural potential of the site is very low and limited to extensive grazing due to the very low rainfall (as also described above). Although the soils are potentially suitable for irrigated agriculture this seems an impossible land use as water availability is the main constraint. There is currently no potential to increase the agricultural potential of the site as the climatic constraints are severe.

6.9 Ecological Profile of the Study Area

6.9.1 Vegetation

Broad context

Nationally the study area falls within the extensive, arid Succulent Karoo Biome (Rutherford & Westfall, 1994; Mucina et al. 2006 in Mucina & Rutherford, 2006) and regionally within the Namaqualand Sandveld Bioregion (Figure 6.10). At a local scale, apart from azonal Namaqualand Seashore Vegetation (AZd2) and the vegetation associated with salt pans (AZi2), two main vegetation types are found in the study area, Namaqualand Coastal Duneveld (SKs8) on the semi-mobile coastal dunes and Namaqualand Strandveld (SKs7) found on red to yellow stabilised aeolian sand overlying a basement of marine sediments and granite-gneisses.

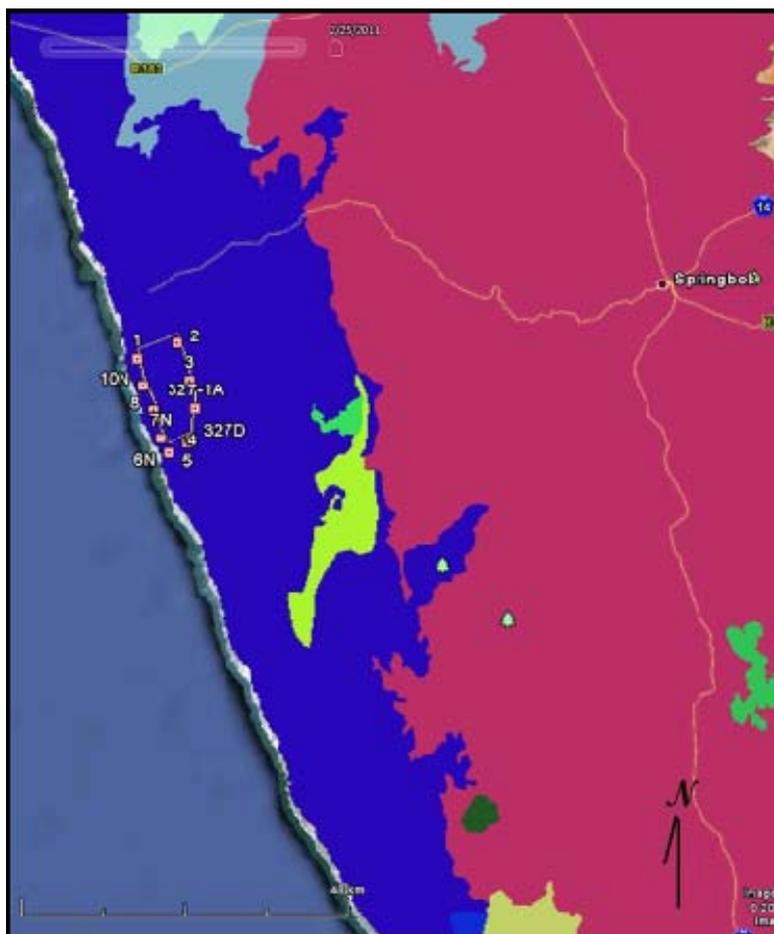


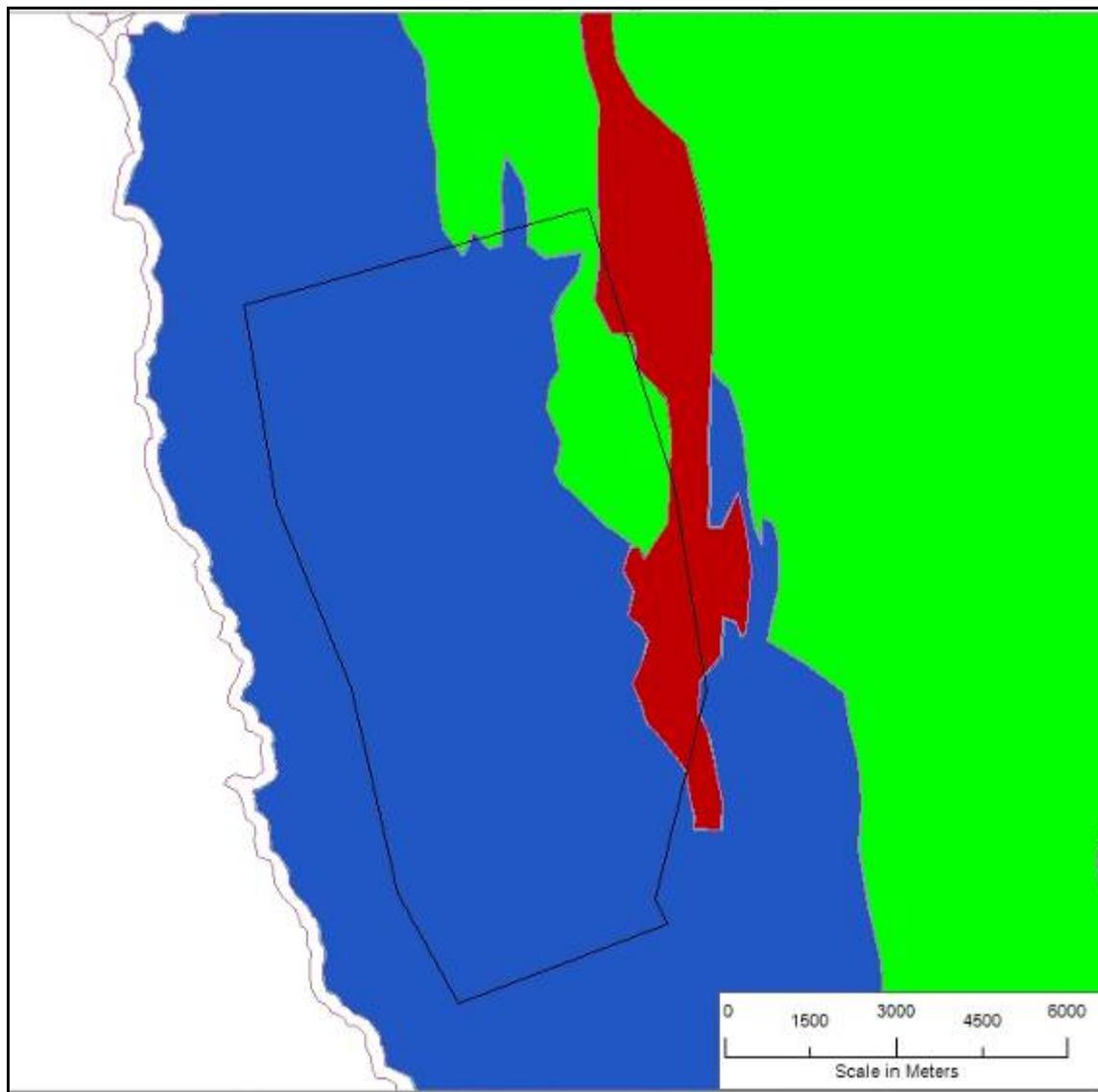
Figure 6.10: Portion of the bioregions map from Mucina, Rutherford and Powrie (2005) with the dark blue indicating the Namaqualand Sandveld bioregion. The footprint of the proposed wind energy facility is shown with position markers near the coast.

Local vegetation communities

Owing mainly to restricted access to the diamond-mining area along the Namaqualand coast, there have been few detailed botanical studies in the coastal sandveld of Namaqualand. Le Roux (1991) in a study of Brazil recognised three major plant communities: *Zygophyllum cordifolium*–*Drosanthemum marinum* Shrubland with *Stoeberia beetzii*-*Wooleya farinosa* Shrubland on flat, shallow sands and *Zygophyllum morgsana*-*Arctotis scullyi* (syn. *A. merxmulleri*) Shrubland on unstable to semi-stable white dunes. The overall vegetation in the study area and surrounds is in medium to good condition with 43 species found in the above-mentioned communities. These species include *Fenestraria rhopalophylla* subsp. *aurantiaca* the “window succulent”, also of conservation importance.

The broad vegetation types recognised by Low & Desmet (2007) are shown in Figure 6.11 as determined from their study at Brazil and Schulpfontein. Their

map has been modified to show the location of the footprint of the proposed wind farm in relation to the vegetation types (Figure 6.11). The proposed Kleinzee 300MW wind farm will potentially affect only Namaqualand Coastal Duneveld and Namaqualand Inland Duneveld following the classification of Low & Desmet (2007).



- Site boundary
- Namaqualand Strandveld
- Namaqualand Coastal Duneveld
- Namaqualand Salt Pans



Figure 6.11: Vegetation map of the study area immediately south of Kleinsee., which impinges on two vegetation types, namely Namaqualand Coastal Duneveld and Namaqualand Inland Duneveld.

Plant species

A checklist of plant species recorded from the quarter degree grids where the study area is located was obtained from the South African National Biodiversity Institute SIBIS database (Refer to Appendix G for vegetation report). The status of the species listed was obtained from the Red List of South African Plants (Raimondo et al. 2009).

Wooleya farinosa (Figure 6.12) is a Namaqualand Coastal Sandveld endemic species and therefore has important conservation value. It has been impacted by diamond-mining along the Namaqualand coast and is listed as **Rare** (Raimondo et al. 2009) although locally dominant not only on sandy dune substrates but also on granite-gneisses (Low & Desmet, 2007).

Several Namibian endemic plant species may occur in the vegetation found at Brazil (Low & Desmet, 2007) and by interference could occur on the remainder of the site being considered for the proposed Eskom Kleinzee 300MW Wind Farm. Particular attention must therefore be paid during the EIA process to the possibility of encountering endemic plant species and to the conservation value of the vegetation of the area.



Figure 6.12: *Wooleya farinosa* – a rare endemic species from the Namaqualand Sandveld bioregion. (Photo: <http://www.succulentguide.com>)

Condition of the vegetation and conservation status

Low & Desmet (2007) found that despite the high impact of diamond mining on the coast south of Kleinsee, the vegetation has survived well. They state for the area they surveyed at Brazil that "Vegetation along this coastline is in remarkably good condition given the ravages of diamond mining over the years. However, vegetation types in the area are poorly conserved. Except for the southern section, most of the site is rated highly (mainly 60 – 80%) for conservation importance."

It is anticipated that the further away from the mining operations the better the condition of the vegetation. Therefore, it is expected that in the 'inland' areas of Brazil and Goraap and in the areas of Kannabieduin, Rooivlei and Honde Vlei falling within the designated footprint, the vegetation will be in a good condition.

Critical Biodiversity Areas

Critical Biodiversity Areas (CBAs) within the Namaqualand District Municipality (NDM) were mapped by Desmet and Marsh (2008). The footprint of the study area including the power line route falls outside any CBA but does fall within the coastal corridor that has conservation importance (refer to Figure 6.13).



Figure 6.13: Portion of the mapped Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) for Namaqualand District Municipality – shown together as green shading. The wind-farm footprint is outlined by the numbered position markers.

6.9.2 Terrestrial Fauna

There is one threatened **mammal species** that has a geographical distribution that includes the site and habitat requirements which are met by those found on site. This is Grant's Golden Mole listed nationally as Vulnerable. The species is listed globally as Least Concern, but this includes another subspecies that is common in Namibia. The national listing is therefore considered valid for the subspecies that occurs only in South Africa. It is found in Strandveld Succulent Karoo in subterranean habitats in shifting sands. There is a high probability that it occurs on site.

There are two additional **mammal species** of lower conservation concern that could occur in available habitats in the study area. This includes the Namaqua

Dune Mole-rat and Littledale's Whistling Rat, both listed nationally as Near Threatened (NT) and globally as Least Concern.

There is one threatened **amphibian species** that has a geographical distribution that includes the site and habitat requirements which are met by those found on site. This is the Desert Rain Frog, listed as Vulnerable. This species is found from the highwater mark up to 10 km inland along the Namaqualand coast (from Namibia to near Hondeklipbaai). This distribution coincides primarily with Namaqualand Coastal Duneveld and Richtersveld Coastal Duneveld vegetation types, the former of which is the dominant vegetation type found on site. There is therefore a high probability that it occurs on site. The Desert Rain Frog is threatened by diamond mining on the west coast.

There are two threatened or near threatened **reptile species** that have a distribution that includes the study area and habitat requirements which are met by those found on site. These are the Namaqua Dwarf Adder, listed as Vulnerable, and the Namaqua Plated Lizard, listed as Near Threatened. The Namaqua Dwarf Adder prefers semi-stable vegetated coastal sand dunes from Little Namaqualand (near Koingnaas) to Lüderitz. It is threatened by alluvial diamond mining. The Namaqua Plated Lizard is found in dry sandy areas and bare rocky hillsides.

In summary, the following threatened or near threatened animal species could potentially occur on site and may therefore be of concern for development of the site:

- » Grant's Golden Mole (VU),
- » Desert Rain Frog (VU),
- » Namaqua Dwarf Adder (VU),
- » Namaqua Plated Lizard (NT),
- » Littledale's Whistling Rat (NT),
- » Namaqua Dune Mole-rat (NT).

6.9.3 Bats

Species probability of occurrence

Table 1: Table of species that may be roosting or foraging in the proposed study area, the possible area specific roosts, and their probability of occurrence.

*LC = Least Concern; NT = Near Threatened; V = Vulnerable (Monadjem *et al.*, 2010).

Species	Common name	Probability of occurrence	Conservation status	Possible roosting habitat to be utilised on study area
<i>Eidolon helvum</i>	Straw coloured fruit bat	Very Low - None	LC	A non-breeding migrant/accidental
<i>Rousettus aegyptiaca</i>	Egyptian rousette (fruit bat)	Very Low	LC	Roosts in caves and no known caves in area. Lack of fruiting trees for foraging. On border of literature distribution.
<i>Rhinolophus capensis</i>	Cape horseshoe bat	Medium	NT	Roosts gregariously in caves, lack of caves on site. But associated with Karoo succulents and suitable hollows may be present.
<i>Rhinolophus clivus</i>	Geoffroy's horseshoe bat	Medium	LC	Roosts gregariously in caves and rock hollows. Suitable hollows may be present.
<i>Nycteris thebaica</i>	Egyptian Slit-faced bat	High	LC	Roosts in any suitable hollows such as culverts, burrows and manmade hollow structures.
<i>Sauromys petrophilus</i>	Robert's Flat headed bat	Low	LC	Crevices in rocks. Lacks of mountainous terrain.
<i>Tadarida aegyptiaca</i>	Egyptian free-tailed bat	High	LC	Crevices, buildings, rock crevices in mountainous area
<i>Miniopterus natalensis</i>	Natal long-fingered bat	Medium	NT	Roosts gregariously in caves, no known

Species	Common name	Probability of occurrence	Conservation status	Possible roosting habitat to be utilised on study area
				caves close to the study site.
<i>Cistugo seabrae</i>	Angolan wing gland bat	High	NT	Endemic to West Coast of Southern Africa and associated to low rainfall areas. May prefer to forage in stream beds or drainage canals.
<i>Eptesicus hottentotus</i>	Long-tailed serotine	Medium	LC	Crevice dweller and in buildings and caves/rock hollows
<i>Neoromicia capensis</i>	Cape serotine	High	LC	Roofs of buildings, very common species.

There is not much surface rock present at site and the site is relatively flat and sandy. From a habitat availability point of view, the natural vegetation of the site does not offer much roosting space for bats. The few buildings on the site can offer suitable roosting space to limited species. Bat roosting space and foraging resources are therefore predicted to be very low for this site.

6.9.4 Avifauna

Avian microhabitats

Bird habitats within the proposed development site comprise coastal marine rocky shore habitat backed by natural and man-made salt pans and gravel plains. The environment has been largely man-altered with large slimes dams (mine tailing dams) as part of the current landscape. Rehabilitation of the tailing dams has been on-going for the past 5 years to re-introduce plants into this sensitive areas (P Carrick pers comm.). These are likely to be the least used of the habitats given the lack of seeds (for local passerines) or roost sites.

There are three main microhabitats for birds in the area, i.e. (i) coastal beaches, rocky shores and islands for marine and coastal bird species (ii) salt pans for terns and flamingos and (iii) succulent shrub habitat for larks and other endemic avifauna.

Species of Special Concern (SSC) likely to occur in the study area

The total number of birds recorded in the study area is a healthy 166 species (SABAP2 scheme). Among the species recorded, 14 are threatened or red-listed in South Africa (Barnes 2000). Several of these are collision-prone species: 10 are highly collision prone (based on their low manoeuvrability and their known collision rate) and 4 are moderately collision prone (refer to Table 1 of Avifauna Report (Appendix H)). Among these are pelicans, cormorants, and the bustards. The low occurrence of the bustards makes it unlikely that they will be at risk. However, the flamingos (33% to 44% probability for the two species occurring) and pelican (34% probability) are the most likely to suffer impacts from inappropriately placed turbines.

Among these red-listed species are six endemic or near-endemic species - three cormorants, the African Black Oystercatcher, the Cape Gannet and Damara Tern. The three cormorants are highly susceptible to collisions, and two are moderately susceptible.

Among the 166 species, no less than 43 (26%) are endemic or near-endemic species. Of these endemics five species are considered highly collision-prone – the three cormorants, the shelduck and the korhaan.

Thus in summary, among the important species (threatened red-listed or endemic) the highly collision prone species are the flamingos (2), cormorants (3), pelican (1), bustards (2), korhaan (1), raptors (2) and one duck; i.e. twelve species in total. These species will require special mitigation. There are other raptor species that are not red-listed including African Fish Eagle, Black-chested Snake Eagle and Southern Pale Chanting Goshawk, which may also be vulnerable to collision.

Migration and/or preferential flight corridors for avifauna in general in the area and in particular for red-listed or endemic species of concern

Flight corridors are likely to occur along the entire coast as wading birds (plovers, sandpipers, godwits etc.) and the red-listed flamingos, pelicans and oystercatchers use the beaches and areas parallel to the beaches as flyways. For more long-distance flights, these areas are also used by flamingos at night to commute to breeding areas or communal roosting feeding areas such as the Orange River mouth. Species such as the cormorants, oystercatchers and flamingos are generally found within 1 km of the coast and these will be high risk zones. However, flamingos and pelicans may also both travel inland to dams and flooded pans and could well be found frequently farther than 1 km from the coast.

Flight corridors are also likely for birds visiting flooded or dry pans inland. These will be important for flamingos which will commute inland and particularly the Damara Terns – should they still breed here. Damara Terns nesting on the pans typically fly into the wind to reach the sea (Rob E. Simmons pers. Obs.) and prevailing winds are from the south or south-east. Therefore, bird-sensitive corridors for this species will be orientated southeast – northwest. While the Buffels River is about 15 km south of the proposed wind farm site it is an important habitat for flamingos and other wetland species (avocets, plovers). They occur at the mouth of the Buffels River but may also fly inland to search for foraging areas and are likely to follow the river.

Further up river are the breeding sites of Black Harriers (Rob E. Simmons unpubl data) and this collision-prone red-listed species may well forage down into the mining concession. It is not listed in the SABAP data for Kleinsee but it has been noted by the author that it nests only 20 km inland – well within its foraging range.

The least sensitive bird areas will be the mine dumps themselves where very few species are likely to occur given the lack of seeds and the lack of sheltered roosting sites.

6.10. Heritage Profile

Paleontological research in Namaqualand is sparse. However, a recent review of the paleontological record as represented in the De Beers Namaqualand Mines by Pether (2008) provides details of many different paleontological features of scientific value. They vary in depth with some important features being close to the surface, particularly close to the coast where raised beach sequences are frequently intersected. Deeper paleontological resources would not likely be impacted by the proposed development.

Extensive archaeological surveys in this vicinity have been carried out in 1991 and between 2001 and 2007 with large numbers of archaeological sites being recorded and excavated (e.g. Halkett 2003; Halkett & Dewar 2007; Orton & Halkett 2005, 2006, 2007). The surrounding farm portions have been found to have very dense Later Stone Age archaeological sites and many have been excavated. The quality of data obtained from these sites is variable, but some include very high quality data. Important archaeological sites from this area have already formed the basis of a major research project (Dewar 2008) with a second currently underway (Orton, in prep.). In addition to Dewar (2008), several publications discussing the archaeology of the region have also appeared (e.g. Dewar *et al.* 2006; Dewar & Jerardino 2007; Orton 2007, 2008a, 2008b; Orton *et al.* 2005). These show that people were living along the coastline throughout the latter half of the Holocene, and possibly earlier, subsisting off shellfish, seals and

land animals. They left extensive collections of stone artefacts, pottery, ostrich eggshell beads and flasks but generally few other organic artefacts. Burials are common; several have been uncovered accidentally during mining activities and, owing to the fact that they are completely unmarked and that the substrate is soft and sandy, they can turn up absolutely anywhere in this region. Only one has ever been found in an archaeological excavation, just north of Kleinsee (Orton 2007).

Historical material, such as 19th century glass and ceramic fragments, is sparsely scattered in the Namaqualand Sandveld and occasional farm houses are present (personal observation). Contact period archaeology, where historical and colonial material co-occur, has been recorded at Hondeklipbaai where shell middens containing historical material likely pertained to indigenous people being used to load copper ore onto ships in the bay (Orton 2009).

6.11 Social Characteristics of the Study Area and Surrounds

6.11.1 Local Context

The site falls within an area which is largely impacted by diamond mining activities undertaken by De Beers. The site is zoned for agriculture but is only suitable for grazing purposes due to climatic constraints.

6.11.2 Economic Overview

The Northern Cape's share of national Gross Domestic Product (GDP) in 2002 was 2%, the lowest of all the nine provinces. The Northern Cape Province's Gross Domestic Product by Region (GDPR) per capita was, however, higher than the national average.

The Northern Cape economy is heavily dependent on the primary sectors, which, in 2002, made up 31.0% of the Northern Cape Province's GDPR. The largest contributor in 2002 was mining (23.7%). Agriculture, though the spatially most prevalent form of land use, contributed 7.3%. However, there is limited processing of the primary commodity output from the mining and agriculture sector in the Northern Cape. As a result Manufacturing only contributed 4.2% towards provincial GDPR (2002).

Extensive agriculture forms the dominant spatial form of land use, both currently and historically. The arid environment however supports little natural vegetation and few sources of accessible water. Mainly small stock – goats, sheep – is farmed. Carrying capacities are extremely low, and vast tracts of land are needed in order to support a viable operation. Marginal plantings of dry land wheat occur in places in the region, as do limited plantings of irrigated crops.

Ostrich farming has also been introduced into the region in recent years. The Gariiep River valley supports a number of irrigated crops, mainly lucerne and grapes.

Mining traditionally formed the economic backbone of the region, and directly gave rise to the establishment of many towns in the region. Commercial copper mining dates back to the 1850's, while the mining of alluvial diamonds in coastal deposits from the late 1920's.

The Kleinsee-Koingnaas study area forms part of a De Beers mining area and continues to be used mainly for mining. However, the importance of the diamond mining sector has declined since the mid 1990's. The Nama Khoi Local Municipality (NKLM) IDP 2011/2012 notes that the regional significance of the sector is being replaced by tourism.

Large parts of the region remain pristine and undeveloped and consist of spectacular landscapes (e.g. the Richtersveld area north of the NKLM). As mentioned above, the region is internationally renowned for its spring flower displays, as well as for its unique, diverse and spectacular succulent vegetation. The region therefore has significant and growing tourism sector. The Nama Khoi Local Municipality IDP 2011/12 identifies tourism as the key emerging driver of economic growth in the municipality.

6.11.3 Population

Despite having the largest surface area, the Northern Cape was home to only about 822 727 people (or 1.8% of the national population) in 2001. The population density was estimated at ~2.27 persons per km², while ~83% of the provincial population was estimated to live in urban areas, of which the most significant the major towns of Kimberley and Upington.

The Namakwa District Municipality was one of the less populous District Municipalities in the Northern Cape Province, and was home to an estimated 108 111 people in 2001. Census 2001 data indicates that the Coloured population group was by far the most dominant (~84%), followed by White (~12%) and Black African (~4%). Afrikaans was spoken by an overwhelming ~96% of the population as first language.

The Nama Khoi Local Municipality had a population of 44 611 (and 11 563 households) in 2001. This represented ~41% of the District Municipality's population – a fact at least part attributable to the presence of the town of Springbok (~11 000 in 2001) in the Nama Khoi Local Municipality area. The most recent estimates for the Nama Khoi Local Municipality indicate a population of

~54 644 (15 707 households) for 2007. The region has a very low population density of 3 people per km²⁷.

No information in the population for Kleinsee could be obtained. However, it is estimated that the town has a population of 1 000 to 2 000. More accurate information will be obtained during the assessment phase of the EIA.

6.11.4 In-migration trends

Census 2001 data indicated net out-migration of the NCP population, compared to 1996. Out-migration was significant in specifically the 20 – 24 cohort of the Northern Cape Province's population, probably driven by the search for better career and job opportunities, and tertiary education. Urbanisation of the rural Northern Cape Province population was observed as another significant trend (increasing from 75.2% in 1996 to 82.7% in 2001).

Information contained in the Draft 2011/2012 Nama Khoi Local Municipality IDP indicates that the Nama Khoi Local Municipality's municipal population has been growing dramatically from around 1995 onwards. In this regard, it is estimated that the population has increased by 22.5% over the 12-year period 1995-2007, while the number of households had increased by 35.8%. It may be assumed that much of this growth was the result of migration into the Nama Khoi Local Municipality area, probably in large part from surrounding municipalities within the Namakwa District Municipality.

6.11.5 Education

An estimated 15.1% of the Northern Cape population had no education at all, while 71.3% had only a primary or secondary education (2001). The respective rates were 20% and 62.7% in 1996, thus indicating a significant improvement over the relevant five year period. It is assumed that these figures are broadly representative of the Nama Khoi Local Municipality and Kleinsee study areas as well.

6.11.6 Employment levels

Census 2001 data indicates that of the economically active population in the Northern Cape, 55.5% were employed while 26.1% were formally unemployed. Of significance, a third of the total population was younger than 15 years old, and approximately 45% of the potential labour force was younger than 30 years. At the same time, unemployment was the highest among the youth, with unemployment rates of 54% and 47% in the 15 - 19 and 20 – 24 year-old age

⁷ www.wikipedia.org/wiki/Nama_Khoi_Local_Municipality

groups. No statistics for the Nama Khoi Local Municipality or Kleinsee areas could be obtained, but it is assumed that provincial rates are broadly applicable.

6.11.7 *Income and economic development*

The Human Development Index⁸ (HDI) for the Northern Cape Province (four indexed factors – life expectancy, adult literacy, GDP per capita (adjusted for real income) and education attainment) as a whole is 0.58, which is substantially below the South African average of 0.72. The HDI in the Springbok area (0.62) is above the NCP, but below the national average.

In terms of per capita income, the Northern Cape Province has the third highest per capita income of all nine Provinces, however, income distribution is extremely skewed, with a high percentage of the population living in extreme poverty. An estimated 36% of households in the Namakwa District Municipality was living under the poverty datum or “bread line” of <R800/month (by head of household) in 2001.

⁸ The closer the HDI to 1.0, the higher the level of “living condition”. For example, Sweden has an index of 0.91 defined as high, South Africa at 0.72 is defined as middle and Lesotho at 0.47 is defined as low.

SCOPE OF THE WIND ENERGY FACILITY PROJECT

CHAPTER 7

This chapter provides details regarding the scope of the proposed Kleinzee wind energy facility, including all required elements of the project and necessary steps for the project to proceed. The scope of the project includes construction, operation and decommissioning activities. This chapter also describes alternative options with regards to the proposed wind energy facility development, including the “do nothing” option.

7.1. Project Alternatives

Through the regional assessment site identification and selection process, Eskom were guided to site/locate their proposed wind farm within an area/zone of preference (the site selection process undertaken is described in detail in Chapter 4). This site identification process is considered acceptable by DEA and therefore no location/site alternatives are required to be considered further. The following project alternatives, however, will be investigated in the EIA:

- » **The ‘do nothing’ alternative:** Eskom does not establish a wind energy facility south of Kleinsee in the Northern Cape (maintain status quo). This option would result in no impacts on the environment as a result of a wind energy facility in this area. It will however also result in the opportunity to introduce 300MW of renewable energy into the Eskom energy mix being lost. This alternative will be assessed in the EIA phase of the process.
- » **Site-specific alternatives:** in terms of turbine positions within the broader study area of 8 682 ha. Once sufficient information is available from an environmental and planning perspective for the broader 8683 ha site, a detailed micro-siting exercise will be undertaken to effectively ‘design’ the wind energy facility. As local level issues were not assessed in sufficient detail at the regional level, these issues are now being considered within the site-specific studies and assessments through the EIA in order to delineate areas of sensitivity within the broader area. Through the process of determining environmental constraining factors, the layout of the wind turbines and infrastructure can be appropriately planned. The overall aim of the planning process would be to maximise electricity production through exposure to the wind resource, while minimising infrastructure, operation and maintenance costs, and social and environmental impacts. Specialist software is available to assist developers in selecting the optimum position for each turbine. This micro-siting information will then be provided, and will inform the specialist impact assessments at the EIA phase. The planning

process will also include the positioning of other ancillary infrastructure, including access roads, laydown areas and substation sites.

Feasible alternatives in this regard will be assessed in detail in the EIA phase.

- » **Alternative technologies:** for use in the establishment of the wind facility. There is a limited range of alternative technologies (turbines) for commercial scale wind energy facilities. In addition, the technology is constantly evolving. Table 7.1 summarises the types of variables associated with existing wind turbine technologies. There are no significant differences from an environmental perspective between technologies. Eskom will embark on a competitive bidding process (i.e. call for bids from suppliers) to arrive at the most cost-effective, yet environmentally responsible, solution for the site based on the measured wind resource and any identified constraining factors.

Table 7.1: Alternative Wind Turbine Technologies

Variables	Types of Technologies
Type	The horizontal axis wind turbine completely dominates the commercial scale wind turbine market.
Size	Typical land-based utility scale wind turbines are in the 600 kW to 5 MW range.
Foundation	The foundation is usually poured concrete. Its size and shape is dictated by the size of the wind turbine and geotechnical considerations.
Tower	Tubular steel towers are generally standard, although other materials could be used for this purpose. The height of towers for larger commercial turbines (1,5 MW – 5MW) generally varies between 80 m and 140 m.
Rotor	3- bladed rotor is standard.
Rotor Speed Control	Fixed or variable speed rotors
Gears	Geared and Gearless ('direct or indirect drives')
Generator	Standard high speed generator (geared) or custom low-speed ring generator (gearless)
Other variables	Yaw gears, brakes, control systems, lubrication systems and all other turbine components are similar on modern wind turbines

Transportation Route Alternatives: for transportation of all components associated with the project to the site. Kleinsee may be accessed from the N7 via one of three possible routes:

- o R355, via Springbok (~97 km). This constitutes the most direct route to Kleinsee.
- o Kommagas gravel road off the R355. This would constitute the shortest route from the N7 to Kleinsee and the proposed wind energy facility site.

- o Combination of (mainly gravel) roads from Garies (off the N7), via Hondelikhbaai and Koingnaas. This constitutes the most direct road link to the harbours of Cape Town and Saldanha via the N7. Garies is located approximately 176 km south-east of Kleinsee (by road).

The various transportation options (harbour, rail, air, road), as well as the possible routes associated with these options will be further assessed through a transportation study to be undertaken by Eskom. The results of this study will be included within the EIA.

- » **Alternative servitudes for power line routing:** Network integration studies, planning and design for the transmission of the power generated at the wind energy facility is still being finalised. This will be informed through understanding the local power requirements and the stability of the local electricity network. A 400 kV power line is proposed to connect the substation/s at the wind farm to the electricity distribution network/grid at the Gromis Substation⁹ which lies approximately 16 km north-east of the proposed development site, or to link into the future Juno-Gromis power line located to the east of the site. The connection point to the Eskom power grid will be confirmed through the network integration and planning exercise.

Alternative routes/corridors for the 400 kV power line have been identified and will be assessed in the EIA phase. Figure 7.1 indicates potential power line corridors between the wind energy facility substation, and the Gromis substation.

- » **Alternative materials for road construction:** Borrow Pits will be as first option procured from commercial sources and as second option recovered within Eskom's site.

⁹ Gromis is at present a 220kV transmission substation

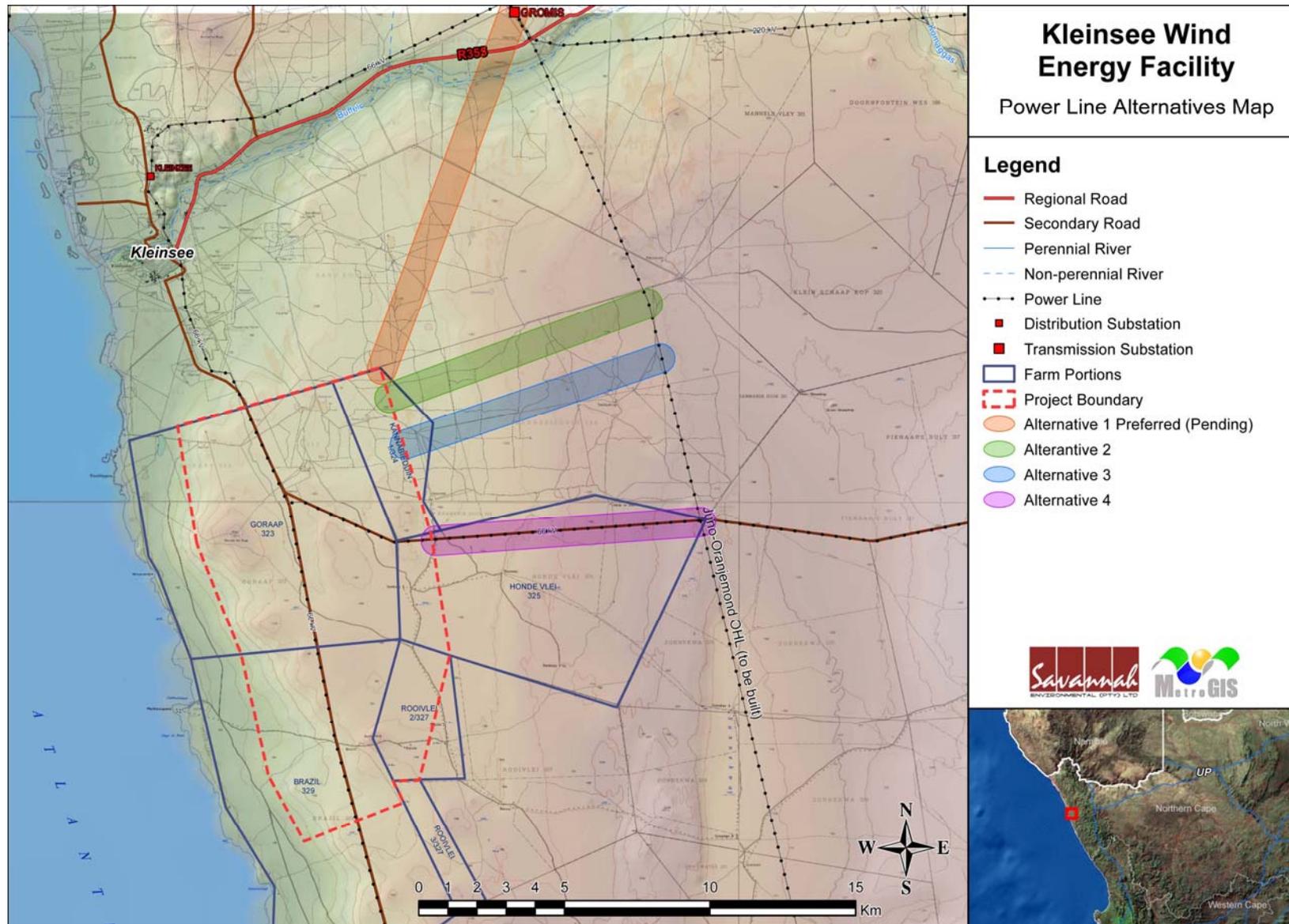


Figure 7.1: Map indicating proposed corridors for power line construction – alignments to be investigated in detail in the EIA Phase.

7.2. Project Construction Phase

In order to construct the proposed wind farm and associated infrastructure, a series of activities will need to be undertaken. The erection and commissioning of the turbines will be completed in a phased approach, as this facility lends itself to phased-construction. It is proposed that the facility will have a capacity of approximately 300 MW (i.e. in the order up to 200 industry-standard turbines). The construction phase for erection of approximately 100 wind turbines as well as the required associated infrastructure is expected to take in the order of 48 months.

It is expected that there will be between 200 and 350 people in a construction crew, depending on the construction phase of project and the nature of activities being undertaken. There may be more than one crew operating on the site at any one time. Construction crews will constitute mainly skilled and semi-skilled workers. No employees will reside on the site at any time during the construction or operational phases.

The following construction activities have been considered to form part of the project scope of the Eskom 300MW Kleinzee Wind Farm in the Northern Cape.

7.2.1. Conduct Surveys

Prior to initiating construction, a number of surveys will be required including, but not limited to, geotechnical survey, site survey and confirmation of the turbine micro-siting footprint, survey of on-site substation site/s and survey of power line servitude/s to determine tower locations.

7.2.2 Establishment of Access Roads to the Site

The proposed site is essentially only accessible from the N7 (via Garies or Springbok). Access/haul roads to the site (if required) as well as internal access roads within the site are required to be established prior to the commencement of construction. Access to the site is likely to be from the gravel roads in the study area. As far as possible, existing access roads would be utilised, and upgraded where required. Within the site itself, access will be required between the turbines for construction purposes (and later limited access for maintenance). Special haul roads of up to 13m in width may need to be constructed to and within the site to accommodate abnormally loaded vehicle access and circulation. The internal service road alignment will be informed by the final micro-siting/positioning of the wind turbines.

These access roads will have to be constructed in advance of any components being delivered to site, and will remain in place after completion for future access

and possibly access for replacement of parts if necessary. It is proposed that in preparing the access road, a portion of it (up to 6m in width) will be constructed as a permanent access road and the remainder as a temporary access road that can be de-compacted and returned to its pre-construction condition.

7.2.3. Undertake Site Preparation

Site preparation activities will include clearance of vegetation at the footprint of each turbine, the establishment of internal access roads (as discussed in 7.2.2 above) and excavations for foundations (refer to 7.2.4 below). These activities will require the stripping of topsoil, which will need to be stockpiled, backfilled and/or spread on site.

Site preparation will be undertaken in a systematic manner to reduce the risk of open ground to erosion. In addition, site preparation will include search and rescue of floral species of concern (where required), as well as identification and excavation of any sites of cultural/heritage value (where required).

7.2.4 Construct Foundation

Concrete foundations will be constructed at each turbine location. Foundation holes will be mechanically excavated to a depth of approximately 2 m.



Figure 7.3: Photograph illustrating the construction of the foundation of one of the turbines at the Klipheuwel demonstration facility (photo courtesy of Eskom)

Concrete will be batched at an appropriate location on-site. The reinforced concrete foundation of approximately 25 m x 25 m x 2 m will be poured and support a mounting ring. The foundation will then be left up to a week to cure. If the geological conditions dictate, the use of alternative foundations will be considered (e.g. reinforced piles).

7.2.5. Transport of Components and Equipment to Site

The wind turbine, including tower, will be brought on site by the supplier in sections on flatbed trucks. Turbine units which must be transported to site consist of a tower (comprised of segments), a nacelle weighing approximately 83 tons, and three rotor blades (each of up to 70 m in length). The individual components are defined as abnormal loads in terms of Road Traffic Act (Act No 29 of 1989)¹⁵ by virtue of the dimensional limitations (abnormal length of the 70 m blades) and load limitations (i.e. the nacelle).



Figure 7.4: Photograph illustrating the equipment required for the transportation of turbine components to site (photographs courtesy of Eskom at during the construction of the Klipheuwel demonstration facility)

¹⁵ A permit may be required for the transportation of these loads on public roads.

In addition, components of various specialised construction, lifting equipment and counter weights etc. are required on site to erect the wind turbines and need to be transported to site. In addition to the specialised lifting equipment, the normal civil engineering construction equipment will need to be brought to the site for the civil works (e.g. excavators, trucks, graders, compaction equipment, cement mixers, etc.).

The components required for the establishment of the substation (including transformers) as well as the power line (including towers and cabling) will also be transported to site as required.

The dimensional requirements of the load during the construction phase (length/height) may require alterations to the existing road infrastructure (widening on corners, removal of traffic islands), accommodation of street furniture (electricity, street lighting, traffic signals, telephone lines etc) and protection of road-related structures (bridges, culverts, portal culverts, retaining walls etc.) as a result of abnormal loading.

The equipment will be transported to the site using appropriate National and Provincial routes, and the dedicated access/haul road to the site itself. The transportation study to be undertaken by Eskom will deal with external roads in this regard.

7.2.6. Establishment of Lay Down Areas on Site

Lay down areas will need to be established at each turbine position for the storage of wind turbine components. The lay down area will need to accommodate the cranes required in tower/turbine assembly. Lay down and storage areas will be required to be established for the normal civil engineering construction equipment which will be required on site.

A large lay down area (approximately 20 m wide x 150 m long) will be required at each position where the main lifting crawler crane may be required to be erected and/or disassembled. This area would be required to be compacted and levelled to accommodate the assembly crane, which would need to access the crawler crane from all sides.

7.2.7. Construct Turbine

A large lifting crane will be brought on site. It will lift the tower sections into place. The nacelle, which contains the gearbox, generator and yawing mechanism, will then be placed onto the top of the assembled tower. The next step will be to assemble or partially assemble the rotor (i.e. the blades of the turbine) on the ground. It will then be lifted to the nacelle and bolted in place. A

small crane will likely be needed for the assembly of the rotor while a large crane will be needed to put it in place.

The wind turbine which will be utilised at the Kleinzee 300MW Wind Farm in the Northern Cape is likely to have a hub height of up to 140m and a rotor diameter of up to 140m (i.e. each blade being up to 70m in length). It is proposed to construct between 150 and 200 turbines appropriately spaced within the study area to make optimum use of the available wind resource. Turbines will be appropriately spaced to minimise wake effects and wind turbulence.

The lifting cranes will be required to move between the turbine sites. The crawler crane is self-powered and can “crawl” between locations should the ground conditions allow. When assembled, the crawler crane has a track width of approximately 11 m.



Figure 7.5: Photograph illustrating the assembly of a turbine tower utilising a large lifting crane (photographs courtesy of Eskom taken during the construction of the Klipheuwel demonstration facility)



Figure 7.6: Photograph illustrating the assembly of a turbine (nacelle and blades) utilising a large lifting crane (photographs courtesy of Eskom from construction at the Klipheuwel demonstration facility)

7.2.8. Construct Substation/s

One or more substations will be constructed within the site. The turbines will be connected to the on-site substation/s via underground 33 kV cabling (refer to 7.2.9 below). The position of the substation (or substations) will be informed by the final micro-siting/positioning of the wind turbines. The layout of the turbines will determine the optimum position for the construction of a substation. The substation/s will be constructed with a high-voltage (HV) yard footprint of up to 80 m x 80 m.

The proposed substation/s would be constructed in the following simplified sequence:

- Step 1: Survey of the site
- Step 2: Site clearing and levelling and construction of access road/s to substation site (where required)
- Step 3: Construction of terrace, earth mat and foundations
- Step 4: Assembly, erection and installation of equipment (including transformers)
- Step 5: Connection of conductors to equipment
- Step 6: Rehabilitation of any disturbed areas and protection of erosion sensitive areas.

7.2.9. Establishment of Ancillary Infrastructure

A small office structure and visitors centre may also be constructed at the entrance to the wind energy facility. These structures would occupy a footprint of about 400 m². The establishment of these buildings will require the clearing of vegetation and levelling of the development site and the excavation of foundations prior to construction. A lay down area for building materials and equipment associated with these buildings will also be required.

7.2.10. Connection of Wind Turbines to the Substation

Each wind turbine will be connected to an optimally positioned substation by underground electrical cables (33 kV). The installation of these cables will require the excavation of trenches, approximately 1 m in depth within which these cables can then be laid. The underground cables will be planned to follow the internal access roads, where possible.

7.2.11. Connect Substation/s to Power Grid

A 400 kV power line will connect the substation/s to the electricity distribution network/grid at the Gromis Substation which lies approximately 16 km north-east of the proposed development site, or to the future Juno-Gromis power line to the east of the site. The connection point to the Eskom power grid will be confirmed through a network planning exercise. A route for the power line will be assessed, surveyed and pegged prior to construction.

The power line will be constructed utilising appropriate 400kV towers and will be approximately 35 m in height. A servitude of approximately 55 m will be required for this power line.

7.2.12. Commissioning

Prior to the start up of a wind turbine, a series of checks and tests will be carried out. This will include both static and dynamic tests to make sure the turbine is working within appropriate limits. Grid interconnection and unit synchronisation will be undertaken to confirm the turbine and unit performance. Physical adjustments may be needed such as changing the pitch of the blades. The schedule for this activity will be subject to site and weather conditions.

7.2.13. Undertake Site Remediation

As construction is completed in an area, and as all construction equipment is removed from the site, the site will be rehabilitated where practical and reasonable. On full commissioning of the facility, any access points to the site

which are not required during the operation phase will be closed and rehabilitated. Due to the mobility of the sandy soils, and as rehabilitation and recovery of vegetation on the site will be slow, rehabilitation activities will (as far as possible) be carried out at each turbine location once construction of that particular turbine is completed.

7.3. Project Operation Phase

Once operational, the wind energy facility will be monitored locally and remotely. It is estimated that the operational phase of the project will provide employment for approximately 10 skilled staff members, who will be responsible for monitoring and maintenance when required. It is most likely that the facility will be manned by the appointed operations and maintenance staff.

Each turbine within the wind energy facility will be operational except under circumstances of mechanical breakdown, extreme weather conditions or maintenance activities. The following operation activities have been considered to form part of the project scope of the Kleinzee 300MW Wind Farm in the Northern Cape.

7.3.1. Maintenance

The wind turbine will be subject to periodic maintenance and inspection. Periodic oil changes will be required. Any waste products (e.g. oil) will be disposed of in accordance with relevant waste management legislation.

7.4. Decommissioning

The turbine infrastructure which will be utilised for the proposed Kleinzee 300MW Wind Farm is expected to have a lifespan of approximately 20 - 30 years (with maintenance). Equipment associated with this facility would only be decommissioned once it has reached the end of its economic life. It is most likely that refurbishment of the infrastructure of the facility discussed in this EIA would comprise the disassembly and replacement of the turbines with more appropriate technology/infrastructure available at that time.

The following decommissioning activities have been considered to form part of the project scope of the proposed Wind Farm.

7.4.1. Site Preparation

Site preparation activities will include confirming the integrity of the access to the site to accommodate required equipment and lifting cranes, preparation of the

site (e.g. lay down areas, construction platform) and the mobilisation of decommissioning equipment.

7.4.2. Disassemble and Replace Existing Turbine

A large crane will be brought on site. It will be used to disassemble the turbine and tower sections. These components will be reused, recycled or disposed of in accordance with regulatory requirements. All parts of the turbine would be considered reusable or recyclable except for the blades.

SCOPING OF ISSUES ASSOCIATED WITH THE KLEINZEE 300MW WIND FARM

CHAPTER 8

Construction activities for wind energy projects typically include:

- » land clearing for site preparation and access routes;
- » transportation of supply materials and fuels;
- » construction of foundations involving excavations and placement of concrete;
- » construction of a substation, underground and above ground power lines
- » operating cranes for unloading and installation of equipment;
- » commissioning of new equipment, and
- » Waste removal and rehabilitation of disturbed sites

Operational activities include regular maintenance of the site infrastructure.

Decommissioning activities may include removal of project infrastructure and site rehabilitation.

Environmental issues associated with construction and decommissioning activities may include, among others, noise impacts, heritage impacts, soil erosion, and threats to biodiversity and ecological processes, including habitat alteration and impacts to wildlife.

Environmental issues specific to the **operation** of a wind farm could include visual impacts; noise produced by the spinning of rotor blades; avian/bat mortality resulting from collisions with blades; and mortality, injury and disturbance to other faunal species.

The significance of impacts associated with a particular wind farm is dependent on site-specific factors, and therefore impacts can be expected to vary significantly from site to site.

The environmental issues associated with all phases of the proposed Kleinzee 300MW Wind Farm have been identified through a scoping evaluation undertaken in accordance with the requirements of the EIA Regulations. This chapter serves to describe and evaluate the identified potential environmental impacts associated with the wind farm project, and to make recommendations for further studies required to be undertaken in the EIA phase, and/or recommendations for the management of these impacts through inclusion in the Environmental Management Programme (EMP).

Sections 8.1 and 8.2 provide a summary of the findings of the scoping study undertaken for the construction and operation phases of the proposed wind farm project respectively. Impacts associated with decommissioning are expected to be similar to those associated with construction. Potential direct and indirect impacts of the proposed wind farm are evaluated, and recommendations are made regarding further studies required within the EIA phase of the process. Specialist scoping reports are included within Appendix F to O.

In identifying and evaluating impacts associated with the proposed project, it has been assumed that although during the **operational phase** the area affected will be limited and comprise between 150 and 200 wind turbines in total (with a hub height of up to 140m each), access roads and a substation footprint, during **construction** a larger area within the approximately 8 682 ha area being considered for the wind farm footprint could suffer some level of disturbance as a result of the required activities on site. However, once construction is complete, only a small portion of this area (typically less than 10%) will be permanently impacted by infrastructure associated with the wind farm.

The **cumulative impacts** associated with the proposed wind farm are expected to be associated with the scale of the project, i.e. between 150 and 200 wind turbines will be located on the proposed site, as well as within the proximity of this proposed wind farm to the proposed Project Blue Wind Energy Facility to be constructed north of Kleinsee, and the Proposed Koingnaas Wind farm located about 60 km south of the town of Kleinsee. The potential direct cumulative impacts associated with the project are expected to be associated predominantly with the potential visual impact, potential noise impacts, potential vegetation impact, potential heritage impact and potential impacts on avifauna, i.e. bats and birds in the surrounding area. Cumulative effects can only be assessed once a preliminary layout is available, and will be considered in the detailed specialist studies to be undertaken in the EIA phase of the process.

It must be noted that the scoping report is a desktop study undertaken by specialists, and all potential impacts identified through the scoping phase (indicated as being of low to high significance) will be further assessed and confirmed during the EIA phase.

8.1. Evaluation of potential impacts associated with the CONSTRUCTION PHASE of the proposed Kleinzee 300MW Wind Farm south of Kleinsee

<u>Potential Visual Impacts:</u>			
<p>Potential visual impacts during the construction phase on observers in close proximity to the wind farm and power line are expected to be:</p> <ul style="list-style-type: none"> » of a short duration and » limited to the site. 			
Issue	Nature of Impact	Extent of Impact	'No go' areas
Potential visual impacts associated with the construction phase on observers in close proximity to the facility and power line.	Construction of the wind farm.	Local	None.
The potential visual impact of the construction of ancillary infrastructure (i.e. the substation at the facility, associated power line, access road to the site, internal access roads within the site, etc as determined) on observers residing in close proximity of the facility.	Construction of associated infrastructure of the wind farm.	Local	None.
<u>Gaps in knowledge & recommendations for further study:</u>			
<p>Impacts are expected to be of moderate to low significance and will therefore require a detailed assessment in the EIA phase to get a better understanding of the implications associated with all potential impacts.</p>			

<u>Potential Impacts on Agricultural potential:</u>
<p>The agricultural potential of the site is very low and limited to extensive grazing due to the very low rainfall in the area (less than 100 mm per year). There is currently no potential to increase the agricultural potential of the site as the climatic constraints are severe. Although the soils are potentially</p>

suitable for irrigated agriculture this seems an impossible land use as water availability is the main constraint.

The impacts on the site need to be viewed in relation to the opencast mining of coal in areas of high agricultural potential soils – such as the Eastern Highveld. With this comparison in mind the impact of a wind farm is negligible compared to the damaging impacts of coal mining – for a similar energy output, especially bearing in mind that no mining of fuel is required for a wind farm. Therefore, in perspective, the impacts of the proposed facility can be motivated as necessary in decreasing the impacts from mining activities in areas where agriculture potential plays a more significant role.

Issue	Nature of Impact	Extent of Impact	'No go' areas
Loss of agricultural land	Construction of proposed Wind farm and associated infrastructure	Local in terms of the activity and will be associated with the activity only. Slightly larger, but still local in extent, impacts are expected if storm water runoff is not controlled. The impacts are considered to be of low significance due to the low agricultural potential of the site	None

Gaps in knowledge & recommendations for further study:

The potentially significant impacts (if any) will be assessed in the EIA phase (refer to Agricultural potential impact assessment – Appendix I). Specific requirements of the Department of Agriculture for this type of development will be addressed.

Potential Impacts on Soil and current land use:

The proposed development Kleinzee 300MW Wind Farm south of Kleinsee will not have large impacts on the current land use of the area. This is mainly due to the low agricultural potential, dominant soils and climatic constraints for the site. Long-term detrimental impacts are not expected but adequate mitigation and management measures have to be put in place. The main aspects that will have to be managed on the site include erosion and dust generation during the construction process.

Issue	Nature of Impact	Extent of Impact	'No go' areas
Soil degradation	Damage of topsoil due to construction	Local (construction areas)	No specific 'no go' areas have been identified at

	activity (excavation, stockpiling, compaction, chemicals).	only)	this stage; and these will be investigated further during the EIA phase.
Soil erosion	Erosion of exposed topsoil by rainfall or artificially concentrated run-off.	Local (construction areas only)	No specific 'no go' areas have been identified at this stage and will be investigated further during the EIA phase.
Physical Soil Disturbance	Construction of proposed Wind farm and associated infrastructure	Local (construction areas only)	No specific 'no go' areas have been identified at this stage and will be investigated further during the EIA phase.
Impacts on Current Land Use	Construction of proposed Wind farm and associated infrastructure	Local (construction areas only)	No specific 'no go' areas have been identified at this stage and will be investigated further during the EIA phase.

Gaps in knowledge & recommendations for further study:

Limitations:

The following limitations, or gaps in knowledge, exist for the proposed activity on the site:

- » Soil distribution (classification) on the site (to be generated during the EIA phase);
- » Extent of degradation due to current land use (to be generated during the EIA phase);
- » Erosion status and erodibility of the soils on the site (to be generated during the EIA phase); and
- » Design specifications and layout of proposed development. This detail will guide the specific impacts to be assessed as well as the proposed mitigation measures.

Recommendations:

A detailed site visit will have to be conducted as part of the EIA level investigation and the following parameters should be investigated:

- » Soil distribution (classification) on the site;
- » Extent of degradation due to current land use (including mining);
- » Erosion status and erodibility of the soils on the site; and
- » Mitigation measures to arrest current impacts and manage future impacts associated with the development.

Potential impacts on Vegetation:

Potential impacts identified in the vegetation report will be restricted to those impacts that would affect vegetation communities, their habitats and their constituent plant species. The impacts could affect ecological processes and consequently ecosystem function. The possible impacts identified are:

- » Impacts on plant species of high conservation value i.e. Red List species and endemics whereby their population dynamics would be negatively affected.
- » Impacts on plant communities through fragmentation that would lead to loss of constituent species and negatively impact the cohesiveness of the communities.
- » Loss of habitat due to degradation of plant communities.
- » Loss of ecosystem function due to changes in such factors as hydrological regime, increased edge effect, disturbance of successional processes, disturbance of pollination processes and possible invasion by alien plant species.

The greatest risk to the vegetation and flora would be during the construction phase of the wind farm. No fatal flaws are anticipated from a botanical viewpoint but there are a few 'red flags'. The latter concerns the possible presence of rare and endemic plant species in the study area.

Issue	Nature of Impact	Extent of Impact	'No go' areas
Direct loss of vegetation	Impacts due to: <ul style="list-style-type: none"> » Construction of access roads » Clearing of vegetation for the turbine pedestals and construction lay-down areas » Trenches for cables and the requirement for construction of pylons for overhead power-lines. » Operation of machinery and vehicles which could result in undesirable soil compaction. » Possible fuel and chemical (cement) contamination. 	Local	No specific 'no go' areas have been identified at this stage and will be investigated further during the EIA phase.
Temporary (but often long term) loss of vegetation	Construction of proposed Wind farm and associated infrastructure	Local	
Impacts on plant species	Construction of proposed Wind farm and	Local- Regional	

of high conservation value i.e. Red List species and endemics whereby their population dynamics would be negatively affected.	associated infrastructure		
Impacts on plant communities through fragmentation that would lead to loss of constituent species and negatively impact the cohesiveness of the communities.	Construction of proposed Wind farm and associated infrastructure	Local	
Loss of habitat due to degradation of plant communities.	Construction of proposed Wind farm and associated infrastructure	Local	
Loss of ecosystem function due to changes in such factors as hydrological regime, increased edge effect, disturbance of successional processes, disturbance of pollination processes and possible invasion by alien plant species.	Construction of proposed Wind farm and associated infrastructure	Local	
<p><u>Gaps in knowledge & recommendations for further study:</u></p> <p><u>Limitations:</u> The vegetation of the coastal zone of Namaqualand north of Kleinsee is not well-documented.</p>			

It is recommended that:

The potential impacts on the plant communities in the study area that have initially been identified and described will be assessed according to standard biodiversity assessment practice. The Nature, Duration, Extent, Magnitude, Probability and Significance of each of the identified impacts will be assessed. In addition, the presence of Red List and endemic species will be given special attention to ensure that they are carefully taken into consideration when designing layouts of the proposed turbines. This information will be summarized together with the sensitivity of plant communities and habitats in a sensitivity map that would be crucial to inform the design phase of the proposed project.

Potential Impacts on Terrestrial Fauna:

There are six animal species of conservation concern that have a geographical distribution that includes the site and habitat preference that includes the type of habitat that could potentially occur on site. This includes the following species:

1. Grant's Golden Mole (VU),
2. Desert Rain Frog (VU),
3. Namaqua Dwarf Adder (VU and Protected),
4. Namaqua Plated Lizard (NT),
5. Littledale's Whistling Rat (NT),
6. Namaqua Dune Mole-rat (NT).

Most of the study area is in a natural state. There is therefore a high probability of encountering any of the species of concern on site.

A risk assessment was undertaken which identified three potential negative impacts on threatened and/or protected terrestrial fauna species. The potential impacts are:

- » loss of habitat for potentially affected species due to construction,
- » fragmentation of habitat for potentially affected species due to construction, and
- » loss of individuals of potentially affected species due to construction and/or the activities of personnel on site.

Of greatest concern is the fact that the proposed wind farm will extend from near the coast to just over 8 km inland. The site is within the known

distribution range of three threatened species (Grant’s Golden Mole, the Desert Rain Frog and the Namaqua Dwarf Adder), all of which are restricted to a band up to 10 km wide from the coast to inland and all of which are highly likely to occur either on site or nearby. If development of the site results in a barrier to these species as wide as the site, which will not necessarily happen, then there is the potential to cause regional fragmentation of any or all of these three species. Taken in combination with existing impacts due to diamond mining further up the coast, the potential threat to these three species from the proposed development of the wind farm is potentially significant. It is important to determine the presence of these species on site and in the surrounding areas and determine the significance of the potential threat posed by the proposed project. If impacts are considered to be likely, mitigation measures must be proposed to minimize potential impacts on these three species that may include maintenance of habitat and migration corridors on site.

Issue	Nature of Impact	Extent of Impact	'No go' areas
Loss of habitat for threatened flightless fauna	» general loss of habitat for sensitive species; disturbance to processes maintaining biodiversity and ecosystem goods and services, as a result of the following: » Excavation of foundations » Clearing of land for construction. » Construction of access roads. » Placement of power lines, cables and water pipelines (if applicable). » Establishment of borrow and spoil areas. » Chemical contamination of the soil by construction vehicles and machinery. » Operation of construction camps. » Storage of materials required for construction.	Local- Regional The proposed WEF, specifically at the scale of the individual infrastructure within the site. At its greatest extent this may affect the entire site, but is likely to only affect a small proportion of the site. The impact will occur at the site of the proposed WEF. The potential impact may differ from one species to another, but could affect regional processes within species populations.	No specific 'no go' areas have been identified at this stage and will be investigated further during the EIA phase.
Fragmentation of habitat for threatened/protected terrestrial fauna	» increased fragmentation of habitat and thus populations of species of concern (depending on location of impact); » disturbance to processes maintaining biodiversity. » reduction in area of occupancy of affected species; and » loss of genetic variation within affected species.	Local- Regional	No specific 'no go' areas have been identified at this stage and will be investigated further during the EIA phase.

Loss of individuals of threatened/protected terrestrial fauna	<ul style="list-style-type: none"> » fragmentation of populations of affected species; » reduction in area of occupancy of affected species; and » loss of genetic variation within affected species. 	Local- Regional	No specific 'no go' areas have been identified at this stage and will be investigated further during the EIA phase.
Reduction in area of occupancy of affected species	<ul style="list-style-type: none"> » Excavation of foundations » Clearing of land for construction. » Construction of access roads. » Placement of power lines, cables and water pipelines (if applicable). » Establishment of borrow and spoil areas. » Chemical contamination of the soil by construction vehicles and machinery. » Operation of construction camps. » Storage of materials required for construction. 	Local- Regional	No specific 'no go' areas have been identified at this stage and will be investigated further during the EIA phase.
Loss of genetic variation within affected species	<ul style="list-style-type: none"> » Excavation of foundations » Clearing of land for construction. » Construction of access roads. » Placement of power lines, cables and water pipelines (if applicable). » Establishment of borrow and spoil areas. » Chemical contamination of the soil by construction vehicles and machinery. » Operation of construction camps. » Storage of materials required for construction. 	Local- Regional	No specific 'no go' areas have been identified at this stage and will be investigated further during the EIA phase.
Impacts on biodiversity	Impacts on populations of individual species of concern due to the construction of the Wind farm.	Local- Regional	No specific 'no go' areas have been identified at this stage and will be investigated further during the EIA phase.
Impacts on sensitive habitats	Impacts on any habitats that are important for threatened fauna due to the construction of the	Local- Regional	No specific 'no go' areas have been identified at this stage and will be

	wind farm.		investigated further during the EIA phase.
Impacts on ecosystem function	<p>Impacts on any processes or factors that maintain ecosystem health and character, including the following:</p> <ul style="list-style-type: none"> » disruption to nutrient-flow dynamics; » impedance of movement of material or water; » habitat fragmentation; » changes to abiotic environmental conditions; » changes to disturbance regimes, e.g. increased or decreased incidence of fire; » changes to successional processes; » effects on pollinators; » increased invasion by alien plants. » Changes to factors such as these may lead to a reduction in the resilience of habitats and ecosystems or loss or change in ecosystem function. 	Local- Regional	No specific 'no go' areas have been identified at this stage and will be investigated further during the EIA phase.
Secondary and cumulative impacts on fauna	Impacts that may arise from changes in the social, economic or ecological environment.	Local- Regional	No specific 'no go' areas have been identified at this stage and will be investigated further during the EIA phase.

Gaps in knowledge & recommendations for further study:

Limitations and exclusions:

- » Red List species are, by their nature, are usually very rare and difficult to locate. Compiling the list of species that could potentially occur in an area is limited by the paucity of collection records that make it difficult to predict whether a species may occur in an area or not. The methodology used in this assessment is designed to reduce the risks of omitting any species, but it is always possible that a species that does not occur on a list may be unexpectedly located in an area.
- » The scoping Terrestrial fauna study (Refer to Appendix F) was based on a desktop assessment only.
- » The Terrestrial fauna study excludes avifauna and bats, which are undertaken in separate specialist studies.

Recommendations:

The following assessments will be done during the EIA phase in order to properly assess potential impacts on the ecological receiving environment by the proposed wind farm:

- » The presence of species of concern must be evaluated. This must be done by assessing habitat suitability for those species that have been assessed as potentially occurring in the area. Particular attention must be paid to those species classified as threatened (VU, EN or CR), Near Threatened or Critically rare, including one mammal species classified as Vulnerable (Grant's Golden Mole), one frog species classified as Vulnerable (Desert Rain Frog), one reptile species classified as Vulnerable (Namaqua Dwarf Adder), one reptile species classified as Near Threatened (Namaqua Plated Lizard) and two mammal species classified as Near Threatened (Littledale's Whistling Rat and Namaqua Dune Mole-rat).

Potential Impacts on Avifauna (birds):

Although the final footprint of most wind farms is likely to be relatively small, the construction phase of development inevitably incurs quite extensive temporary damage or permanent destruction of habitat, which may be of lasting significance in cases where wind farm sites coincide with critical areas for restricted range, endemic and/or threatened species. Similarly, construction, and to a lesser extent ongoing maintenance activities, are likely to cause some disturbance of birds in the general surrounds, and especially of shy and/or ground-nesting species resident in the area. Mitigation of such effects requires that generic best-practice principles be rigorously applied - sites are selected to avoid the destruction of key habitats, and construction and final footprints, as well as sources of disturbance of key species, must be kept to an absolute minimum.

Some studies have shown significant decreases in the numbers of certain birds in areas where wind energy facilities are operational as a direct result of avoidance of the noise or movement of the turbines (e.g. Larsen & Guillemette 2007), while others have shown decreases which may be attributed to a combination of collision casualties and avoidance or exclusion from the impact zone of the facility in question (Stewart et al. 2007). Such displacement effects are probably more relevant in situations where wind energy facilities are built in natural habitat (Pearce-Higgins et al. 2009, Madders & Whitfield 2006) than in more modified environments such as farmland (Devereaux et al. 2008).

Infrastructure commonly associated with wind farms can be detrimental to birds. The construction and maintenance of substations, power lines, servitudes and roadways causes both temporary and permanent habitat destruction and disturbance. New overhead power lines also pose a collision and possibly an electrocution threat to certain species (Van Rooyen 2004a, Lehman et al. 2007, Jenkins et al. 2010).

Some habitat destruction and alteration inevitably takes place during the construction of power lines, substations and associated roadways. Power line servitudes also have to be cleared of excess vegetation at regular intervals in order to allow access to the line for maintenance and to reduce the risk of fire

under the lines. These activities may have an impact on birds breeding, foraging and roosting in or in close proximity to the servitude, because they can have the effect of altering bird community structure along the length of a power line (e.g. King & Byers 2002).

Issue	Nature of Impact	Extent of Impact	'No go' areas
Disturbance by construction and maintenance activities	Construction & maintenance	Local	No specific 'no go' areas have been identified at this stage and will be investigated further during the EIA phase.
Habitat loss – destruction, disturbance and displacement	Construction footprint	Local	No specific 'no go' areas have been identified at this stage and will be investigated further during the EIA phase.

Gaps in knowledge & recommendations for further study:

- » A full EIA and a pre-construction monitoring phase is recommended as it will generate more detailed assessments of all potential impacts, provide passage rates of critical species and better inform recommended mitigation where necessary.

Impacts on bats:

The entire site is predicted to have a low bat sensitivity and no specific feature or habitat type can be isolated or identified from available data that may indicate a higher presence of bats in such an area.

Some foraging habitat will be destroyed by the construction of the turbines and associated infrastructure. This impact is a negative and local impact that will be more significant during construction than during the operation of the wind farm.

During the construction phase of the project possible bat roosts may be impacted by earthworks and large machinery. Diggings related to the placement of underground cables can also damage bat roosts. This is a negative local impact being applicable only during the construction phase, on the contrary this may be perceived as a neutral local impact after construction since the new turbines and associated structure will provide additional roosting space for some species of bats. But it is important to understand that this may be upsetting to the ecology since the new structures will benefit only a few species unnaturally.

Issue	Nature of Impact	Extent of Impact	'No go' areas
Destruction of foraging habitat	Rotating turbine blades	Regional - The impact will occur at the site of the proposed Wind farm, but will have an impact at a more	Cannot be determined at this stage.

		regional level, since it affects entire populations of affected species and may affect migration routes of species, especially marine birds that breed along the coastline.	
Destruction of roosts	Rotating turbine blades	Regional - The impact will occur at the site of the proposed Wind farm, but will have an impact at a more regional level, since it affects entire populations of affected species and may affect migration routes of species, especially marine birds that breed along the coastline.	Cannot be determined at this stage.

Gaps in knowledge & recommendations for further study:

Limitations:

The existing impacts on the study area are very limited and seem to include some mining activities particularly in the northern parts. The available literature on South African bat behaviour and ecology is limited, especially on behavioural acts pertaining to large geographical regions. Much of the knowledge of bat behaviour is therefore still relatively uncertain in comparison to more charismatic species of animals. Areas on the site to be designated as having a higher bat activity and/or diversity, is deemed as such based on the occurrences of certain environmental and terrain features that will be favourable to bats. Due to the featureless and homogenous nature of the site and the fact that no single terrain type or feature can be isolated and identified as having a higher possibility to support bat occurrence, no desktop sensitivity map could be drawn for this site.

Recommendations:

- » Areas of higher bat foraging activity should be identified and these areas be treated with more caution and unnecessary habitat clearance avoided (During the detailed specialist EIA study a sensitivity map may be drawn after a site visit has been conducted, and the terrain explored in more detail on foot to enable discovery of possible bat roosts.)
- » All diggings and earthworks must be kept to a minimum especially in rocky outcrop areas (should these exist on site), and blasting should be minimised.

Potential impacts on Palaeontology and Heritage Resources:

Palaeontology

Paleontological resources are known to occur widely in the region, although these will be less prevalent within the surficial aeolian sands that predominate in the study area. However, if a duricrust (hard soil layer formed through accumulation and subsequent precipitation of soluble minerals) is present beneath the sand then this could harbour fossil remains of animals that have been deflated down onto it in the past. In southern Namaqualand these duricrusts usually have archaeological material on them too.

Archaeology

The study area lies far enough from the coast to avoid the very high concentrations of shell middens that occur within about 500 m of the shore line. However, inland dune fields can harbour archaeological sites and some have already been observed in such localities in the past (Halkett & Hart 1997). Refer to Heritage report in Appendix L for the locations of archaeological sites already on record in the general study area. It should be emphasised that their distribution is more a function of the areas searched than of the real distribution of archaeological sites (Halkett 2006; Halkett & Hart 1997; Parkington & Hart 1991). It is important to note that despite the concentration along the coast, sites are nonetheless found further inland, far enough to be impacted by the proposed Wind Farm. In one area north of Kleinsee three sites were found and excavated 6.0 km from the coast (Halkett 2003). It is very seldom that the types of sites located in this area require in situ conservation.

The study area is deemed to be generally suited to the proposed development since it is very remote and currently inaccessible to the general public. There are also very few farm buildings and/or residences in the area. Archaeological resources are concentrated close to the sea shore and they are likely to be relatively uncommon within the study area.

A heritage impact assessment (HIA) is recommended for this project. The reporting would necessarily focus on archaeology, since it is that aspect of heritage that would likely receive the greatest impact. Figure 8.1 indicates possible sensitivity ratings with areas closer to the coast being rated more highly as this is where shell middens are most frequent. However, the distance from the sea means that the likelihood of significant sites does diminish substantially. It should be noted, though, that a very important site with Middle Stone Age material has been located in a white sand dune field 6.5 km inland and 25 km south of the present study area. The nature of the receiving environment and of the heritage resources known to occur in the area suggest that the project should proceed to the EIA phase. No fatal flaws are identified but areas closer to the coast are considered to be of higher (medium) significance than those further inland (low significance). No areas are considered to carry potentially high archaeological significance and no no-go areas have been identified through the heritage specialist report (Refer to Appendix L). A Heritage Impact Assessment will be required, primarily to address archaeological concerns and perhaps the routing of the power line.



Figure 8.1: Aerial photographic view of the study area showing areas within approximately 3.5 km of the coast as medium archaeological sensitivity (orange area) and the remaining area as low sensitivity (yellow area).

Issue	Nature of Impact	Extent of Impact	'No go' areas
Palaeontology	<ul style="list-style-type: none"> » Construction of the wind farm and associated infrastructure; » Bulk earth works 	Local	No 'no- go' areas have not been identified at this stage.
Archaeology	Construction of the wind farm and associated infrastructure;	Local	No 'no- go' areas have not been identified at this stage.
Graves	Construction of the wind farm and associated infrastructure;	Local	No 'no- go' areas have not been identified at this stage.

Gaps in knowledge & recommendations for further study:

No limitations were identified.

During the EIA phase of the project it is suggested that:

- » During fieldwork the relevant parts of the study area to be impacted by the development will need to be walked such that archaeological resources visible on the surface can be recorded. The client will need to provide detailed mapping/layout of the proposed Wind Farm to enable accurate fieldwork. It is suggested that as part of the Heritage Impact Assessment, a desktop paleontological specialist report be commissioned.
- » A full archaeological study of the affected areas should be conducted to locate any archaeological sites that might be affected by the proposed development. This will enable mitigation requirements to be determined. These may include archaeological excavation and/or sampling or shifting of the turbines.
- » A visual impact assessment should also be conducted, since this may suggest the need for certain turbines to be omitted or shifted to protect particular views from or of certain places.
- » An alert for the uncovering of fossil bone and implements be included in the EMP for the project.
- » In the event of possible fossil and/or archaeological finds, the contracted archaeologist or palaeontologist must be contacted.

Potential noise impacts:

The noise impact assessment (Appendix N) indicated that the proposed project could have an impact of a low to high significance on the noise climate in the surrounding area as there are Noise-sensitive developments (NSD) within the potential area of influence.

Construction activities may include the following:

- » construction of access roads,
- » establishment of turbine tower foundations and electrical substation(s),
- » the possible establishment, operation and removal of concrete batching plants,
- » the construction of any buildings,
- » digging of trenches to accommodate underground power cables; and
- » the erection of turbine towers and assembly of WTGs.

The equipment likely to be required to complete the above tasks will typically include:

- » excavator/grader, bulldozer, dump trucks, vibratory roller, bucket loader, rock breaker, (potentially) drill rig, excavator/grader, bulldozer, dump truck, flat bed trucks, concrete truck(s), pile driver, cranes, fork lift and various 4WD and service vehicles.

Issue	Nature of Impact	Extent of Impact	'No go' areas
Noise impacts due to construction equipment	<ul style="list-style-type: none"> » (potential) borrow pit; » concrete batching/delivery; » foundation preparation; and » the digging of trenches 	Local	Cannot be determined at this stage.
Noise impacts due to blasting (if required)	<ul style="list-style-type: none"> » Blasting 	Local	Cannot be determined at this stage.
Noise impacts due to construction traffic	Increased traffic due to: <ul style="list-style-type: none"> » deliveries and » movement onsite 	Local	Cannot be determined at this stage.

Gaps in knowledge & recommendations for further study:

Limitations:

- » There is no information available regarding the existing soundscape of the area.
- » Projected impacts from the construction phase can only be modelled once more information regarding the duration of construction and equipment used are known.

Recommendations:

The following construction activities will be considered in the EIA studies, taking cognisance of the worst-case scenario (activities close to a potential sensitive receptor) during the EIA phase:

- » the (potential) borrow pit,
- » concrete batching/delivery,

- » foundation preparation,
- » the digging of trenches and
- » increased traffic (deliveries and movement onsite)

It is recommended that the potential noise impact associated with the proposed Wind farm be investigated in more detail in the Environmental Impact Assessment phase. The following information is considered critical:

- » The prevailing night-time background ambient noise levels,
- » The available meteorological data,
- » The exact locations of the various WTGs in the wind farm,
- » The full specifications of the WTGs,
- » The confirmation of the Noise-sensitive developments, and;
- » An overview of the equipment, processes and schedules for the construction phase.

Potential impacts on the social environment:

A number of key social issues are potentially associated with the construction of the Proposed Wind farm. The potential positive impacts associated with the construction phase relate to the creation of limited employment and skills development opportunities. The potential negative impacts are linked to the presence of construction workers on the site and in the area, the impact on local roads (transport of turbine components), and potential opportunistic immigration and labour stranding.

The key conclusions of the Scoping level study are as follows:

- » The establishment of wind energy facilities are supported at national and provincial levels.
- » Key potential construction phase issues for further investigation during the EIA phase relate to the recruitment and on-site management of construction labour and the management of impacts on local roads.

Detailed consultation with affected stakeholders will be undertaken by the SIA consultant during the assessment component of the SIA.

Issue	Nature of Impact	Extent of Impact	'No go' areas
Formulating appropriate labour recruitment strategies, specifically bearing in mind the potential	Influx of job seekers into the area (limited positive impact)	Local, Regional and National	N/A

of opportunistic labour in-migration			
The formulation of suitable training strategies, specifically bearing in mind the generally very low education and skills levels in the local area	Skills development (limited positive impact)	Local, Regional and National	N/A
The appropriate siting of the construction camp	Sense of place	Local, Regional and National	N/A
Adequate on-site management of construction crews	Risks related to infrastructural damage, veld fires and stock and game losses on adjacent properties	Local	N/A
The provision of adequate services and facilities for construction crews	Health risks	Local	N/A
Managing health risks associated with large groups of construction workers, including the spread of STDs, HIV/Aids and TB	Health risks	Local, Regional and National	N/A
Job creation	Maximising opportunities to local and regional SMMEs and other businesses to provide a range of services, which may include, but not limited to, catering, laundry, transport (limited positive impact)	Local, Regional and National	N/A
Increase in construction activity due to the proposed construction of the wind farm	Potential impacts on traffic flows along roads in the study area associated, with the movement of heavy equipment onto the site	Local	N/A
Crime	Influx of job seekers, and criminal elements, into the area	Local, Regional and National	N/A
Traffic	Potential impacts on traffic flows along roads in the study area associated, with the movement of heavy equipment onto the site.	Local	N/A

Gaps in knowledge & recommendations for further study:

Limitations:

The information presented in the Social Scoping level study is based on available desktop sources only. With regard to the study area, the amount of relevant literature available is limited. Baseline information presented in this report will be supplemented and amended by information obtained from interviews with key local officials and community members during field interviews envisaged as part of the EIA phase.

» Demographic data

The demographic data used in the study is largely based on the findings of the 2001 Census¹⁸, or on sources which based projections on the Census 2001 data. While this data does provide useful information on the demographic profile of the affected area, the actual data is dated and should be treated with care.

In addition, it is no longer possible to access Census 2001 data at Ward level via the Municipal Demarcation Board. As a result it was not possible to obtain demographic data for Ward 5. The social baseline for this part of the study area is therefore described at Local Municipal level (NKLM) only.

Recommendations:

Methodology to be undertaken for the EIA phase:

- » Review of existing project information, including the Planning and Scoping Documents;
- » Collection and review of reports and baseline socio-economic data on the area (IDPs, Spatial Development Frameworks etc.);
- » Site visit and interviews with key stakeholders in the area including local land owners and authorities, local community leaders and councillors, local resident associations and residents, local businesses, community workers etc;
- » Identification and assessment of the key social issues and opportunities;
- » Preparation of Draft Social Impact Assessment (SIA) Report, including identification of mitigation/optimization and management measures to be implemented.
- » Finalisation of SIA Report.

¹⁸ The last comprehensive national census was conducted in 2001. Census 2001 provided demographic and socio-economic data from National to Municipal Ward level. An interim Community Survey (sample based) was undertaken in 2007, but provided information only on provincial and district municipal levels. The next comprehensive national census is planned for October 2011. It is unlikely that the compiled data would be publicly available before November 2012 (www.Statsa.gov.za).

The following typical, generic project information is required in order to inform the Social Impact Assessment (Including all related infrastructure such as transmission lines, access roads, office and warehouse components):

- » Comments received from I&APs during the public participation process, including those with regard to the Final Scoping Report;
- » A draft illustration (plan) of the proposed lay-out(s) of the turbines (including an indication of the phasing sequence on the site), supporting structures and infrastructure;
- » Duration of the construction phase (months);
- » Number of people employed during the construction phase;
- » Breakdown of number of people employed in terms of low skilled, semi-skilled and skilled;
- » Estimate of the total wage bill for the construction phase and breakdown in % as per skills categories;
- » Total capital expenditure estimate for construction phase;
- » Indication of where construction workers will be housed (on site or in nearest town);
- » Opportunities for onsite skills development and training;
- » Description of the typical activities associated with the construction phase, specifically on-site construction activities. This includes a description of how the large components associated with a WEF will be transported to the site and assembled on the site;
- » The size of the vehicles needed to transport the components and the routes that will be used to transport the large components to the site, and an estimate of the number of vehicle trips required and duration of each trip.

8.2. Evaluation of potential impacts associated with the OPERATION PHASE of the proposed Kleinzee 300MW Wind farm south of Kleinsee

Potential Visual Impacts:

The result of the preliminary viewshed analyses for the proposed facility is shown on Figure 8.2. The initial viewshed analysis was undertaken from preliminary vantage points within the proposed development area at offsets of 140m above average ground level (i.e. the approximate hub height of the proposed wind turbines). This was done to determine the general visual exposure of the area under investigation, simulating the proposed structures associated with the facility. It must be noted that the viewshed analyses do not include the effect of vegetation cover or existing structures on the exposure of the proposed wind turbines, therefore signifying a worst-case scenario.

Figure 8.2 indicates areas from which any number of turbines (with a minimum of one turbine) could potentially be visible as well as proximity offsets from the proposed development area. The proposed facility will have a large core area of potential visual exposure on the wind farm site itself, and within a 5km offset. Almost the entire area within 5km will be visually exposed to the wind farm. This core area includes the southern edge of the town of Kleinsee, the settlement of Melkbospunt and the secondary roads leading south from Kleinsee. Most of this core area lies within the Namaqua National Park’s Priority Natural Area. Potential visual exposure decreases somewhat in the medium distance (i.e. between 5 and 10km) with visually screened areas occurring in the north, east, south east and south. This visual screening is by virtue of local topography (i.e. the hills and incised river valleys). Receptors likely to be visually exposed include the residents of Kleinsee and the users of the R355 and secondary roads. The southern two thirds of this visually exposed area still falls within the Namaqua National Park’s Priority Natural Area. In the longer distance (i.e. between 10km and 20km), potential visual exposure remains moderately high with significant visually protected areas evident in the north east, east and south east. Visual receptors that may experience visual impact are limited to users of the R355, and the secondary roads running to the north and south, along the coast. More than half of this visually exposed zone (to the south) lies within the Namaqua National Park’s Priority Natural Area. The facility will be visible for the entire length of the R355 as well as for most of the lengths of secondary road within the study area.

It is envisaged that the turbine structures would be highly visible to limited numbers of observers (i.e. people travelling along roads and residing in Kleinsee and Melkbospunt) and would constitute a high visual prominence, especially within a 10km radius, potentially resulting in visual impact. This potential impact is expected to be minimised due to the presence of remnants of mining activities and associated infrastructure within the broader region.

Issue	Nature of Impact	Extent of Impact	‘No go’ areas
The visibility of the facility to, and potential visual impact on, observers travelling along arterial (i.e. R355) and secondary roads in close proximity to the proposed wind farm and within	Visual exposure to wind turbines and associated infrastructure.	Local	Cannot be determined at this stage.

the region.			
The visibility of the wind farm to, and potential visual impact on, the small town of Kleinsee and the settlement of Melkbospunt located in close proximity to the proposed wind farm.	Visual exposure to wind turbines and associated infrastructure.	Local	Cannot be determined at this stage.
The visibility of the wind farm to, and the potential visual impact on conservation planning features, specifically the Namaqua National Park's Priority Natural Area.	Visual exposure to wind turbines and associated infrastructure.	Local	Cannot be determined at this stage.
The potential visual impact of the wind farm on the visual character of the landscape and sense of place of the region.	Visual exposure to wind turbines and associated infrastructure.	Local	Cannot be determined at this stage.
The potential visual impact of the wind farm on tourist routes, tourist destinations and tourist potential of the region, especially in terms of events such as the Namaqualand flower displays.	Visual exposure to wind turbines and associated infrastructure.	Local	Cannot be determined at this stage.
The potential visual impact of ancillary infrastructure (i.e. the substation, the overhead power line, the internal access roads, the borrow pits, the office / workshop and the visitor centre) on observers in close proximity to the wind farm and/or the associated infrastructure.	Visual exposure to wind turbines and associated infrastructure.	Local	Cannot be determined at this stage.
The potential visual impact of operational, safety and security lighting of the facility at night on observers in close proximity to the facility.	Visual exposure to wind turbines and associated infrastructure.	Local	Cannot be determined at this stage.
Potential cumulative visual impacts of the wind farm and associated infrastructure.	Visual exposure to wind turbines and associated infrastructure.	Local	Cannot be determined at this stage.

Gaps in knowledge & recommendations for further study:

The potential visual impacts need to be assessed in greater detail during the EIA phase of the project.

It is recommended that:

- » The viewshed analyses be refined once a layout of the wind farm is completed and will be regenerated per actual turbine position (and actual proposed turbine height) during the EIA phase of the project. This will be undertaken for the full number of turbines proposed.
- » The severity of the potential visual impact on sensitive receptors be assessed in further detail in the EIA.
- » Additional spatial analyses must be undertaken in order to create a visual impact index that will further aid in determining potential visual impact.
- » Specific spatial criteria need to be applied to the visual exposure of the proposed facility in order to successfully determine visual impact and ultimately the significance of the visual impact.
- » In addition, photo simulations of critical viewpoints should be undertaken where required, in order to aid in the visualisation of the envisaged visual impact.

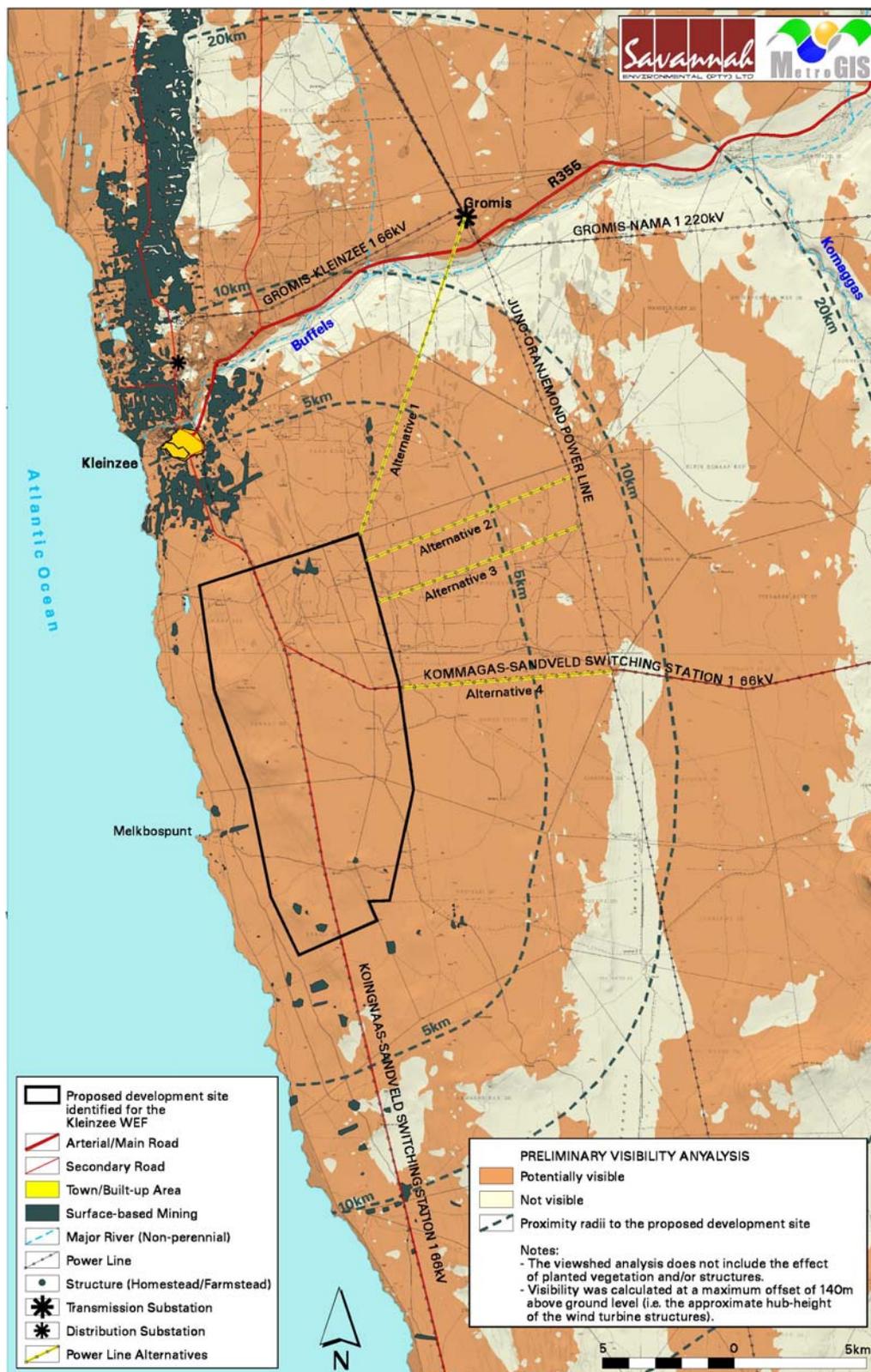


Figure 8.2: Map indicating the Potential visual exposure of the proposed wind farm (Note: the visible area indicates areas from which any number of wind turbines (with a minimum of one turbine) may be visible. NB: nothing apart from topography has been considered in this figure – as per the VIA report).

Impacts on Avifauna:

The main issue associated with the operation of a wind farm in terms of avifaunal impacts relates to the potential for collisions with the blades. Multiple factors influence the number of birds killed at wind farms. These can be classified into three broad groupings: (i) avian variables, (ii) location variables, and (iii) facility-related variables. Although only one study has so far shown a direct relationship between the abundance of birds in an area and the number of collisions (Everaert 2003), it would seem logical to assume that the more birds there are flying through an array of turbines, the higher the chances of a collision occurring. The identity of the species present in the area is also very important as some birds are more vulnerable to collision with turbines than others, and feature disproportionately frequently in collision surveys (Drewitt & Langston 2006, 2008, de Lucas et al. 2008). Species-specific variation in behaviour, such as foraging, commuting or courting, also affects susceptibility to collision (Barrios & Rodríguez 2004, Smallwood et al. 2009). There may also be seasonal and temporal differences in behaviour, for example breeding males displaying may be particularly at risk.

Of the 14 conservation priority, red-listed species known to occur in the area, 10 of the 14 are considered to have a high probability of collision –and the 3 of the 14 are considered to be at moderate risk of colliding with the blades of the turbines (The remaining species – the oystercatcher – is unknown). Two species are perceived to have a moderate to high risk of electrocution on bird-unfriendly power infrastructure (Martial Eagle and Lanner Falcon), and 5 high risk (two cormorants, Cape Gannet, Damara Tern and African Black Oystercatcher). Eight species (moderate) are considered to be at risk of being disturbed and losing habitat during the construction of the wind farm. All these species may be disturbed in the longer term by operational activities around the facility such as power line and turbine maintenance, (refer to Table 1 of the Avifauna report- appendix H of this scoping report).

It is predicted in the avifauna study that the two species of cormorants, the two species of flamingos and the Great White Pelican will be the most collision-prone impacted species, and the Damara Tern will be the most likely to be displaced.

Issue	Nature of Impact	Extent of Impact	'No go' areas
Collisions of birds with turbines	Collision with turbine blades	Regional - The impact will occur at the site of the proposed Wind farm, but will have an impact at a more regional level, since it affects entire populations of affected species and may affect migration routes of species, especially marine birds that breed along the coastline.	Cannot be determined at this stage.
Habitat loss – destruction, disturbance and displacement	Noise and movement	Local	Cannot be determined at this stage.

Impacts of associated infrastructure	» Electrocutation with associated power lines » The maintenance of substations, power lines, servitudes and roadways causes both temporary and permanent habitat destruction and disturbance.	Local to Regional. -the impact will occur at the site of the proposed Wind farm, but will have an impact at a more regional level, since it affects entire populations of affected species and may affect migration routes of species, especially marine birds that breed along the coastline.	Cannot be determined at this stage.
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Gaps in knowledge & recommendations for further study:

Limitations:
 Inaccuracies in the sources of information used for the avifauna study (Refer to Appendix H of this report) could limit this study. The SABAP1 (Southern African Bird Atlas Projects) data for the study area is almost 19 years old (Harrison et al. 1997), and the area is relatively remote and seldom visited. However, a relatively healthy set of atlas cards has been submitted by Dr Sutherland (private resident of Kleinsee) in the SABAP2 scheme and this forms a solid basis for this desk-top study.

There are only two, small wind energy facilities functioning in South Africa (totalling 8 turbines), therefore data on the environmental effects of wind energy facilities in South Africa is limited. However, numerous studies are emerging from other such facilities internationally. While general principles can be gleaned from them, care is required when adapting international knowledge and experience to uniquely South African birds and conditions.

It is not possible at the desktop study or scoping stage to determine the relative significance of these various potential impacts, mainly because too little information is available on the relative size of local populations of the priority species. This can be investigated in more detail during the EIA phase and a site visit.

Recommendations:
 The EIA phase will emphasise the outcome of the site visit, which in turn will include:

- (i) sample surveys of large terrestrial species, raptors and other collision-prone species within the study area to determine the relative importance of local populations of these key taxa;
- (ii) estimates of the extent and direction of possible movements of these species within/through the anticipated impact zone of the wind farm, in relation to nesting or roosting sites (e.g. cliff-lines, wetland pans, existing power lines) and foraging areas (high productivity coastlines and inland wetlands).
and

(iii) identification of the least sensitive/lowest risk areas to locate wind turbines within the broader study area, in terms of (i) and (ii) above.

The results will include a more detailed assessment of all impacts, recommended mitigation where necessary (particularly with reference to the siting of turbines). It can also detail a long-term programme for monitoring actual impacts from pre- to post-construction phases of the development, and improving our understanding of the long-term effects of wind energy developments on South African avifauna.

Impacts on bats:

The entire site is predicted to have a low bat sensitivity and no specific feature or habitat type can be isolated or identified from available data that may indicate a higher presence of bats in such an area. The site does not display the three factors of possible roosting space, surface water and probability of insects strongly, suggesting that it is unlikely to have a high bat activity. The possible presence of *Cistugo seabrae*, *Rhinolophus capensis*, and *Miniopterus natalensis* must be investigated and special attention paid to the possible presence of caves in the surrounding area of the site.

There is a concern of bats and possible wind turbine blade collisions/barotrauma have been mentioned, but yet international research and experiments are unable to suggest sustainable large scale mitigation measures that can move this threat to a category of no concern. This is a negative regional direct impact that can have a cumulative effect effective for the lifetime of the wind farm, with a low probability of occurrence.

The migration paths of South African bats in the Cape Provinces are virtually unknown. Cave dwelling species like *Miniopterus natalensis* and *Myotis tricolor* undertake annual migrations, although no caves are known to be in close proximity to the study area. Due to a great lack in local knowledge of the South African bat migration routes, this impact needs to be conservatively considered, but have a low probability of occurrence.

This is a negative, direct and potentially cumulative (especially if other proposed wind farms are also considered) national impact, that is effective for the lifetime of the wind farm.

Issue	Nature of Impact	Extent of Impact	'No go' areas
Bat mortalities due to blade collisions and barotrauma during foraging	» Rotating turbine blades	Regional - The impact will occur at the site of the proposed Wind farm, but will have an impact at a more regional level, since it affects entire populations of affected species and may affect migration routes of	Cannot be determined at this stage.

		species, especially marine birds that breed along the coastline.	
Bat mortalities due to blade collisions and barotrauma during migration	» Rotating turbine blades	Regional - The impact will occur at the site of the proposed Wind farm, but will have an impact at a more regional level, since it affects entire populations of affected species and may affect migration routes of species, especially marine birds that breed along the coastline.	Cannot be determined at this stage.

Gaps in knowledge & recommendations for further study:

Limitations:

The existing impacts on the study area are very limited and seems to include some mining activities particularly in the northern parts. The available literature on South African bat behaviour and ecology is limited, especially on behavioural acts pertaining to large geographical regions. Much of the knowledge of bat behaviour is therefore still relatively uncertain in comparison to more charismatic species of animals. Areas on the site to be designated as having a higher bat activity and/or diversity, is deemed as such based on the occurrences of certain environmental and terrain features that will be favourable to bats.

Recommendations:

- » It is important to note that this scoping phase sensitivity study is not intended to govern the ideal locations of wind turbines with regards to bat sensitivity, but rather to provide guidance for the EIA phase, although the site is deemed to have a low bat sensitivity, the entire site should still be critically investigated and bat activity monitored.
- » True bat foraging activity needs to be determined in the EIA phase.
- » Avoiding the placement of wind farms and individual turbines in areas of high bat activity can significantly lessen the impact of wind farms on bat fauna. Therefore it is proposed that areas of higher bat activity be identified in the EIA assessment and site visit with nocturnal monitoring, and these areas preferable be avoided in turbine placement. Affordable pre-construction long term monitoring data can be correlated with meteorological data and consequently provide more accurate data for implementation of mitigation measures, such as the ideal wind speed to use as a cut in speed.
- » Pre construction monitoring is more favourable than post construction monitoring, since some bat fatalities may already occur before the mitigation measures are perfected for the site. Additionally the areas identified in the desktop phase, where implementation of mitigation measures are likely to be prioritized, must receive special attention in the EIA phase.
- » Even though no known caves are in close proximity, it will be beneficial to collaborate with academic institutions to promote research on the subject. It

is essential to establish that the site is not within any bat migration routes, and if so during what time and season of the year does migration take place. This can be achieved by doing affordable long term preconstruction monitoring and quantifying the risks more accurately. After which, if the site falls in line with a migration route, aggressive mitigation measures can be applied during the established times of bat migrations. An example of such a very aggressive mitigation measure would be to keep turbines static at night during periods of bat migrations, which can be several weeks at a time and occurring at least twice a year.

Potential Heritage Impacts:

Potential impacts on heritage as a result of the operation of the wind farm relate to visual impacts on areas around heritage structures and cultural landscapes, as well as impacts on sense of place.

Built environment

The only structures visible from Google Earth occur in the south-eastern part of the study area. They comprise of a small complex of farm buildings on the farm 'Roovlei' (Refer to Figure 7 of the Heritage Study contained in Appendix L of this report). These structures would need to be examined for significance to determine their appropriate adaptive reuse should this be considered in the development. If the structures are older than 60 years, a permit would be required for demolition or alteration.

Cultural landscape and visual impacts

Although much of Namaqualand is essentially a pristine natural landscape, the coastal stretch from Kleinsee northwards has been heavily altered by open cast diamond mining. Small test excavations and trenches dot the entire coastline both inside and outside of the current high security mining areas. Large structures and mine dumps are present several kilometres north of the study area and these lend an industrial character to parts of the landscape. The area is currently all private land and is not accessible to the general public. This means that relatively few visual receptors (aside from the town of Kleinsee) are present on the landscape. The visual impacts will thus be of high significance but of low intensity (or magnitude).

Issue	Nature of Impact	Extent of Impact	'No go' areas
Built environment	Physical structural appearance of the Wind farm.	Local	No 'no- go' areas have been identified at this stage.
Cultural landscapes and sense of place	Physical structural appearance of the Wind farm.	Unknown at this stage of impact assessment	No 'no- go' areas have been identified at this stage.

Gaps in knowledge & recommendations for further study:

During the EIA phase of the project it is suggested that:

- » A visual impact assessment should also be conducted, since this may suggest the need for certain turbines to be omitted or shifted to protect particular views from or of certain places.

Potential noise impacts:

Increased noise levels can directly be linked with the various activities associated with the operational phase of the activity. During this evaluation, more focus was placed on the impacts on the surrounding noise environment during times when a quiet environment is highly desirable. Noise limits should therefore be appropriate for the most noise-sensitive activity. Noise-sensitive activities such as sleeping, or areas used for relaxation or other activities (places of worship, school, etc) should determine appropriate Zone Sound Levels. However, for the noise Scoping report the $L_{Req,N}$ of **35dBA** as proposed by SANS 10103 was used.

Commonly the most significant stage relating to noise is the operational phase. The sources of noise include:

- » Aerodynamic noise is emitted by a wind turbine blade (sound of the wind turbine “cutting” wind – low frequency noise)
- » Mechanical noise (from the gear-box / generator)
- » Transformer noises (sub-stations)
- » Transmission Line noise (Corona noise)
- » Low frequency noise
- » Amplitude modulation of the sound emissions from the wind turbines

The worst case scenarios as indicated in the noise study (Appendix N) illustrates the situation where atmospheric conditions are favourable for sound propagation, with the wind speeds above the cut-in speeds of the Wind Turbine Generator (WTG), but before wind induced noises start to mask the noises from the WTG.

Based on the total area that could be influenced by the construction and operation of the Wind farm, it has been concluded that it is possible that there are potential receptors (to be confirmed during EIA phase) that could be affected by the facility. The significance of this impact however would depend on:

- » Equipment selected for the construction and operational phase,
- » The total number of wind turbines or other noise sources operational within 5,000 meters from the potential sensitive receptors (all noise sources within a 5 km distance could add to cumulative noise impacts),
- » The layout of the Wind farm in relation to the potential sensitive receptors (including the consideration of the buffer zones),
- » Prevailing wind conditions, and

» Surrounding environment, and how it responds to increased wind speeds in terms of noise generation (wind induced).

In addition, the exact locations of the various Wind Turbine Generators (WTGs) will only be defined during the EIA phase, and only then can their noise impact be modelled in detail.

Issue	Nature of Impact	Extent of Impact	'No go' areas
Noise impacts associated with the operation of the wind farm	The noise will be a combination of the cumulative effects of up to 200 wind turbines operating at night. Based on the preliminary impact estimations (as detailed in the noise specialist report contained within Appendix N) there are potential noise-sensitive developments (NSD) within the potential area of influence. This, however, needs to be confirmed through detailed modelling of the preliminary layout in the EIA phase of the process.	Regional (i.e. beyond the site boundaries). The noise could impact on receptors within the potential area of influence (worst case scenario – wind blowing from wind farm towards receptor).	An appropriate buffer around identified sensitive receptors- to be confirmed in the EIA phase

Gaps in knowledge & recommendations for further study:

Limitations:

No layout was provided at this stage of the study. Conceptual scenarios were therefore modelled to illustrate the potential spatial extent of noise impacts that wind turbines may have on a potential receptor.

Recommendations:

It is recommended that the potential noise impact associated the proposed Wind farm be investigated in more detail in the Environmental Impact Assessment phase. The following information is considered critical:

- » The prevailing night-time background ambient noise levels,
- » The available meteorological data,
- » The exact locations of the various WTGs in the Wind farm,
- » The full specifications of the WTGs, and
- » The confirmation of the Noise-sensitive developments.

Potential Social Impacts:

The potential positive impacts associated with the operational phase relate to the creation of employment opportunities and the promotion of clean, renewable energy. The potential negative impacts are linked to the impact on the rural sense of place and scenic integrity of the landscape. These impacts can in turn impact on the tourism potential of the area.

Social change is recognised as a natural and on-going process. However, it is important to recognise and understand that projects have the potential to influence and alter both the rate and direction of social change. As a result, the development and implementation of projects can result in specific social changes (both positive and negative) as opposed to merely being aware that development per se will be accompanied by social change.

Social impacts can be defined as the consequences to human populations of any public or private actions (these include policies, programs, plans and or projects) that alter the way 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, family or household, community and organisation or society level (Vanclay, 2002).

Categories of social impacts include:

- » **People's way of life** – how people live, work, play and relate to other people on a day-to-day basis;
- » **Their culture** – shared beliefs, customs, values, and language or dialect;
- » **Their community** – its cohesion, stability, character, services and facilities;
- » **Their political system** – extent to which people are able to participate in decisions affecting their lives, the level of democratization and the resources available;
- » **Their environment** – quality of the natural environment in which people live, including the air and water people use; the availability and quality of the food they eat; the level of hazard or risk, dust and noise they are exposed to; the adequacy of sanitation, their physical safety and their access and control over resources;
- » **Their health and well-being** – health is defined as a state of complete physical, mental, social and spiritual well being and not merely the absence of disease or infirmity;
- » **Their personal and property rights** – particularly in cases where people are economically affected, or experience personal disadvantage, which may include a violation of their civil liberties.
- » **Their fears and aspirations** – fears and perceptions about their safety and well being and the future of their community, and their hopes for their future and the future of their children and the community.

Issue	Nature of Impact	Extent of Impact	'No go' areas
Formulating appropriate labour recruitment strategies, specifically bearing in mind the need for extensive training with regard to the local communities, and setting appropriate local training and employment targets	Influx of people seeking employment	Local-Regional	N/A
Potential impact on future mining and other land use options of the site during the operational phase, as well as after decommissioning	Potential loss of mining potential	Local/Regional	N/A
Potential impacts on existing tourism and tourism potential of the area	Visual impacts on tourists visiting the coastal areas of the West Coast	Local-regional	N/A
Potential visual and sense of place impacts on existing receptors, including nearby rural residences. In this regard it is recognized that the site is located the De Beers mining area, and that the regional settlement pattern is sparse;	Impact closely linked to visual impacts, associated with turbines and associated infrastructure, particularly 400 kV power line/s proposed.	Local-regional	N/A
Creation of opportunities to local business (within Nama Khoi local Municipality) during the operational phase, including but not limited to, provision of security, staff transport, and other services	(Positive impact)	Local, Regional and National	N/A
Potential up and down-stream economic opportunities for the local, regional and national economy	(Positive impact)	Local, Regional and National	N/A
Provision of a clean, renewable energy source for the national grid	(Positive impact)	Local, Regional and National	N/A

Gaps in knowledge & recommendations for further study:

Limitations:

The information presented in the Social Scoping level study is based on available desktop sources only. With regard to the study area, the amount of relevant literature available is limited. Baseline information presented in this report will be supplemented and amended by information obtained from interviews with key local officials and community members during field interviews envisaged as part of the EIA phase.

» Demographic data

The demographic data used in the study is largely based on the findings of the 2001 Census¹⁹, or on sources which based projections on the Census 2001 data. While this data does provide useful information on the demographic profile of the affected area, the actual data is dated and should be treated with care.

In addition, it is no longer possible to access Census 2001 data at Ward level via the Municipal Demarcation Board. As a result it was not possible to obtain demographic data for Ward 5. The social baseline for this part of the study area is therefore described at Local Municipal level (NKLM) only.

Recommendations:

Methodology to be undertaken for the EIA phase:

- » Review of existing project information, including the Planning and Scoping Documents;
- » Collection and review of reports and baseline socio-economic data on the area (IDPs, Spatial Development Frameworks etc.);
- » Site visit and interviews with key stakeholders in the area including local land owners and authorities, local community leaders and councillors, local resident associations and residents, local businesses, community workers etc;
- » Identification and assessment of the key social issues and opportunities;
- » Preparation of Draft Social Impact Assessment (SIA) Report, including identification of mitigation/optimization and management measures to be implemented.
- » Finalisation of SIA Report.

¹⁹ The last comprehensive national census was conducted in 2001. Census 2001 provided demographic and socio-economic data from National to Municipal Ward level. An interim Community Survey (sample based) was undertaken in 2007, but provided information only on provincial and district municipal levels. The next comprehensive national census is planned for October 2011. It is unlikely that the compiled data would be publicly available before November 2012 (www.Statsa.gov.za).

The following typical, generic project information is required in order to inform the Social Impact Assessment (Including all related infrastructure such as transmission lines, access roads, office and warehouse components):

- » Operating budget per annum;
- » Total number of people employed;
- » Breakdown of number of people employed in terms of skills levels (see above);
- » Annual wage bill;
- » Typical activities associated with the operational phase;
- » Information on opportunities for skills development and training;
- » Typical lifespan of proposed wind farm;
- » Information on the lease / rental agreements with local landowners and or communities. This information is required so as to indicate how local landowners and communities stand to benefit from the project.

CONCLUSIONS

CHAPTER 9

The site selection process, undertaken by Eskom Holdings SoC (State owned Company) and Savannah Environmental, has identified a site (as assessed in this final scoping report) south of the mining town of Kleinsee within the Nama Khoi Local Municipality in the Northern Cape, and within a De Beers mining area, for the establishment of a commercial wind farm. The facility is proposed to accommodate **between 150 and 200 appropriately spaced wind turbines** over an extent of approximately **8 682 hectares** for the purpose of electricity generation. The total generating capacity of the proposed facility will be **up to 300 MW**. The facility will be referred to as the **Kleinzee 300 MW Wind Farm**.

The Scoping Study for the proposed **Kleinzee 300 MW Wind Farm** south of Kleinsee in the Northern Cape Province has been undertaken in accordance with the EIA Regulations published in Government Notice 33306 of GN R543, R544, R545 and R546 (18 June 2010), in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998). This project was registered with the National Department of Environmental Affairs under application reference number **12/12/20/2212**.

This Final Scoping Report is aimed at detailing the nature and extent of this facility, identifying potential issues associated the proposed project, and defining the extent of studies required within the EIA. This was achieved through an evaluation of the proposed project, involving the project proponent, specialist consultants, and a consultation process with key stakeholders that included both relevant government authorities and interested and affected parties (I&APs). In accordance with the requirements of the EIA Regulations, feasible project-specific alternatives (including the "do nothing" option) have been identified for consideration within the EIA process.

The conclusions and recommendations of this Final Scoping Report are the result of limited on-site inspections, desk-top evaluations of impacts identified by specialists, and the parallel process of public participation. A summary of the conclusions of the evaluation of the potential impacts identified to be associated the proposed wind farm and associated 400kV power line is provided below. Recommendations regarding investigations required to be undertaken within the EIA are provided within the Plan of Study for EIA, contained within Chapter 10 of this report.

9.1. Conclusions drawn from the Evaluation of the Proposed Site for Development of the proposed Wind Farm

The location of the proposed area for the development of the Kleinzee 300MW Wind Farm (~8 682 ha in extent) includes following farm portions, which are located south of the mining town of Kleinsee:

- » RE of Brazil 329
- » RE of Goraap 323,
- » RE of Honde Vlei 325,
- » RE of Kannabieduin 324,
- » Portion 4 of Roivlei 327 (refer to Figure 9.1).

The wind energy facility is proposed to have a generating capacity of up to 300 MW and accommodate between 150 and 200 wind turbines appropriately spaced to make use of the wind resource on the site. In identifying and evaluating impacts associated with the proposed wind farm, it has been assumed that although during operation, the area affected will comprise between 150 and 200 turbines (depending on which turbine types are ultimately chosen by the developer), access roads and a substation(s), during construction much of the approximately 8 682 ha of the proposed site could suffer some level of disturbance. However, once construction is complete, only a small portion of this area (estimated at approximately 10%) will be permanently impacted by infrastructure associated with the wind energy facility.

General potential issues identified through this scoping study associated with the proposed Kleinzee 300MW Wind Farm south of Kleinsee are summarised in Tables 9.1 and 9.2.

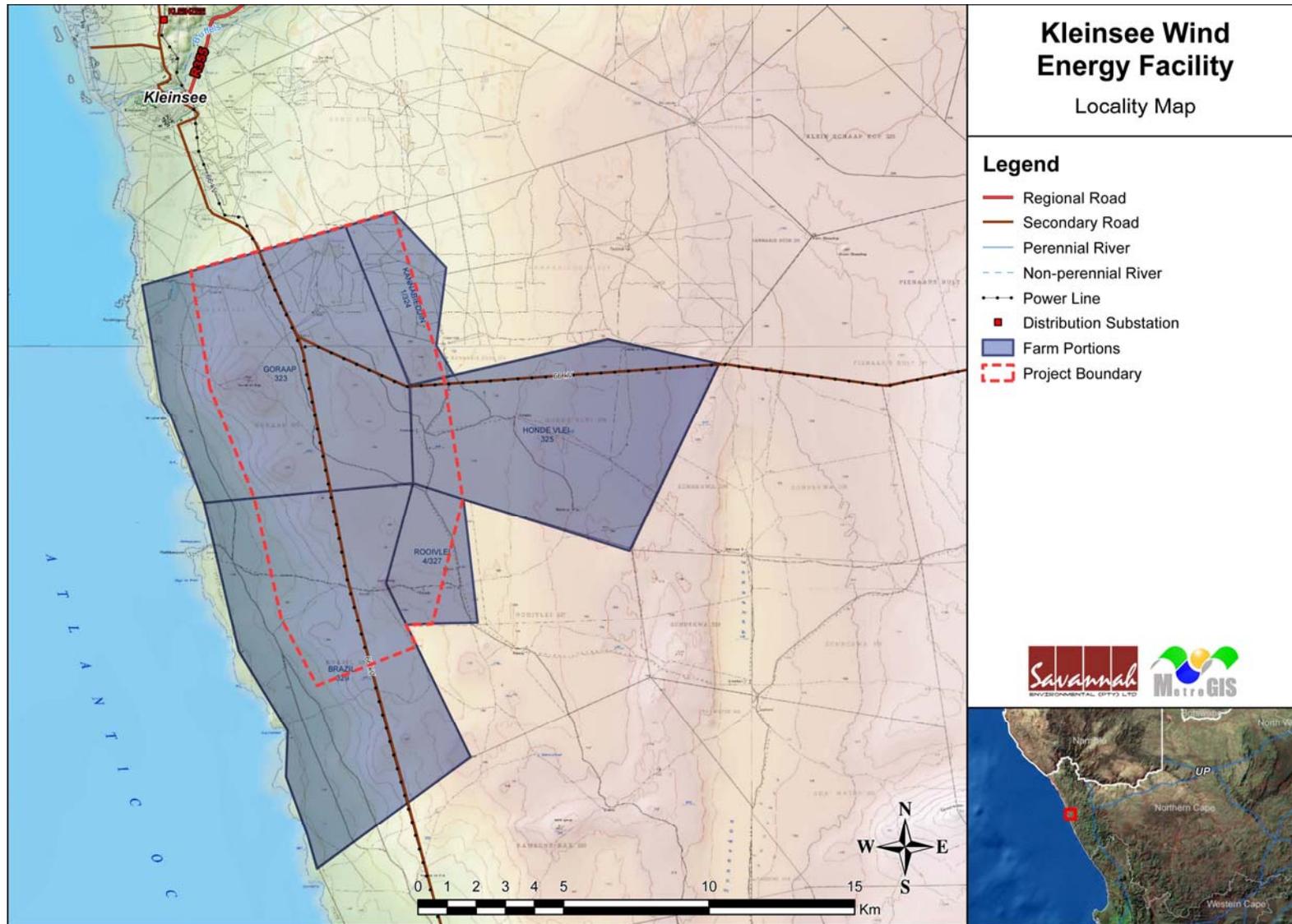


Figure 9.1: Locality map indicating project boundary for the establishment of the Kleinsee 300MW Wind Farm

Table 9.1: Potential impacts associated with the Construction/ Decommissioning Phase with the proposed Kleinzee 300MW Wind Farm

Impacts resulting from the Construction/ Decommissioning Phase	Positive /Negative	Extent
Potential visual impacts associated with the construction phase	-	L
Potential visual impact of the construction of ancillary infrastructure on observers in close proximity	-	L
Loss of agricultural land (anticipated to be low to negligible, it will still have to be investigated)	-	L
Soil degradation	-	L
Soil erosion	-	L
Physical Soil Disturbance	-	L
Impacts on Current Land Use	-	L
Direct loss of vegetation	-	L
Temporary (but often long term) loss of vegetation	-	L
Impacts on plant species of high conservation value i.e. Red List species and endemics	-	L-R
Impacts on plant communities through fragmentation	-	L
Loss of habitat due to degradation of plant communities	-	L
Loss of ecosystem function	-	L
Loss of habitat for threatened flightless fauna	-	L-R
Fragmentation of habitat for threatened/protected terrestrial fauna	-	L-R
Loss of individuals of threatened/protected terrestrial fauna	-	L-R
Reduction in area of occupancy of affected terrestrial fauna	-	L-R
Loss of genetic variation within affected species of terrestrial fauna	-	L-R
Impacts on biodiversity amongst terrestrial fauna	-	L-R
Impacts on sensitive habitats for terrestrial fauna	-	L-R
Impacts on ecosystem function for terrestrial fauna	-	L-R
Secondary and cumulative impacts on fauna	-	L-R

Impacts resulting from the Construction/ Decommissioning Phase	Positive /Negative	Extent
Disturbance on avifauna by construction and maintenance activities	-	L
Habitat loss for avifauna as a result of destruction, disturbance and displacement	-	L
Destruction of foraging habitat for bats	-	R
Destruction of roosts for bat species	-	R
Impacts on Palaeontology	-	L
Impacts on Archaeology	-	L
Impacts on Graves	-	L
Noise impacts due to construction equipment	-	L
Noise impacts due to blasting (if required)	-	L
Noise impacts due to construction traffic	-	L
Formulating appropriate labour recruitment strategies, specifically bearing in mind the potential of opportunistic labour in-migration	+	L-N
The formulation of suitable training strategies, specifically bearing in mind the generally very low education and skills levels in the local area	+	L-N
The appropriate siting of the construction camp	-	L-N
Adequate on-site management of construction crews	-	L
The provision of adequate services and facilities for construction crews	-	L
Managing health risks associated with large groups of construction workers, including the spread of STDs, HIV/Aids and TB	-	L-N
Job creation	+	L-N
Increase in construction activity due to the proposed construction of the WEF	-	L
Crime	-	L-N
Traffic	-	L

L Local
 R Regional
 N National
 I International

Table 9.2: Potential impacts associated with the Operational Phase with all three phases of the proposed Kleinzee 300MW Wind Farm

Impacts resulting from the Operational Phase	Positive /Negative	Extent
The visibility of the facility to, and potential visual impact on, observers travelling along arterial (i.e. R355) and secondary roads in close proximity to the proposed WEF and within the region.	-	L
The visibility of the wind farm to, and potential visual impact on, the small town of Kleinsee and the settlement of Melkbospunt located in close proximity to the proposed wind farm.	-	L
The visibility of the wind farm to, and the potential visual impact on conservation planning features, specifically the Namaqua National Park's Priority Natural Area.	-	L
Potential visual impact of the facility on the visual character of the landscape and sense of place of the region	-	L
Potential visual impact of the wind farm on tourist routes, tourist destinations and tourist potential of the region, especially in terms of events such as the Namaqualand flower displays.	-	L
Potential visual impact of ancillary infrastructure (i.e. the substation, the overhead power line, the internal access roads and the office / workshop) on observers in close proximity to the facility and/ or associated infrastructure.	-	L
Potential visual impact of operational, safety and security lighting of the facility at night on observers in close proximity to the facility.	-	L
Potential cumulative visual impacts.	-	L
Collisions of birds with turbines	-	R
Habitat loss for Avifauna as a result of destruction, disturbance and displacement	-	L
Impacts of associated infrastructure on Avifauna	-	L-R
Bat mortalities due to blade collisions and barotrauma during foraging	-	R
Bat mortalities due to blade collisions and barotrauma during migration	-	R
Built environment	-	L
Cultural landscapes and sense of place	-	Unknown
Noise impacts associated with the operation of the wind farm	-	R
Formulating appropriate labour recruitment strategies, specifically bearing in mind the need for extensive training with regard to the local communities, and setting appropriate local training and employment targets	-	L-R

Impacts resulting from the Operational Phase	Positive /Negative	Extent
Potential impact on future mining and other land use options of the site during the operational phase, as well as after decommissioning	-	L-R
Potential impacts on existing tourism and tourism potential of the area	-	L-R
Potential visual and sense of place impacts on existing receptors, including nearby rural residences. In this regard it is recognized that the site is located the De Beers mining area, and that the regional settlement pattern is sparse;	-	L-R
Creation of opportunities to local business (within Nama Khoi local Municipality) during the operational phase, including but not limited to, provision of security, staff transport, and other services	+	L-N
Potential up and down-stream economic opportunities for the local, regional and national economy	+	L-N
Provision of a clean, renewable energy source for the national grid	+	L-N

L **Local**
 R **Regional**
 N **National**
 I **International**

The majority of potential impacts identified to be associated with the construction and operation of the proposed wind farm are anticipated to be localised and restricted to the proposed site. No environmental fatal flaws were identified to be associated with the site. However, areas of potential sensitivity were identified through the scoping phase. These areas of sensitivity are illustrated in the sensitivity map included as Figure 9.2.

The potentially sensitive areas/environmental features that have been identified include:

- » Areas of visual exposure within (but not restricted to) 10 km of the proposed wind energy facility site such as homesteads and observers travelling along major and gravel roads,
- » Potentially sensitive noise receptors as indicated in Figure 9.2 of this report,
- » Areas of medium to low heritage sensitivity as indicated in Figure 9.2 of this report.

The findings of the Final Scoping Report do not, therefore, identify any portion of the proposed study sites as of "high sensitivity" prohibiting the development. However, bat, avifauna, ecological and faunal sensitivity can only be confirmed in the EIA phase through detailed field investigations by the various specialists.

The proposed design of the wind farm (i.e. wind turbines and other infrastructure) can be based on the full extent of the site, and therefore utilise the most technically optimal positions on the broader site to the fullest extent. This recommendation does, however, require that due cognisance is taken of the recommendations outlined in Chapter 8 and above (as well as within individual specialist reports) regarding sites of potential moderate to high sensitivity. Understanding which area of the site would be least impacted by the development of such a facility, Eskom should prepare the detailed infrastructure layouts for consideration within the EIA phase.

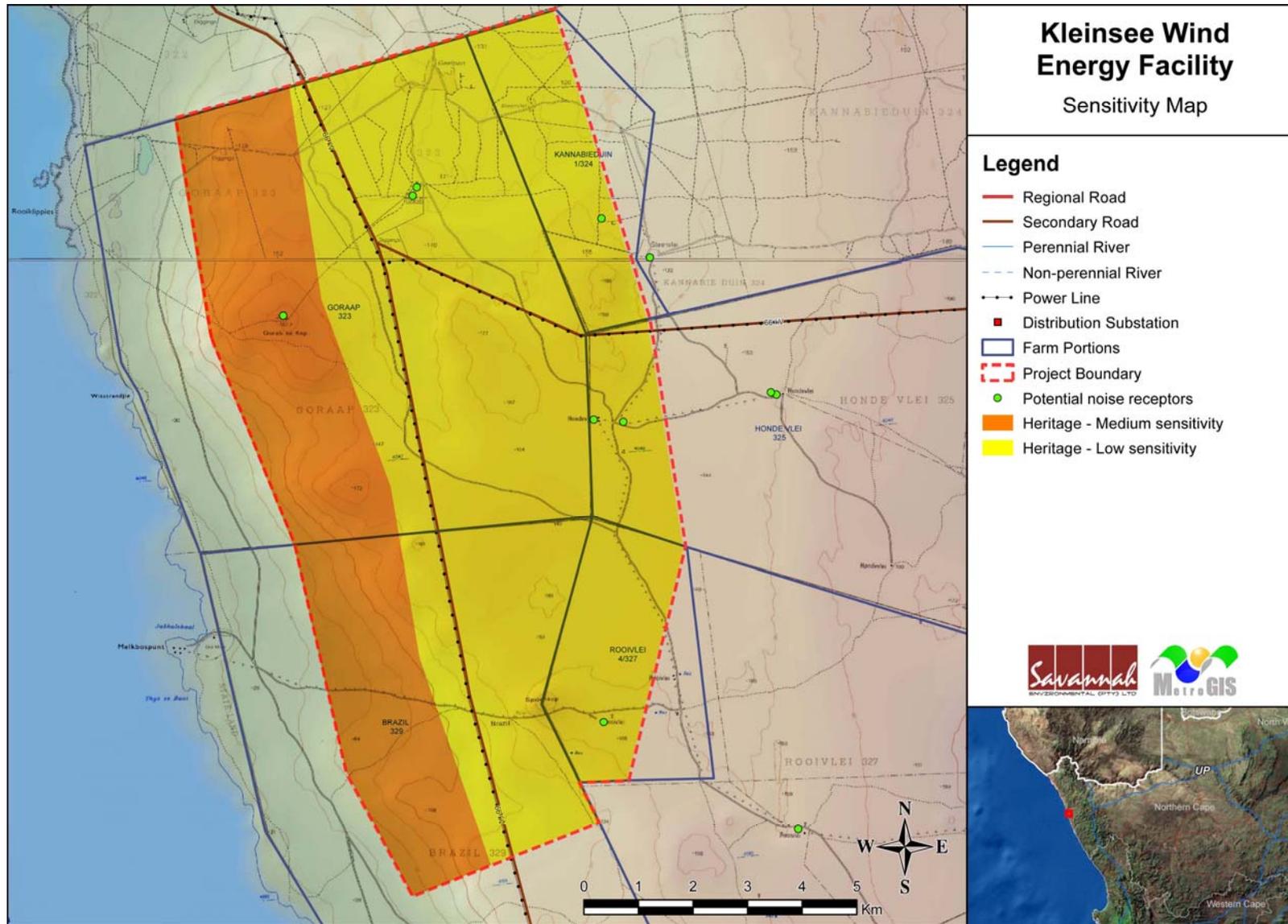


Figure 9.2: Environmental Sensitivity Map for the proposed Kleinsee 300MW Wind Farm.

The alternate routes for the power line (as mapped in figure 9.3) as identified will be comparatively assessed in the EIA Phase and a preferred alternative recommended for implementation.

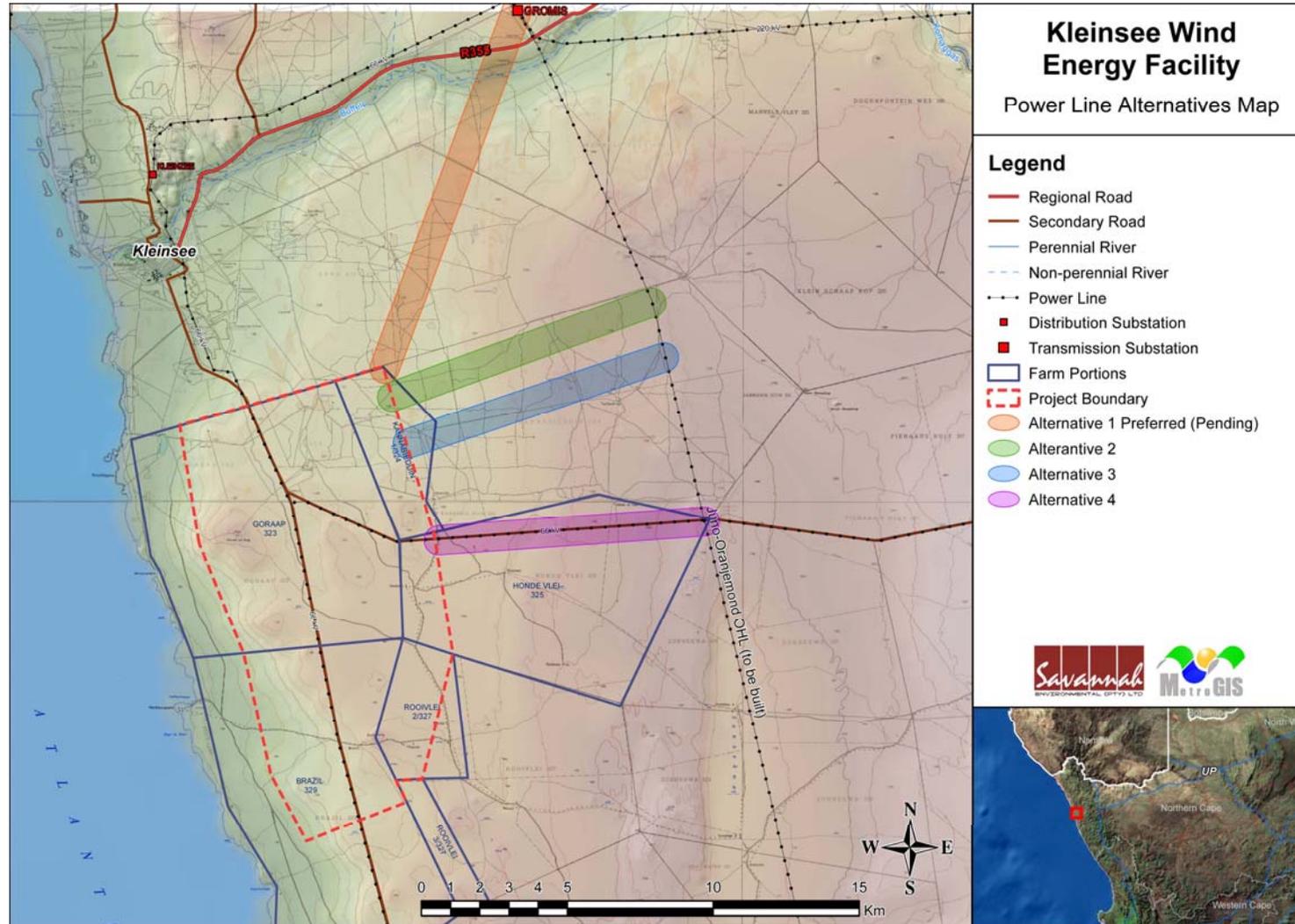


Figure 9.3: Map indicating proposed corridors for power line construction – alignments to be investigated in detail in the EIA Phase.

9.2. Evaluation of the Potential Issues associated with the overhead power line

In order to connect the wind farm to the power grid, an overhead power line will be required to be established from the wind farm substation to the selected connection point on the electricity grid. It is proposed that one overhead power line (400 kV) will connect the substation to the electricity distribution network/grid. Two options for connection are being considered as follows:

- » Option 1: Directly to the Gromis substation from the on-site substation
- » Option 2: Turning into the Juno - Gromis power line (this is a recently authorised power line located to the east of the site, with construction planned to commence shortly).

9.3. Potential Benefits of the Proposed Kleinzee Wind Farm

At present, South Africa is some way off from exploiting the diverse gains from renewable energy and from achieving a considerable market share in the renewable energy industry. South Africa's electricity supply remains heavily dominated by coal based power generation, with the country's significant renewable energy potential largely untapped to date.

Through research, the viability of a wind farm has been established, and Eskom proposes that between 150 and 200 turbines can be established as part of the Kleinzee 300MW Wind Farm south of Kleinsee. Potential benefits associated with the proposed wind farm development include:

- » **Increased energy security:** The current electricity crisis in South Africa highlights the significant role that renewable energy can play in terms of supplementing the power available. In addition, given that renewables can often be deployed in a decentralised manner close to consumers, they offer the opportunity for improving grid strength and supply quality, while reducing expensive transmission and distribution losses.
- » **Resource saving:** Conventional coal-fired power plants are major consumers of water during cooling processes and power generation process. It is estimated that the achievement of the targets in the Renewable Energy White Paper will result in water savings of approximately 16.5 million kilolitres, when compared with wet-cooled conventional coal-fired power stations. This translates into a revenue saving of R26.6 million. As an already water stressed nation, it is critical that South Africa engages in a variety of water conservation measures, particularly as the detrimental effects of climate change on water availability are expected to be experienced in the future.
- » **Exploitation of our significant renewable energy resource:** At present, valuable national resources (including biomass by-products, solar insulation

and wind) remain largely unexploited within South Africa. The use of these energy flows will strengthen energy security within the country through the development of a diverse energy portfolio.

- » **Pollution reduction:** The release of by-products from fossil fuel burning for electricity generation has a particularly hazardous impact on human health through impacts on air quality, and contributes to ecosystem degradation. Renewable energy generation is not associated with such emissions to air.
- » **Climate friendly development:** The uptake of renewable energy offers the opportunity to address energy needs in an environmentally responsible manner, contributing to the mitigation of climate change through the reduction of greenhouse gas (GHG) emissions. South Africa as a nation is estimated to be responsible for 1% of global GHG emissions and is currently ranked 9th worldwide in terms of per capita CO₂ emissions. The recent application for a world bank loan to finish the Medupi Power Station was opposed by international NGOs on the basis that South Africa's grid is 'dirty' and without significant renewables.
- » **Support for international agreements and enhanced status within the international community:** The effective deployment of renewable energy provides a tangible means for South Africa to demonstrate its commitment to its international agreements under the Kyoto Protocol, and for cementing its status as a leading player within the international community.
- » **Employment creation:** The sale, development, installation, maintenance and management of renewable energy facilities have significant potential for job creation on a local scale as well as in South Africa.
- » **Acceptability to society:** Renewable energy offers a number of tangible benefits to society including reduced pollution concerns, improved human and ecosystem health and climate friendly development.
- » **Support to a new industry sector:** The development of renewable energy offers an opportunity to establish a new industry within the South African economy.
- » **Protecting the natural foundations of life for future generations:** Actions to reduce South Africa's disproportionate carbon footprint can play an important part in ensuring the country's role in preventing dangerous anthropogenic climate change; thereby securing the natural foundations of life for generations to come.

These and other potential benefits will be assessed in more detail in the EIA phase of the process.

PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT

CHAPTER 10

A detailed description of the nature and extent of the proposed Kleinzee 300MW Wind Farm and associated infrastructure, details regarding the Scoping Phase followed, as well as the issues identified and evaluated through the Scoping phase (to date) have been included in this Final Scoping Report. This section of the report provides the context for a Plan of Study for Environmental Impact Assessment (EIA).

The Plan of Study describes how the EIA Phase for the proposed wind energy facility project will proceed. The EIA Phase of the study includes detailed specialist studies for those impacts recorded to be of significance as well as on-going public consultation. The key findings of the Scoping Phase (which includes inputs from authorities, the public, the proponent and the EIA specialist team) are used to inform the Plan of Study for EIA, together with the requirements of the NEMA EIA Regulations and applicable guidelines.

10.1. Aims of the EIA Phase

The EIA Phase will aim to achieve the following:

- » Provide an overall assessment of the social and biophysical environments affected by the proposed project.
- » Assess potentially significant impacts (direct, indirect and cumulative, where required) associated with the proposed wind energy facility and associated infrastructure.
- » Identify and recommend appropriate mitigation measures for potentially significant environmental impacts.
- » Undertake a fully inclusive public involvement process to ensure that I&AP are afforded the opportunity to participate, and that their issues and concerns are recorded.

The EIA will address potential environmental impacts and benefits (direct, indirect and cumulative impacts) associated with all phases of the project including design, construction, operation and decommissioning, and will aim to provide the environmental authorities with sufficient information to make an informed decision regarding the proposed project. All identified feasible alternatives (including the 'do nothing' alternative) will be assessed.

10.2. Authority Consultation

Consultation with the regulating authorities (i.e. DEA and DENC) will continue throughout the EIA process. On-going consultation included/ will include the following:

- » Submission of a Draft Scoping Report to DENC and other relevant Organs of State for review and comment. A 40-day review period will be allowed as per the requirements of NEMA.
- » Submission of a Final Scoping Report to DEA following a 30-day review period.
- » Submission of a Draft EIA Report to DENC and other relevant organs of State for review and comment. A 40-day review period will be allowed as per the requirements of NEMA.
- » Submission of a Final EIA Report to DEA following a 30-day public review period.
- » An opportunity to visit and inspect the site.

10.3. Consideration of Alternatives

As the location of the Kleinzee 300MW Wind Farm and associated infrastructure is constrained by the current and future mining activities in the study area, limited feasible alternatives exist for this proposed development. One 400kV power line is proposed to connect the substation at the wind farm to the electricity distribution network/grid. The following feasible project alternatives have been identified through the scoping study and will be investigated in the EIA:

- » **The 'do nothing' alternative:** Eskom does not establish the Kleinzee 300 MW Wind Farm (maintain status quo).
- » **Site-specific alternatives:** in terms of actual turbine positions and positions of the associated infrastructure on the site (i.e. turbine locations, access roads, substation/s, etc. over an 8682 ha area).
- » **Alternative servitudes for power line routing:** Three alternative power line routing corridors have been identified for investigation in the EIA process.

10.4. Assessment of Potential Impacts and Recommendations regarding Mitigation Measures

Based on the findings of the Scoping Study, the following issues were identified as not requiring further investigation within the EIA:

- » Potential impacts on Palaeontology

A summary of the issues which require further investigation within the EIA phase, as well as the proposed activities to be undertaken in order to assess the significance of these potential impacts is provided within Table 10.1. The specialists involved in the EIA Phase are also reflected in Table 10.1. These specialist studies will consider the site proposed for the development of the wind energy facility and all associated infrastructure (including alternatives with regards to design, layout, as well as the alternative alignments of access road/s).

Table 10.1: Summary of the issues which require further investigation within the EIA phase and activities to be undertaken in order to assess the significance of these potential impacts

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
Impact on Vegetation	» The potential impacts on the plant communities in the study area will be identified, described and assessed according to standard assessment practice. The Nature, Duration, Extent, Magnitude, Probability and Significance of each of the identified impacts will be assessed. In addition Critical Biodiversity Areas, areas identified in the detailed vegetation survey as sensitive, the presence of Red List and endemic species will be given special attention to ensure that they are carefully taken into consideration when designing final layouts of the proposed turbines. This information will be summarised together with the sensitivity of plant communities and habitats in a sensitivity map that will inform the final design phase of the proposed project.	Dave McDonald of BergWind Botanical Surveys
Impacts on terrestrial fauna	The following assessments are required to be done during the EIA phase in order to properly assess potential impacts on terrestrial fauna by the proposed wind energy facility: » The potential for presence of species of concern must be confirmed. This must be done by assessing habitat suitability for those species that have been assessed as potentially occurring in the area, through a field survey of the study area. Particular attention must be paid to those species classified as threatened (VU, EN or CR), Near Threatened or Critically rare, including one mammal species classified as Vulnerable (Grant’s Golden Mole), one frog species classified as Vulnerable (Desert Rain Frog), one reptile species classified as Vulnerable (Namaqua Dwarf Adder), one reptile species classified as Near Threatened (Namaqua Plated Lizard) and two mammal species classified as Near Threatened (Littledale’s Whistling Rat and Namaqua Dune Mole-rat).	David Hoare of David Hoare Consulting cc
Impacts on avifauna	The specialist study to be undertaken in the EIA phase will include the following: » sample surveys of large terrestrial species, raptors and endemic passerines within the study area to determine the relative importance of local populations of these key taxa; » estimates of the extent and direction of possible movements of these species within/through the anticipated impact zone of the wind energy facility, in relation to the distribution of available resources – e.g. nesting or roosting sites (especially existing power lines) and foraging areas; and » identification of the least sensitive/lowest risk areas to locate wind turbines within the broader	Rob Simmons

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	<p>study area, in terms of (i) and (ii) above.</p> <ul style="list-style-type: none"> » a field site visit of at least 1 full day per area ear-marked, or 5 days of field work. » The results will include a more detailed assessment of all impacts, recommended mitigation measures where necessary (particularly with reference to the siting of turbines) and, perhaps most importantly, provide guidance for the development of a comprehensive, long-term programme for monitoring actual impacts from pre- to post-construction phases of the development. This will improve the understanding of the long-term effects of wind energy developments on South African avifauna. 	
Impacts on bats	<p>A detailed site visit will have to be conducted as part of the EIA level investigation and the following parameters should be investigated:</p> <ul style="list-style-type: none"> » Study the habitat types and make predictions of the species of bats that may reside and forage in different parts of the proposed wind energy site. » Important roosts and geographical features that will attract bats (for foraging and/or roosting) are designated as sensitive and buffered, trying to minimise operational impacts of each turbine on the local bats. » Mist nets are erected at strategically important localities where the chances of catching a bat is the highest, while the site is surveyed for nocturnal bat activity by transecting it with a bat detector (where allowed by terrain). » A bat detector is a device that can record ultrasound calls of bats, which will be later analysed and interpreted by the specialist on computer to determine species and activity. 	Werner Marais of Animalia
Impacts on geology, soils and agricultural potential study)	<p>A detailed site visit will have to be conducted as part of the EIA level investigation and the following parameters should be investigated:</p> <ul style="list-style-type: none"> » Soil distribution (classification) on the site; » Extent of degradation due to current land use (such as overgrazing and mining); » Erosion status and erodibility of the soils on the site; and » Mitigation measures to arrest current impacts and manage future impacts associated with the development. 	Johan van der Waals of Terrasoil Science
Visual impacts	<p>The Plan of Study for EIA is as follows:</p> <ul style="list-style-type: none"> » The following factors must be included in the EIA study: <ul style="list-style-type: none"> * Determine Visual Distance/Observer Proximity to the facility * Determine Viewer Incidence/Viewer Perception 	Lourens du Plessis of MetroGIS

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	<ul style="list-style-type: none"> * Determine the Visual Absorption Capacity of the landscape * Determine the Visual Impact Index » The above exercise should be undertaken for the core wind energy facility as well as the ancillary infrastructure, as these structures (i.e. the substation, the overhead power line, the internal access roads, and the office / workshop) are envisaged to have varying levels of visual impact at a more localised scale. » The site-specific issues (as mentioned earlier in the report) and potential sensitive visual receptors should be measured against this visual impact index and be addressed individually in terms of nature, extent, duration, probability, severity and significance of visual impact. » In addition, cumulative visual impact should be addressed, as well as suggested mitigation measures for all identified impacts (if any). 	
Impacts on heritage sites	<p>The specialist study to be undertaken in the EIA phase will include:</p> <ul style="list-style-type: none"> » An Archaeological Impact Assessment (AIA) which will be used to identify heritage sites falling within the proposed footprints, assess their significance and recommend mitigation measures if appropriate. » An assessment of impacts on landscape character and sense of place based on the results of the visual impact assessment specialist study. 	Jayson Orton of the Archaeology Contracts Office, Department of Archaeology: University of Cape Town
Noise impacts	<p>The specialist study to be undertaken in the EIA phase will include:</p> <ul style="list-style-type: none"> » Site visit to measure the site-specific background ambient sound levels and to confirm the presence of the identified receptors. » Using the data (proposed processes, noise characteristics of the selected equipment, and locations of the WTG) as provided by the project developer, the predicted impact of the wind energy facility on potentially sensitive receptors will be predicted using the CONCAWE method as stipulated by SANS 10357:2004 for both the construction and operational phases. » Using the calculated noise levels at the identified sensitive receptors, the projected significance of the wind energy facility (whether construction or operational) will be determined using the criteria as proposed (subject to possible changes after any stakeholder input). 	Morné de Jager of M ² Environmental Connections
Social Impact Assessment	<p>The identification and assessment of social impacts will be guided by the specialist SIA Guidelines. The specialist study will include the following activities:</p> <ul style="list-style-type: none"> » On-going identification of key landowners, stakeholders and interested & affected parties; 	Tony Barbour (Environmental Consultant and

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	<ul style="list-style-type: none">» Meetings and interviews with key stakeholders and interested & affected parties;» Identification and assessment of key social issues based on feedback from key interested and affected parties.» Recommendations regarding mitigation/optimisation and management measures to be implemented.	Researcher)

10.5. 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**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional:
 - * local extending only as far as the development site area – assigned a score of 1;
 - * limited to the site and its immediate surroundings (up to 10 km) – assigned a score of 2;
 - * will have an impact on the region – assigned a score of 3;
 - * will have an impact on a national scale – assigned a score of 4; or
 - * will have an impact across international borders – assigned a score of 5.
- » The **duration**, wherein it will be indicated whether:
 - * the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
 - * the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
 - * medium-term (5–15 years) – assigned a score of 3;
 - * long term (> 15 years) - assigned a score of 4; or
 - * permanent - assigned a score of 5.
- » The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
 - * 0 is small and will have no effect on the environment;
 - * 2 is minor and will not result in an impact on processes;
 - * 4 is low and will cause a slight impact on processes;
 - * 6 is moderate and will result in processes continuing but in a modified way;
 - * 8 is high (processes are altered to the extent that they temporarily cease); and
 - * 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- » The **probability of occurrence**, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale, and a score assigned:
 - * Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
 - * Assigned a score of 2 is improbable (some possibility, but low likelihood);
 - * Assigned a score of 3 is probable (distinct possibility);
 - * Assigned a score of 4 is highly probable (most likely); and
 - * Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).

- » the **significance**, which shall be determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.
- » the **status**, which will be described as either positive, negative or neutral.
- » the degree to which the impact can be reversed.
- » the degree to which the impact may cause irreplaceable loss of resources.
- » the *degree* to which the impact can be *mitigated*.

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

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

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

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

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

As Eskom Holdings Limited (SOC) has the responsibility to avoid or minimise impacts, and plan for their management (in terms of the EIA Regulations), the mitigation of significant impacts will be discussed. Assessment of impacts with mitigation will be made in order to demonstrate the effectiveness of the proposed mitigation measures.

The results of the specialist studies and other available information will be integrated and synthesised by the Savannah Environmental project team. A single EIA report will be compiled for all phases of the proposed project within which each phase will be assessed separately. In addition, the cumulative impacts associated with the proposed development will be assessed. The EIA Report will include:

- » **detailed description** of the proposed activity
- » a description of the property(ies) on which the activity is to be undertaken and the location of the activity on the property(ies)

- » a description of the **environment that may be affected by the activity** and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity
- » details of the **public participation process** conducted, including:
 - * steps undertaken in accordance with the plan of study for EIA;
 - * a list of persons, organisations and organs of state that were registered as interested and affected parties;
 - * a summary of comments received from, and a summary of issues raised by registered interested and affected parties, the date of receipt of these comments and the response to those comments; and
 - * copies of any representations, objections and comments received from registered interested and affected parties
- » a description of the **need and desirability** of the proposed project and identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity
- » an indication of the methodology used in determining the **significance** of potential environmental impacts
- » a description and comparative **assessment of all alternatives** identified during the environmental impact assessment process
- » a summary of the findings and recommendations of **specialist reports**
- » a description of all environmental issues that were identified during the environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures
- » an assessment of each identified potentially significant impact
- » a description of any assumptions, uncertainties and gaps in knowledge
- » an environmental **impact statement** which contains:
 - * a summary of the key findings of the environmental impact assessment; and
 - * a comparative assessment of the positive and negative implications of the proposed activity and identified alternatives
- » a draft **environmental management programme (EMP)**
- » copies of specialist reports

The draft EIA Report will be released for a 30-day public review period. The comments received from I&APs will be captured within a Comments and Response Report, which will be included within the final EIA Report, for submission to the authorities for decision-making.

10.6. Public Participation Process

A public participation process will be undertaken by Sustainable Futures ZA in conjunction with Savannah Environmental in accordance with the requirements of the EIA Regulations. Consultation with key stakeholders and I&APs will be on-going throughout the EIA process. Through this consultation process, stakeholders and I&APs will be encouraged to provide input to the project, and to comment on the findings of the EIA process.

In order to accommodate the varying needs of stakeholders and I&APs within the study area, as well as capture their inputs regarding the project, various opportunities will be provided for stakeholders and I&APs to be involved in the EIA phase of the process, as follows:

- » Public meeting (advertised meeting for members of the general public).
- » Focus group meetings (pre-arranged and stakeholders invited to attend).
- » One-on-one consultation meetings (for example on request by stakeholders or I&APs).
- » Telephonic consultation sessions (consultation with various parties from the EIA project team, including the project participation consultant, lead EIA consultant as well as specialist consultants).
- » Written, faxed or e-mail correspondence.

The draft EIA report will be made available for public review for a 30-day period prior to finalisation and submission to the DEA for review and decision-making. In order to provide an overview of the findings of the EIA process and facilitate comments, a public meeting will be held during this public review period.

10.7. Key Milestones of the programme for the EIA

The envisaged key milestones of the programme for the EIA phase of the project are outlined in Table 7.2.

Table 10.2: Envisaged key milestones of the programme for the EIA phase of the project

Key Milestone Activities	Proposed completion date ¹³
Public review period for Draft Scoping report	12 December 2011 – 30 January 2012
Finalisation of Scoping Report	February 2012
Authority acceptance of the Scoping Report and Plan of Study to undertake the EIA	March 2012
Undertake detailed specialist studies and public	February - April 2012

¹³ Indicative dates only

Key Milestone Activities	Proposed completion date¹³
participation process	
Make draft EIA Report and draft EMP available to the public, stakeholders and authorities	May 2012
Finalisation of Environmental Impact Assessment Report	June 2012
Submit Final EIA Report to DEA for review and decision-making	June 2012

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