ENVIRONMENTAL IMPACT ASSESSMENT PROCESS
DRAFT SCOPING REPORT

PROPOSED WIND ENERGY FACILITY ON A SITE NORTH OF OYSTER BAY
EASTERN CAPE PROVINCE
(DEA Ref No: 12/12/20/1585)

DRAFT FOR PUBLIC REVIEW
November 2010

Prepared for:
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PROJECT DETAILS

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Title	:	Environmental Impact Assessment Process Draft Scoping Report: Proposed Wind Energy Facility on a site north of Oyster Bay, Eastern Cape Province
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Project Developer	:	Renewable Energy Systems (RES) Southern Africa (Pty) Ltd
Report Status	:	Draft Scoping Report for public review
Review Period	:	22 November 2010 to 10 January 2011

When used as a reference this report should be cited as: Savannah Environmental (2010) Draft Scoping Report: Proposed Wind Energy Facility on a site north of Oyster Bay, Eastern Cape Province.

PURPOSE OF THE DRAFT SCOPING REPORT

As part of the project planning and feasibility studies and as per environmental legal requirements, Renewable Energy Systems (RES) Southern Africa (Pty) Ltd is currently undertaking an Environmental Impact Assessment (EIA) process to determine the environmental feasibility of a Wind Energy Facility on a site that is located approximately 6 km north of Oyster Bay in the Eastern Cape Province. RES 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).

In terms of NEMA, the Scoping Report is submitted to the competent authority (i.e. the National Department of Environmental Affairs (DEA)) for decision-making on the proposed wind energy facility. The Scoping Report is also intended to provide sufficient background information to other non-statutory parties, 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 nine sections:

Chapter 1 provides background to the proposed Wind Energy Facility project and the environmental impact assessment

Chapter 2 describes the activities associated with the project (project scope). This chapter also describes wind energy as a power option and provides insight to technologies for wind turbines

Chapter 3 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 4 describes the existing biophysical and socio-economic environment

Chapter 5 provides an evaluation of the potential issues associated with the proposed project

Chapter 6 presents the conclusions of the scoping evaluation

Chapter 7 describes the Plan of Study for EIA

Chapter 8 provides references used to compile the Scoping Report

The release of a draft Scoping Report provides stakeholders with an opportunity to verify that the issues they have raised to date have been captured and adequately considered within the study. The Final Scoping Report will incorporate

all comments received prior to submission to the National Department of Environmental Affairs (DEA).

INVITATION TO COMMENT ON THE DRAFT SCOPING REPORT

Members of the public, local communities and stakeholders are invited to comment on the Draft Scoping Report which has been made available for public review and comment at the following locations from **22 November 2010 to 10 January 2011**.

Humansdorp Public Library	St Francis Bay Library
Jeffrey's Bay Public Library	**www.savannahSA.com**

Please submit your comments to
Ravisha Ajodhapersadh or Bongani Khupe PO Box 148, Sunninghill, 2157 Tel: +27 (0)11 234 6621 Fax: +27 (0)86 684 0547 Email: ravisha@savannahsa.com / bongani@savannahsa.com
The due date for comments on the Draft Scoping Report is **10 January 2011**

Comments can be made as written submission via fax, post or e-mail.

PUBLIC FEEDBACK MEETING

In order to facilitate comments on the draft Scoping report and provide feedback on the findings of the studies undertaken, a public feedback meeting will be held during the review period for the Draft Scoping Report as follows:

» **Date:** 06 December 2010
» **Time:** 18:00
» **Venue:** Oyster Bay Community Hall

SUMMARY

Background and Project Overview

RES is proposing to establish a commercial wind energy facility and associated infrastructure (referred to as the Oyster Bay Wind Energy Facility) on a site located approximately 6km north of the settlement of Oyster Bay in the Eastern Cape Province. An area which falls within the Kouga Local Municipality has been identified for consideration within an Environmental Impact Assessment (EIA).

The capacity of the wind energy facility will depend on the wind turbine selected by RES (in terms of turbine capacity and model that will be deemed most suitable for the site). Turbines of between 1.8 MW and 3 MW in capacity are being considered for the site. The total number of turbines proposed for the site could therefore vary as follows:

» Up to 50 turbines, assuming a turbine capacity of 3MW each
» Up to 80 turbines, assuming a turbine capacity of 1.8 MW each

The final turbine numbers and capacity will be determined based on further site specific studies of wind regime, terrain and environmental constraints. Depending on the final selection, the estimated total installed capacity for the proposed Oyster Bay wind energy facility is up to 160MW. Associated infrastructure proposed includes a substation, access roads and a power line.

The Scoping Report for the proposed project has been undertaken in accordance with the EIA Regulations published in Government Notice 28753 of 21 April 2006, in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998).

This Scoping Report is aimed at identifying broad issues, detailing the nature and extent of this facility, identifying potential issues associated with the proposed project, and defining the specific 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 Scoping Report are the result of desk-top evaluations of impacts identified by specialists, and the parallel process of public participation. Every effort has been made to include representatives of all stakeholder groupings in the study area and the Province in the public consultation process.

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.

The proposed Oyster Bay wind energy facility will include the following infrastructure:

» **Wind turbines** (between 80m – 120m hub height) and **concrete foundations** to support them.
» Possibly small transformer outside each turbine tower, depending on what make and model of turbine which is deemed most suitable for the site. Such a transformer would have its own foundation and housing around it.
» Crane hardstandings.
» **Cabling** between the turbines, to be laid underground where practical.
» **Internal access roads** to each turbine.
» **Workshop area** for control, maintenance and storage.
» Temporary and permanent met masts for calibration and site monitoring.
» Small mast for telecommunications
» An on-site **substation** to facilitate the connection between the wind energy facility and the grid.
» New overhead **power line** to connect to Eskom's existing Melkhout (132/66kV) substation, which is located approximately 20km north of the site.

The wind energy facility is proposed on the following farm portions:

» Portion 3 of Farm Klein Rivier 713
» Portion 1, 2 , 3, 4 and the Remainder of Farm Rebok Rant 715
» Portion 1 and 3 of Farm Ou Werf 738
» Portion 5 of Farm Klippedrift 732
» Portion 10 and Portion 12 of Farm Kruis Fontein 681

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.

Environmental Impact Assessment

The proposed Oyster Bay Wind Energy Facility is subject to the requirements of the Environmental Impact Assessment Regulations (EIA Regulations) published in terms of Section 24(5) of the National Environmental Management Act (NEMA, No 107 of 1998). This section provides a brief overview of EIA Regulations and their application to this project. In terms of sections 24 and 24D of NEMA, as read with GNs R385 (Regulations 27–36) and R387, a Scoping and EIA are required to be undertaken for this proposed project.

The National Department of Environmental Affairs (DEA) is the competent authority for this project. An application for authorisation has been accepted by DEA (under Application Reference number 12/12/20/1585). Through the decision-making process, the DEA will be supported by the Eastern Cape Department of Economic Development and Environmental Affairs (DEDEA).

EIA Process – Scoping Phase

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 56 of Government Notice No R385 of 2006 during the Scoping phase of this EIA process. This public participation process comprised the following:

» **Notification of the EIA Process** in local, regional and national newspapers 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 main issues identified through this scoping study associated with the proposed Oyster Bay wind energy facility are summarised as follows:

Potential impacts associated with the construction phase:

Potential Negative Impacts	» Soil degradation / soil erosion / loss » Impacts on biodiversity due to the site falling within fynbos vegetation » Impact on heritage resources (loss of archaeological material/heritage sites) » Limited construction noise and visual disturbances
Potential Positive Impacts	» Job creation (direct and indirect) » Assistance towards provision of secure power supply in South Africa

Potential impacts associated with the operation phase:

Potential Negative Impacts	» The visibility of the facility to, and visual impact people within 10km of the wind energy facility » Collision or mortality of certain avifauna (birds) species and bats with the wind turbines and power line » Noise impacts on receptors in close proximity to the facility.
Potential Positive Impacts	» Creation of employment and business creation opportunities » Potential up and down-stream economic opportunities for the local, regional and national economy » Provision of clean, renewable energy source for the national grid » Assistance towards provision of secure power supply in South Africa

The majority of potential impacts identified to be associated with the construction of the proposed wind energy facility are anticipated to be localised and restricted to the proposed site itself, while operational phase impacts range from local to regional. No environmental fatal flaws were identified to be associated with the site. However, areas of potential environmental sensitivity were identified through the scoping phase. These areas of sensitivity are illustrated in the sensitivity map - see Figure 1 below.

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. This map does not represent no-go areas but rather an outline of potentially sensitive areas identified through scoping. These potentially sensitive areas will, therefore, be further investigated and assessed through detailed specialist studies (including field surveys) during the EIA phase. The map will be further refined in the EIA phase. In order to assess potential impacts within sensitive

areas, the preliminary layout for the wind energy facility will be considered in the EIA phase. The potentially sensitive areas/ environmental features / issues that have been identified for further study / investigation include:

» Areas containing untransformed natural vegetation (Fynbos or other), high diversity or habitat complexity, Red List organisms or systems (such as rivers, wetlands or dunes) as vital to sustaining ecological functions are considered sensitive. Any transformed area that has no importance for the functioning of ecosystems is considered to have low ecological sensitivity.
» The study area could support more than 48 priority bird species. It can be reasonably inferred that sensitive bird species such as White-bellied Korhaan, Denham's Bustard and Blue Crane could be affected by the noise (and the movement) of the construction of the turbines. The sensitivity map indicates the spatial distribution of avifauna sensitive areas in the study area. The high sensitive areas could be wetlands and dams which are critically important habitat for a large number of priority species. The area of medium avifauna sensitivity could be old lands, pastures and Fynbos which are important habitat for many priority species. The areas of low avifauna sensitivity could be artificial woodland is not important habitat for most priority species.
» The presence of noise sensitive receptors (possibly homesteads) has been determined at a desktop level this stage; noise modelling will provide more input for turbine positioning and noise mitigation for potential noise sensitive receptors, if necessary.
» Visual impacts could be an issue for observers within 10km of more of the wind energy facility, specifically tourist areas such as St Francis Bay, conservation areas (Thyspunt National Heritage Site which is located 3km to 7km away) and nature reserves in the area.

Understanding which area of the site would be least impacted by the development of such a facility, RES should prepare the detailed infrastructure layouts for consideration within the EIA phase. Through the EIA phase more detailed studies will be conducted, and further sensitive areas will be marked, more accurately and in more detail than in this Draft Scoping Report.

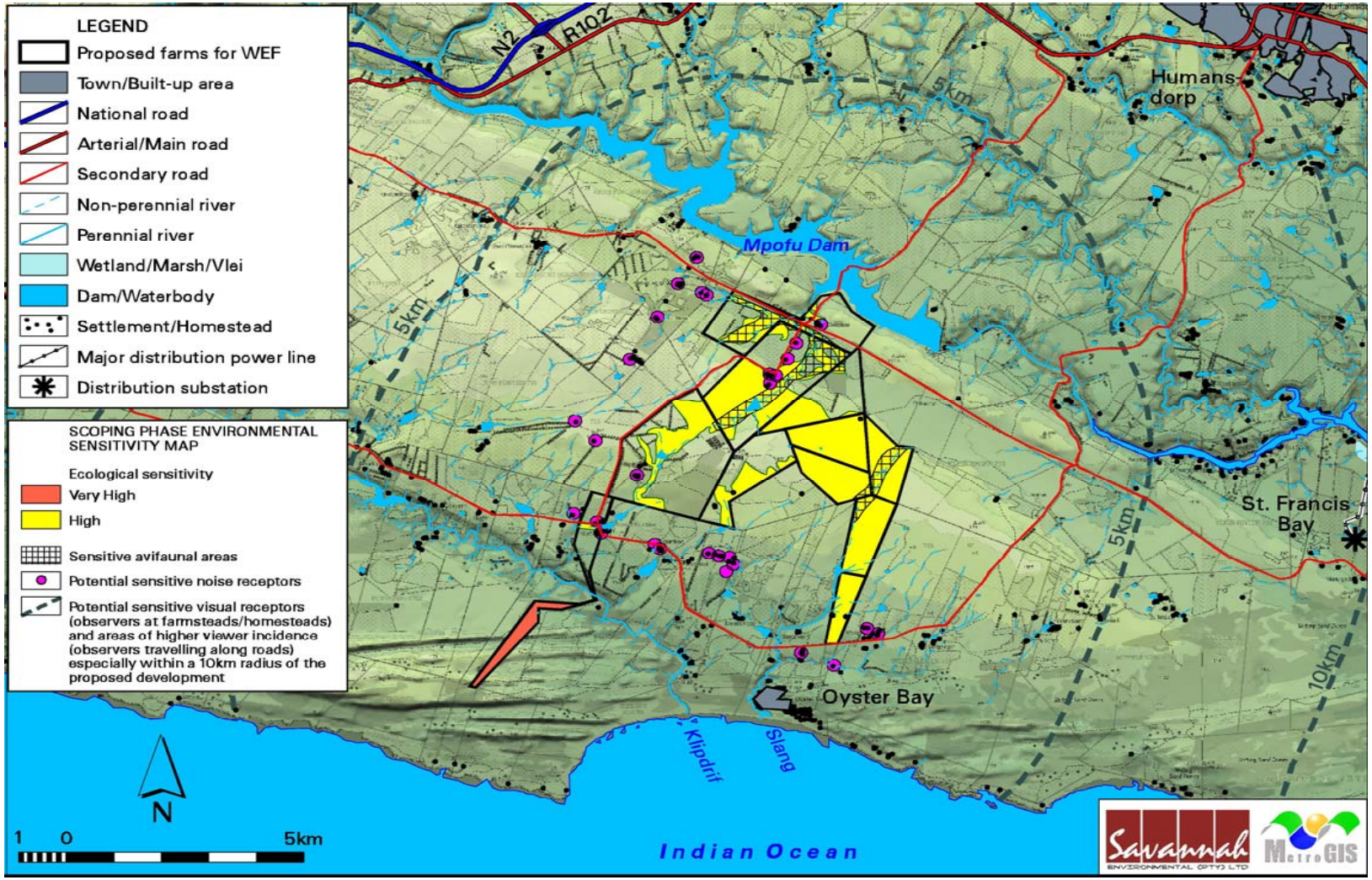

Figure 1: Environmental Sensitivity Map for the proposed Oyster Bay Wind Energy Facility

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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 on-going 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
DEDEA	Eastern Cape Department of Economic Development and Environmental Affairs
DEAT	National Department of Environmental Affairs and Tourism
DEA	National Department of Environmental Affairs
DME	Department of Minerals and Energy
DOT	Department of Transport
DWAF	Department of Water Affairs and Forestry
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
LUPO	Rezoning and Subdivision in terms of Land Use Planning Ordinance, Ordinance 15 of 1985
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

Renewable Energy Systems (RES) Southern Africa (Pty) Ltd is proposing to establish a commercial wind energy facility and associated infrastructure (referred to as the **Oyster Bay Wind Energy Facility**) on a site located north of Oyster Bay in the Eastern Cape Province. An area which falls within the Kouga Local Municipality has been identified for consideration within an Environmental Impact Assessment (EIA). It is proposed for a cluster of up to 80 wind turbines to be constructed over an area of approximately 23 km^2 in extent. The facility is proposed to have a generating capacity of up to ~160 MW. Associated infrastructure proposed includes a substation, access roads and a power line.

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 Draft Scoping Report.

1.1. Project Overview

The site is located approximately 6 km north of Oyster Bay and falls within the Kouga Local Municipality, in the Eastern Cape Province. Other settlements in the broader region include Humansdorp (~13 km north-east of the site) and Jeffrey's Bay (~24 km east of the site). Port Elizabeth lies ~84 km east of the site. In terms of its specific location, the wind energy facility is proposed on the following farm portions:

» Portion 3 of Farm Klein Rivier 713
» Portion 1, 2 , 3, 4 and the Remainder of Farm Rebok Rant 715
» Portion 1 and 3 of Farm Ou Werf 738
» Portion 5 of Farm Klippedrift 732
» Portion 10 and Portion 12 of Farm Kruis Fontein 681.

The capacity of the wind energy facility will depend on the wind turbine selected by RES (the turbine capacity and model deemed to be most suitable for the site will be chosen). Turbines of between 1.8 MW and 3 MW in capacity are being considered for the site. The total number of turbines proposed for the site could therefore vary as follows:

» Up to 50 turbines, assuming a turbine capacity of 3MW each
» Up to 80 turbines, assuming a turbine capacity of 1.8 MW each

The final turbine numbers and capacity will be determined based on further site specific studies in terms of wind regime, terrain and environmental constraints.

The broader site is proposed to accommodate both the wind turbines as well as the associated infrastructure which is required for such a facility, including though not limited to:

» Cabling between the wind turbines, to be lain underground where practical
» On-site substation/s to facilitate the connection between the wind energy facility and the grid.
» A new 66/132 kV overhead power line to be connected to Eskom's existing Melkhout Substation.
» Internal access roads to each turbine.
» Workshop area for maintenance and storage.

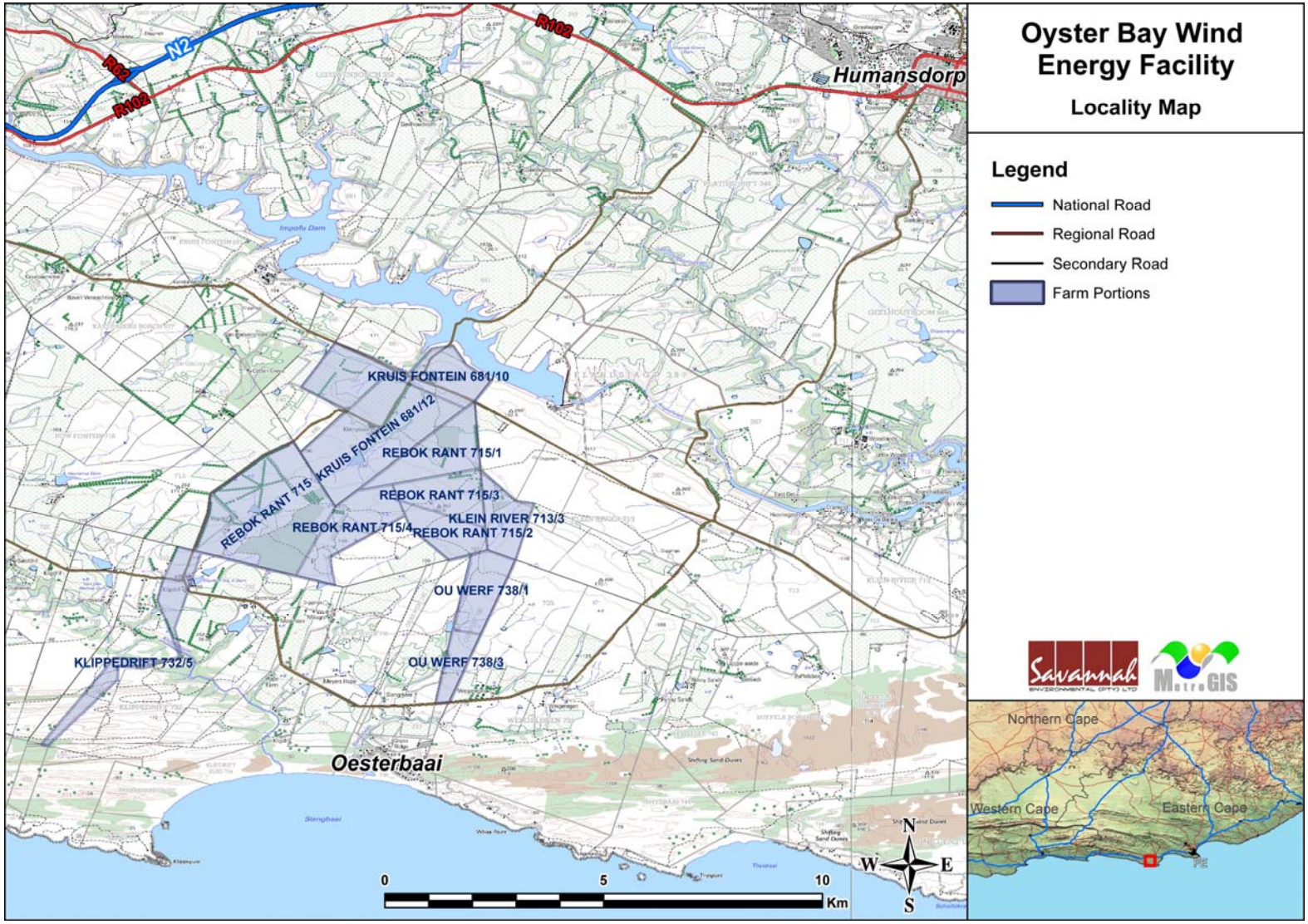

Figure 1.1: Locality map showing the proposed area for the establishment of the Oyster Bay Wind Energy Facility, Eastern Cape Province

1.2. The Need and Desirability for the Proposed Wind Energy Facility 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, oil and coal, for energy and thus reduce the volume of greenhouse gasses emitted into the atmosphere. Grid connected renewable energy is one of the fastest growing sectors 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.

As stated in the most recently available State of Environment Report of 2006 (Department of Environmental Affairs - http://soer.deat.gov.za/themes.aspx?m=406#) on Renewable Energy, South Africa has the following installed renewable generation capacity in Megawatts of electrical power (MWe):

» ~415 MWe from Biomass (this can be broken down as ~245MWe from sugar refineries and ~170 MWe from pulp mills);
» 8MWe from Wind;
» Over 8MWe from Solar,
» 4,2MW biogas (PetroSA), and
» 661 MWe from Hydroelectricity.

The draft Integrated Energy Resources Plan for South Africa for the period 2010 – 2030 further states that the following added capacity from renewable energy is targeted for 2019:

» The total wind capacity is 4500 MW
» Solar capacity is 600 MW

The targeted total renewable capacity added from 2019 to 2030 is 7200MW (DoE, 2010).

Targets for the promotion of renewable energy now exist in more than 58 countries, of which 13 are developing countries. The South African Government has recognised the country's high level of renewable energy potential and presently has in place targets of 10 000 GWh of renewable energy by 2013 (to be produced mainly from biomass, wind, solar and small-scale hydro). This amounts to ~4% (1 667 MW) of the total estimated electricity demand (41 539 MW) by 2013.

To contribute towards this target and towards socio-economic and environmentally sustainable growth, and kick start and stimulate the renewable energy industry in South Africa, the need to establish an appropriate market

mechanism was identified, and Feed-in Tariffs (FIT) have been set. FIT are, in essence, guaranteed prices for electricity supply rather than conventional consumer tariffs. The basic economic principle underpinning the FITs is the establishment of a tariff (price) that covers the cost of generation plus a "reasonable profit" to induce developers to invest. This is quite similar to the concept of cost recovery used in utility rate regulation based on the costs of capital. Feed-in tariffs to promote renewable energy have now been adopted in over 36 countries around the world. The establishment of the Renewable Energy Feed-In Tariff (REFIT) in South Africa provides the opportunity for an increased contribution towards the sustained growth of the renewable energy sector in the country, the region and internationally, and promote competitiveness for renewable energy with conventional energies in the medium- and long-term. Under the National Energy Regulator Act, 2004 (Act No 40 of 2004), the Electricity Regulation Act, 2006 (Act No 4 of 2006) and all subsequent relevant Acts of Amendment, the National Energy Regulator of South Africa (NERSA) has the mandate to determine the prices at and conditions under which electricity may be supplied by licence. In this regard, South Africa differs from the rest of the world in that the amount of Renewable Energy that can qualify for the REFIT is capped and proponents have to go through a tendering system to qualify. In the case of wind, the draft Integrated Resource Plan of 2010 allows 4500 MW until 2019.

Renewable energy is recognised internationally as a major contributor in protecting the climate, nature, and the environment as well as providing a wide range of environmental, economic and social benefits that will contribute towards long-term global sustainability. A typical 100 MW wind project would save approximately 2,676,000 tons of coal or 8,312,000 barrels of oil from being burned over the course of 20 years. In South Africa, this would also remove 92,000 round trips made by coal trucks travelling between the colliery and the power station.

SA is an arid country and availability of water is a severe constraint on both the agriculture and the energy sectors. Unlike coal-fired or nuclear power generation, wind power requires no water to generate electricity.

Eskom currently consumes up to 1,350 litres of water per MWh[1]. It is estimated that a typical 100 MW wind project will generate approximately 260,000 MWh every year saving at least 350 million litres of water which would have been consumed by fossil fuel plants. This is equivalent to the annual water required by

[1] Eskom Annual Report 2008

a South African town of over 1300 people[2]. At over 3 Rand per kilolitre this equates to a cost in excess of 1 Million Rand each year.[3]

It is considered viable that long-term benefits for the community and/or society in general can be realised should the site identified by RES proves to be acceptable from a technical and environmental perspective for the potential establishment of a wind energy facility. In the event of the Oyster Bay Wind Energy Facility being developed, it will contribute to and strengthen the existing electricity grid for the region. In addition, the implementation of the proposed project will aid in achieving the goal of a 30% share of all new power generation being derived from independent power producers (IPPs), as targeted by the Department of Energy (DoE).

At national, regional and local levels, investment in renewable energy initiatives, such as the proposed wind energy facility, is supported. As South Africa is a signatory to the Kyoto Protocol, it is important that positive policy is enacted at the national level to encourage renewable energy development.

1.3. Scope of the proposed Wind Energy Facility

Wind turbines use the energy from the wind to generate electricity. In essence, the blades of the turbine are turned by the wind and the energy captured is converted into electrical energy and supplied to the electricity grid for use in homes and elsewhere.

The overarching objective for the wind energy facility 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**. The development should also aim to minimise pressure on the surrounding environment, without threatening the natural area or any conservation measures, in line with national legislation.

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 energy facility will be developed by RES for assessment at 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 the 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

[2] https://www.cia.gov/library/publications/the-world-factbook/geos/sf.html
[3] Rand Water – current water tariffs for private industry

constructed. This layout will then inform the positioning of other infrastructure such as the internal substation and access roads.

The scope of the proposed Oyster Bay Wind Energy Facility project, including details of all elements of the project (for the construction, operation and decommissioning phases) is discussed in more detail in Chapter 2.

1.4. Requirement for an Environmental Impact Assessment Process

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

NEMA is national legislation that provides for the authorisation of certain controlled activities known as "listed activities". In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be considered, investigated, assessed and reported on to the competent authority (the decision-maker) charged by NEMA with granting of the relevant environmental authorisation. The National Department of Environmental Affairs (DEA) is the competent authority for this project. An application for authorisation has been accepted by the DEA (under Application Reference number **12/12/20/1585**). Through the decision-making process, the DEA will be supported by the Eastern Cape Department of Economic Development and Environmental Affairs (Eastern Cape DED&EA).

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 assess if environmental impacts can be avoided, minimised or mitigated to acceptable levels. Comprehensive, independent environmental studies are required to be undertaken in accordance with the EIA Regulations to provide the competent authority with sufficient information in order for an informed decision to be taken regarding the project. RES has appointed Savannah Environmental (Pty) Ltd to conduct the independent Environmental Impact Assessment (EIA) process for the proposed project.

An EIA is also an effective planning and decision-making tool for the project proponent. It allows the environmental consequences resulting from a technical facility during its establishment and its operation to be identified and appropriately managed. It provides the opportunity for the developer to be forewarned of potential environmental issues, and allows for resolution of the

issue(s) reported on in the Scoping and EIA reports as well as dialogue with affected parties.

In terms of sections 24 and 24D of NEMA, as read with Government Notices R385 (Regulations 27–36) and R387, a Scoping and EIA are required to be undertaken for this proposed project as it includes the following activities listed in terms of GN R386 and R387 (GG No 28753 of 21 April 2006):

No & date of relevant notice	Activity No (in terms of relevant Regulation / notice)	Description of listed activity
Government Notice R387 (21 April 2006)	1(a)	The construction of facilities or infrastructure, including associated structures or infrastructure, for the generation of electricity where (i) the electricity output is 20 megawatts or more; or (ii) the elements of the facility cover a combined area in excess of 1 hectare
Government Notice R387 (21 April 2006)	1(l)	The construction of facilities or infrastructure, including associated structures or infrastructure, for the transmission and distribution of above ground electricity with a capacity of 120 kV or more
Government Notice R387 (21 April 2006)	2	Any development, activity, including associated structures and infrastructure, where the total area of the developed area is, or is intended to be 20 ha or more.
Government Notice R386 (21 April 2006)	12	The transformation or removal of indigenous vegetation of 3 ha or more or of any size where the transformation or removal would occur within a critically endangered or an endangered ecosystem listed in terms of section 52 of the National Environmental Management: Biodiversity Act, 2004 (Act No 10 of 2004).
Government Notice R386 (21 April 2006)	14	The construction of masts of any material of type and of any height, including those used for telecommunications broadcasting and radio transmission, but excluding (a) masts of 15m and lower exclusively used by (i) radio amateurs; or (ii) for lightening purposes (b) flagpoles; and (c) lightening conductor poles
Government Notice R386 (21 April 2006)	16(a)	The transformation of undeveloped, vacant or derelict land to residential, mixed, retail, commercial, industrial or institutional use where such development does not constitute infill and where the total area to be transformed is bigger than 1 ha.

No & date of relevant notice	Activity No (in terms of relevant Regulation / notice)	Description of listed activity
Government Notice R386 (21 April 2006)	15	The construction of a road that is wider than 4m or that has a reserve wider than 6m, excluding roads that fall within the ambit of another listed activity or which are access roads of less than 30m long.
Government Notice R386 (21 April 2006)	7	The above ground storage of a dangerous good, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30m^3 but less than 1 000m^3 at any one location or site.
Government Notice R386 (21 April 2006)	13	The abstraction of groundwater at a volume where any general authorisation issued in terms of the National Water Act, 1998 (Act No. 36 of 1998) will be exceeded.

Note that this EIA is being conducted in accordance EIA Regulations that were current at the time of submitting the Application for Authorisation (i.e. the EIA Regulations of April 2006). No additional listed activities in terms of the EIA Regulations promulgated in August 2010 are triggered by the proposed wind energy facility development. Therefore, no additional activities are required to be considered within this application.

This report documents the scoping evaluation of the potential environmental impacts of the proposed construction and operation of the Oyster Bay Wind Energy Facility. 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 provides stakeholders with an opportunity to verify that the issues they have raised through the process to date have been captured and adequately considered, and provides a further opportunity for additional key issues for consideration to be raised. The Final Scoping Report will incorporate 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 RES 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 its specialist sub-consultants on this project are subsidiaries of or affiliated to RES. Note that the noise study was done in-house by RES, though reviewed by an independent noise specialist consultant from South Africa. 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 assessment and environmental management, and have been actively involved in undertaking environmental studies for a wide variety of projects throughout South Africa. Strong competencies have been developed in project management of environmental EIA processes, as well as strategic environmental assessment and compliance advice, and the identification of environmental management solutions and mitigation/risk minimising measures.

Savannah Environmental has gained extensive knowledge and experience on potential environmental impacts associated with electricity generation projects through their involvement in related EIA processes. They have successfully managed and undertaken EIA processes for power generation projects, including other wind energy facilities, throughout South Africa. Curricula vitae for the Savannah Environmental project team consultants are included in Appendix A.

In order to adequately identify and assess potential environmental impacts associated with the proposed project, Savannah Environmental has appointed several specialist consultants to conduct the specialist studies and assessments, as required. The curricula vitae for the EIA specialist consultants are also included in Appendix A.

OVERVIEW OF THE PROPOSED PROJECT CHAPTER 2

RES is proposing to establish a commercial wind energy facility and associated infrastructure (referred to as the Oyster Bay Wind Energy Facility) on a site located approximately 6km north of the settlement of Oyster Bay in the Eastern Cape Province.

The capacity of the wind energy facility will depend on the wind turbine selected by RES (in terms of turbine capacity and model that will be deemed most suitable for the site). Turbines of between 1.8 MW and 3 MW in capacity are being considered for the site. The total number of turbines proposed for the site could therefore vary as follows:

» Up to 50 turbines, assuming a turbine capacity of 3MW each
» Up to 80 turbines, assuming a turbine capacity of 1.8 MW each

The final turbine numbers and capacity will be determined based on further site specific studies of wind regime, terrain and environmental constraints. Depending on the final selection, the estimated total installed capacity for the proposed Oyster Bay wind energy facility is up to **160MW** and will include the following infrastructure:

» **Wind turbines** (between 80m – 120m hub height) and **concrete foundations** to support them.
» Possibly small transformer outside each turbine tower, depending on what make and model of turbine which is deemed most suitable for the site. Such a transformer would have its own foundation and housing around it.
» Crane hardstandings.
» **Cabling** between the turbines, to be laid underground where practical.
» **Internal access roads** to each turbine.
» **Workshop area** for control, maintenance and storage.
» Temporary and permanent met masts for calibration and site monitoring.
» Small mast for telecommunications
» An on-site **substation** to facilitate the connection between the wind energy facility and the grid.
» New overhead **power line** to connect to Eskom's existing Melkhout (132/66kV) substation, which is located approximately 20km north of the site.

An area which falls within the Kouga Local Municipality has been identified for consideration within an Environmental Impact Assessment (EIA). The wind energy facility is proposed on the following farm portions:

» Portion 3 of Farm Klein Rivier 713

» Portion 1, 2 , 3, 4 and the Remainder of Farm Rebok Rant 715
» Portion 1 and 3 of Farm Ou Werf 738
» Portion 5 of Farm Klippedrift 732
» Portion 10 and Portion 12 of Farm Kruis Fontein 681 (**Refer to the locality map contained in Figure 1.1 and Figure 2.1 below).**

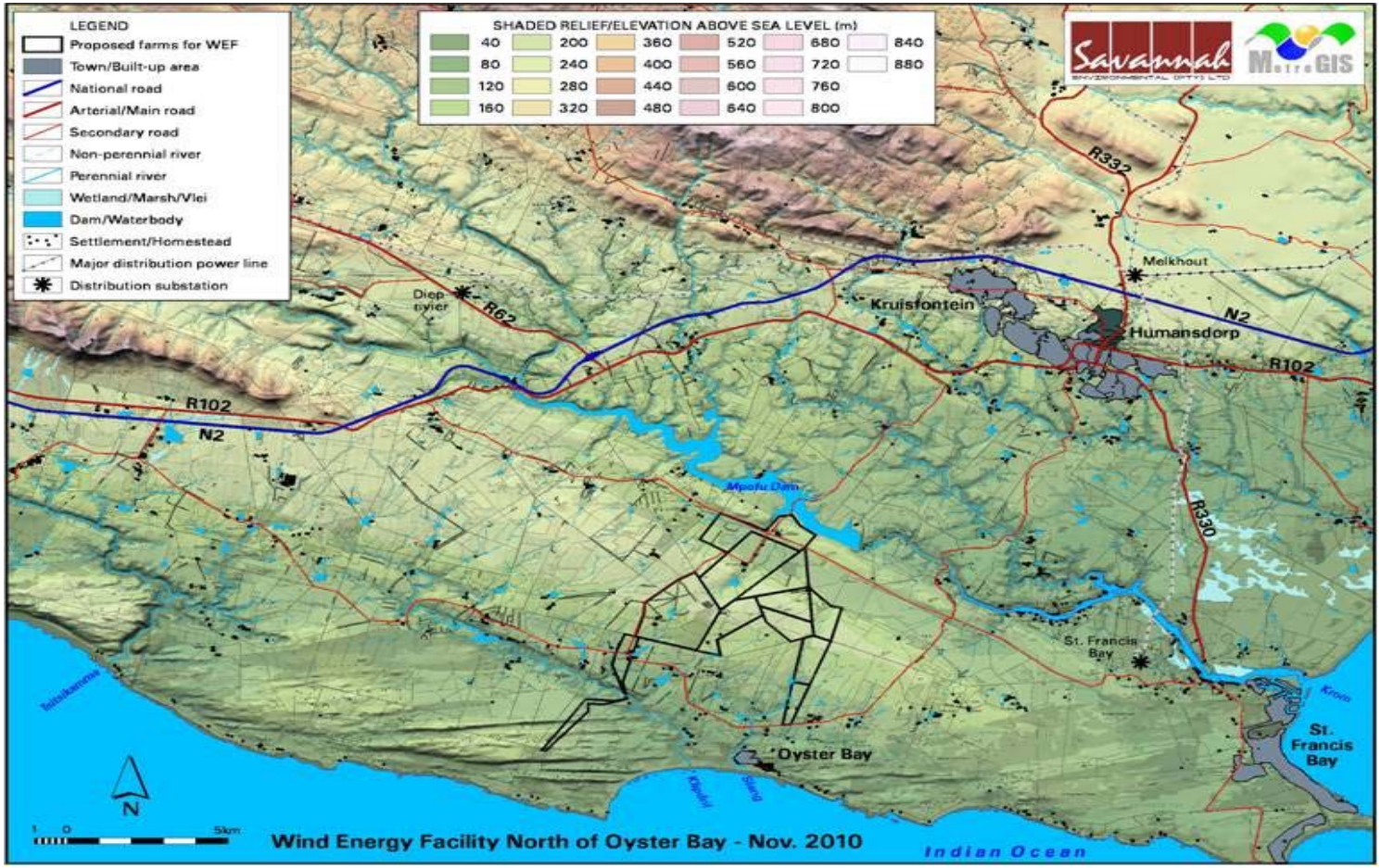

Figure 2.1: Shaded relief map (indicating the location of the proposed facility and the topography and elevation above sea level) of the study area.

2.1. Site Selection and Pre-Feasibility Analysis

The site near Oyster Bay site was selected by RES for the development of a wind energy facility based on its wind climate (high wind speeds), suitable proximity in relation to the existing electricity grid as well as estimated grid capacity available at the nearest Eskom substation, minimum constraints from an engineering, construction and technical point of view, and availability of suitable land. Therefore, RES consider the Oyster Bay site to be highly preferred for wind energy facility development. Wind monitoring is planned from an on-site 80 m wind monitoring mast in early 2011 (authorisation for the mast was received in August 2010 under the DEA Reference number 12/12/20/1580) in order to confirm the wind resource on site and inform the turbine selection process.

2.2 Technology Alternatives

Following significant consideration of technology alternatives based on site characteristics it was determined by the developer that the site would only be suitable for a wind energy facility. RES will be considering various wind turbine designs and layouts in order to maximise the capacity of the site. The turbines being considered for use at this wind energy facility will be between 1.8 MW and 3 MW in capacity. The turbines will have a hub height of between 80m – 120m, and a rotor diameter of between 80 – 112m (i.e. each blade up to a maximum 55 m in length). The technology provider has not yet been confirmed and will be decided after further wind analysis and a tender process. Note that RES will be constructing the same make and model (and size) of turbine across the whole site.

2.3 Site-specific or Layout Design Alternatives

Once sufficient information is available from an environmental and planning perspective for the broader site, a detailed micro-siting exercise will be undertaken to effectively 'design' the wind energy facility and the turbine positions within the broader study area. Through the process of determining constraining factors and environmentally sensitive areas, the layout of the wind turbines and infrastructure can be planned and adjusted if necessary. A draft preliminary wind turbine layout will be developed by RES and will be available in the EIA phase. It is expected that this preliminary layout will be approximately 80% accurate. The overall aim of the layout is 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 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, power line and substation site.

Planning and design for the transmission of the power generated at the wind energy facility is being undertaken. This will be informed through understanding the local power requirements and the stability of the local electricity network. A 132kV power line is proposed to connect the substation at the wind energy facility to the electricity distribution network/grid at Eskom's existing Melkhout (66/132 kV) substation, which is located approximately 20km north of the site. Alternative routes/corridors for the 132 kV power line will be assessed in the EIA phase and in discussions with Eskom.

2.4 The 'do-nothing' Alternative

The 'do-nothing' alternative is the option of not constructing the Oyster Bay Wind Energy Facility on the proposed site. This alternative would result in no environmental impacts on the site or surrounding area.

The electricity demand in South Africa is placing increasing pressure on the country's existing power generation capacity. There is therefore a need for additional electricity generation options to be developed throughout the country. The decision to expand South Africa's electricity generation capacity, and the mix of generation technologies is based on **national policy** and informed by on-going strategic planning undertaken by the national Department of Energy (DoE), the National Energy Regulator of South Africa (NERSA) and Eskom Holdings Limited (as the primary electricity supplier in South Africa). The support for renewable energy policy is guided by a rationale that South Africa has a very attractive range of renewable resources, particularly solar and wind and that renewable applications are in fact the least-cost energy service in many cases - and more so when social and environmental costs are taken into account.

The generation of electricity from renewable energy in South Africa offers a number of socio-economic and environmental benefits. These benefits are explored in further detail in the South Africa Renewable Energy Feed-in Tariff (REFIT) Regulatory Guideline published by NERSA (March 2009), and 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 plants are major consumers of water during their requisite cooling processes. 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, where compared with wet cooled conventional power stations. This translates into 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 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. The use of these energy flows will strengthen energy security through the development of a diverse energy portfolio.
» **Pollution reduction:** The release of by-products of fossil fuel burning for electricity generation have a particularly hazardous impact on human health, and contribute to ecosystem degradation.
» **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 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 CO_2 emissions.
» **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 has significant potential for job creation 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 our disproportionate carbon footprint can play an important part in ensuring our role in preventing dangerous anthropogenic climate change; thereby securing the natural foundations of life for generations to come.

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.

Within a policy framework, the development of renewable energy in South Africa is supported by the White Paper on Renewable Energy (November 2003), which has set a target of 10,000 GWh renewable energy contribution to final energy consumption by 2013. The target is to be achieved primarily through the development of wind, biomass, solar and small-scale hydro. DME's macroeconomic study on renewable energy, developed under the now completed Capacity Building in Energy Efficiency and Renewable Energy (CaBEERE) project, has established that the achievement of this target would provide a number of economic benefits, including increased government revenue amounting to R299 million, increased GDP of up to R1 billion per year and the creation of an estimated 20,500 new jobs. In addition, the development of renewable energy beyond the 10,000 GWh target holds further employment benefits and would maximise the number of jobs created per TWh (South Africa Renewable Energy Feed-in Tariff (REFIT) Regulatory Guideline published by NERSA (March 2009).

Through research, the viability of the Oyster Bay Wind Energy Facility has been established, and RES proposes that up to 80 turbines can be established as part of the facility. The 'do nothing' alternative will not assist the South African government in reaching the set targets for renewable energy. In addition the Eastern Cape's power supply will be deprived of an opportunity to benefit from the additional generated power being evacuated directly into the Provinces' grids.

The 'do nothing' alternative is, therefore, not a preferred alternative and will therefore not be assessed in further detail during the EIA Phase.

2.5 Wind Energy as a Power Generation Technology

Wind power is the conversion of wind energy into a useful form, such as electricity, using wind turbines. The use of wind for electricity generation is a non-consumptive use of a natural resource, and produces an insignificant quantity of greenhouse gases in its lifecycle. Wind power consumes no fuel for continuing operation, and has no emissions directly related to electricity production.

Wind energy is one of the fastest growing electricity generating technologies and features in energy plans worldwide. Operation does not produce carbon dioxide, sulphur dioxide, mercury, particulates, or any other type of air pollution, as do fossil fuel power sources.

Environmental pollution and the emission of CO_2 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 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.

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 energy facility (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 in general can be considered as having a moderate wind resource as compared to Northern Europe (Scandinavia), Great Britain and Ireland, New Zealand and Tasmania. 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 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.

The wind speed measurements taken at a particular site are affected by the local topography (extending to a few tens of kilometres from the mast) or surface roughness. This is why local on-site monitored wind speed data is so important for detailed wind energy facility design. 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.

A wind resource measurement and analysis programme is planned to provide measured data and a prediction of the facility's expected energy production over its lifetime. The design (and micro-siting) of a Wind Energy Facility is sensitive to the predominant wind directions and wind speeds for the site. Although modern wind turbines are able to yaw to the direction of the wind, the micro-siting must consider the wind direction and strength of the wind in the optimal positioning of the turbines.

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. 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.

2.7 How do wind turbines function

Wind turbines, like windmills, are mounted on a tower to capture the most energy. The kinetic energy of wind is used to turn a wind turbine to generate electricity. At 30 m or more aboveground, they can take advantage of the faster and less turbulent wind. Turbines catch the wind's energy with their propeller-like blades. Usually, two or three blades are mounted on a shaft to form a **rotor**. Generally a wind turbine 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 Wind Energy Facility near Oyster Bay, Eastern Cape will have a hub height of between 80 m and 120 m, and a rotor diameter of up to 112 m (i.e. each blade up to maximum 55 m in

length). These turbines would have a generating capacity of between 1.8 MW and 3 MW (in optimal wind conditions). Wind turbines can start generating at wind speed 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 and 17 m/s).

The capacity of the wind energy facility will depend on the wind turbine chosen by RES (turbine capacity and model that will be deemed most suitable for the site). Turbines of between 1.8 MW and 3 MW in capacity are being considered for the site. The total number of turbines proposed for the site could therefore vary as follows:

» Up to 50 turbines, assuming a turbine capacity of 3MW each
» Up to 80 turbines, assuming a turbine capacity of 1.8 MW each

Other infrastructure associated with the facility includes internal service roads, an access road, power line and a substation (placed within the facility). The construction phase of the Wind Energy Facility is dependent on the number of turbines erected and is estimated at one week per turbine, or in total approximately 18 months (including all infrastructure). The lifespan of the facility is approximated at 20 to 30 years.

2.7.1. Main Components of a Wind Turbine

The turbine consists of the following major components:
» The rotor
» The nacelle
» The tower
» The foundation unit

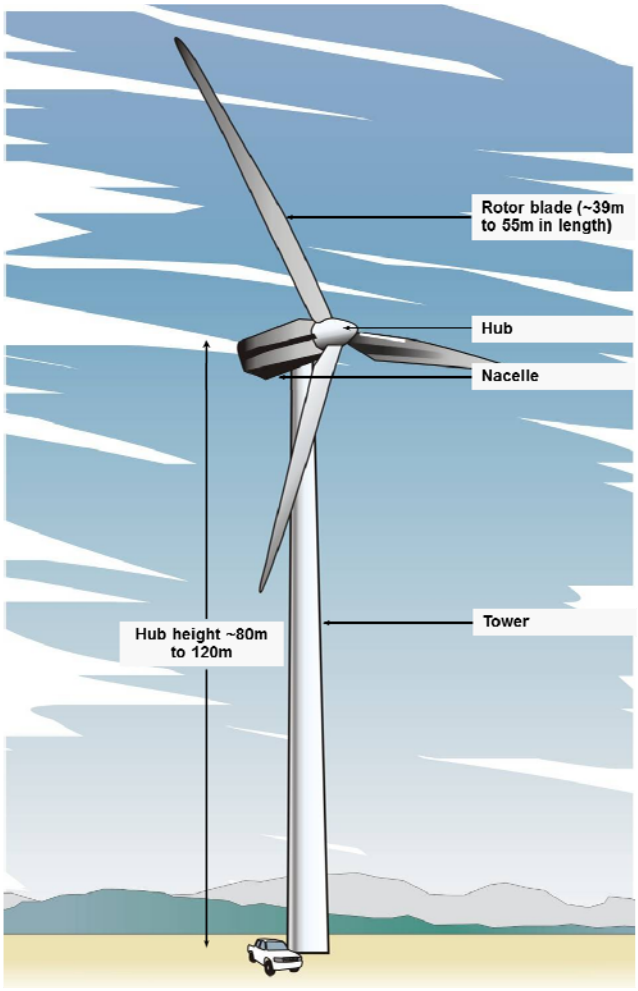

Figure 2.1: Illustration of the main components of a wind turbine

The Rotor

The portion of the wind turbine that collects energy from the wind is called the rotor. The rotor comprises of three rotor blades (the approximate rotor diameter is in the range of 80m – 112m, and the length of blade is between 39m – 55m long). The rotor blades use the latest advances in aeronautical engineering materials science to maximise efficiency. The greater the number of turns of the rotor the more electricity is produced. The 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). 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.

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 2.2).

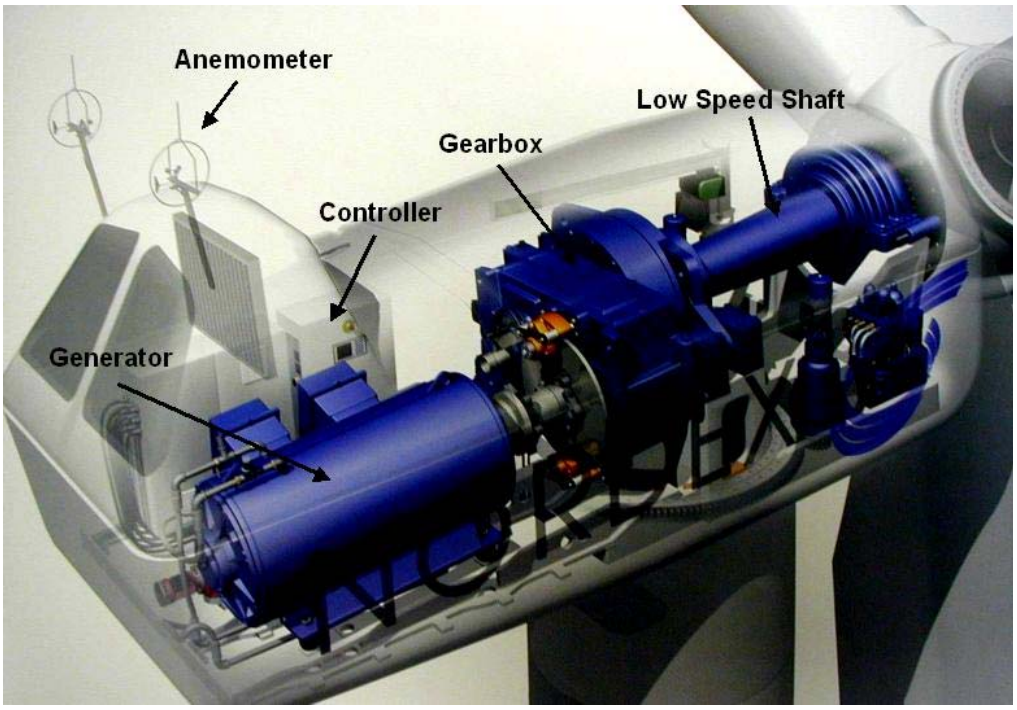

Figure 2.2: Detailed structure of a nacelle of a horizontal axis turbine

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 tower

The tower is a hollow structure allowing access to the nacelle (between 80m and 120m in height). The height of the tower is a key factor in determining the amount of electricity a turbine can generate. Small transformers may occur outside each turbine tower, depending on what make and model of turbine is deemed most suitable for the site. Such a transformer would have its own foundation and housing around it. Alternatively, the transformer could be housed within the tower. The transformers convert the electricity to the correct voltage for transmission into the grid.

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.

2.7.2. 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 Energy Facility 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.

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).

Wind turbines can be used as stand-alone applications, or they can be connected to a utility power grid. For utility-scale sources of wind energy, a large number of wind turbines are usually built close together to form a **wind energy facility.**

2.8 Project Construction Phase

The construction phase of the wind energy facility is dependent on the number of turbines to be erected, but can be estimated at one week per turbine or in total approximately 18 months (including all infrastructure). The lifespan of the facility is approximated at 20 to 30 years. In order to construct the proposed wind energy facility and associated infrastructure, a series of activities will need to be undertaken. The construction process is outlined in Figure 2.3 and discussed in more detail below.

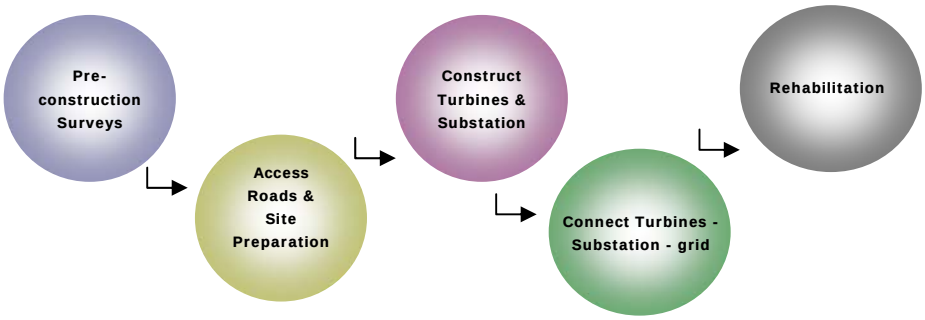

Figure 2.3: Typical Construction Process for Development of the Wind Energy Facility

2.8.1. 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 substation site and survey of the power line servitude to determine tower locations.

2.8.2 Establishment of Access Roads to the Site

The site has a network of secondary gravel roads (such as the R330 to Humansdorp) around it. Access/haul roads to the site as well as internal access roads within the site are required to be established. Two options of access to the site is currently being investigated, one accessing the site from the west and one from the north, using existing secondary roads and farm access roads. As far as possible, existing access roads to the site 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). 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, access for replacement of parts if necessary and decommissioning.

2.8.3. Undertake Site Preparation

Site preparation activities will include clearance of vegetation at the footprint of each turbine, the establishment of laydown areas (refer to 2.8.6 below), the establishment of internal access roads and excavations for foundations. These activities will require the stripping of topsoil, which will need to be stockpiled, backfilled and/or spread on site. Figure 2.4 illustrates these areas.

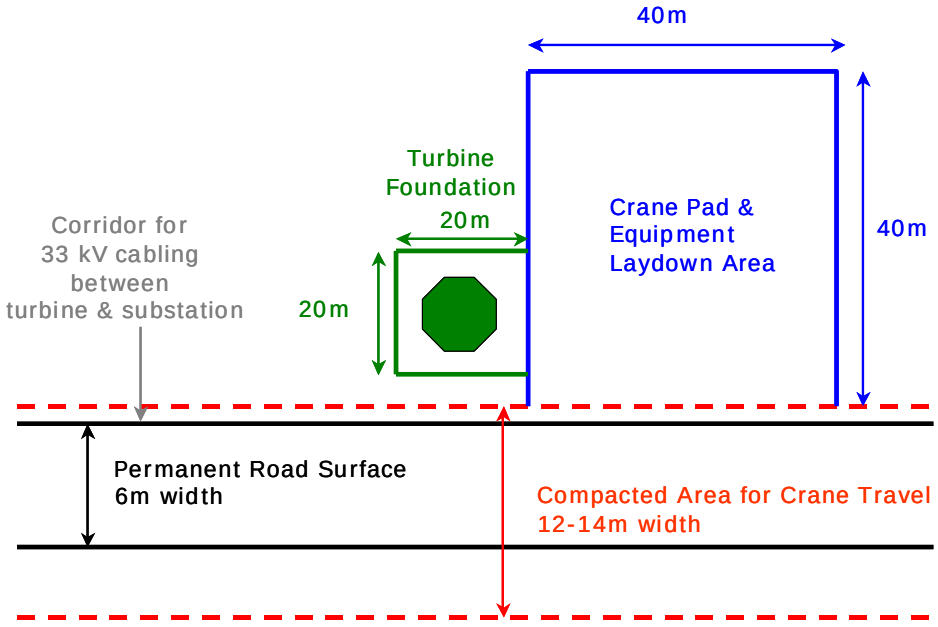

Figure 2.4: Diagrammatic representation of the proposed layout of the components. Please note that this layout is indicative only, final dimensions and orientation are subject to detailed design following turbine and crane selection.

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).

2.8.4. Construct Foundation

Concrete foundations will be constructed at each turbine location. Foundation holes will be mechanically excavated to a depth of approximately 4 m, depending on the local geology. Concrete may to be brought to site as ready-mix or batched on site if no suitable concrete suppliers are available in the vicinity. The reinforced concrete foundation of up to 22m x 22m x 4m will be poured and will support a mounting ring. The foundation will then be left up to a week to cure.

2.8.5. Transport of Components and Equipment to Site

The wind turbine, including the tower, will be brought on site by the turbine supplier in sections on flatbed trucks. Turbine units which must be transported to site consist of: the tower (in segments), hub, nacelle, and three rotor blades. The individual components are defined as abnormal loads in terms of Road Traffic Act (Act No 29 of 1989)[4] by virtue of the dimensional limitations (abnormal length of the blades) and load limitations (i.e. the nacelle). In addition, components of various specialised construction and lifting equipment are required on site to erect the wind turbines and need to be transported to site. In addition to the specialised lifting equipment/cranes, 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 trucks, welfare facilities, site offices etc.).

The components required for the establishment of the substation/s (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 (e.g. widening on corners), accommodation of street furniture (e.g. street lighting, traffic signals, telephone lines etc) and protection of road-related structures (i.e. 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 roads, and the dedicated access/haul road to the site itself.

2.8.6. Establishment of Laydown Areas on Site

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

In addition a number of construction compound areas will need to be established around the site. These will be temporary structures for site offices, welfare facilities, storage and safe refuelling areas.

[4] A permit will be required for the transportation of these abnormal loads on public roads.

A large laydown area will be required at each position where the main lifting crane may be required to be assembled 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.

2.8.7. 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.

2.8.8 Construct Substation

Only one 33/132 kV substation will be constructed within the site footprint. The turbines will be connected to the substation via underground cabling. The position of the substation 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 will be constructed with a high-voltage (HV) yard footprint of up to 2400m^2.

The construction of the substation would require a survey of the site; site clearing and levelling and construction of access road/s to the substation site (where required); construction of substation terrace and foundations; assembly, erection and installation of equipment (including transformers); connection of conductors to equipment; and rehabilitation of any disturbed areas and protection of erosion sensitive areas.

2.8.9 Establishment of Ancillary Infrastructure

A workshop as well as a contractor's equipment camp may also be required to be constructed. Temporary storage areas and a construction compound (sizes and numbers to be confirmed later in process). Service building(s) (number, size and location to be confirmed later in process) are also required.
The establishment of these facilities/buildings will require the clearing of vegetation and levelling of the development site and the excavation of foundations prior to construction. A laydown area for building materials and equipment associated with these buildings will also be required.

2.8.10 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.

2.8.11 Connect Substation/s to Power Grid

One 132 kV power line will connect the substation to the electricity distribution network/grid via the Melkhout substation. A final route for the power line will be assessed, surveyed and pegged prior to construction.

2.8.12. Undertake Site Rehabilitation

As construction is completed in an area, and as all construction equipment is removed from the site, the site 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 prepared for rehabilitation.

2.9. Project Operation Phase

It is not known at this stage exactly how many people will be responsible for monitoring and maintenance of the facility. It is anticipated that there could be security and maintenance staff required on site.

Each turbine within the wind energy facility will be operational except under circumstances of mechanical breakdown, inclement weather conditions or maintenance activities. The wind turbine will be subject to periodic maintenance and inspection. Periodic oil changes will be required. Any waste products (e.g. oil) will be disposed of in accordance with relevant waste management legislation.

2.10. Project Decommissioning Phase

The turbine infrastructure which will be utilised for the proposed Wind Energy Facility is expected to have a lifespan of approximately 20 - 30 years (with maintenance). Equipment associated with this facility would only be decommissioned once it has reached the end of its economic life. It is most likely that decommissioning activities of the infrastructure of the 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.

2.10.1. 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 construction equipment.

2.10.2. 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. Almost all parts of the turbine would be considered reusable or recyclable except for the blades.

2.10.3. Project-related Benefits

It is considered viable that long-term benefits for the community and/or society in general can be realised should the Oyster Bay site prove to be acceptable from a technical and environmental perspective for the potential establishment of a wind energy facility. In the event of this facility being developed, it will contribute to and strengthen the existing electricity grid for the area. In addition, the proposed project will aid in achieving the goal of a 30% share of all new power generation being derived from independent power producers (IPPs).

At national, regional and local level, investment in renewable energy initiatives, such as the proposed wind energy facility, is supported. It is important that at the national level (South Africa being signatories to the Kyoto Protocol) that positive policy is enacted to encourage wind energy (and indeed all renewable) development.

APPROACH TO UNDERTAKING THE SCOPING PHASE CHAPTER 3

An Environmental Impact Assessment (EIA) process refers to that process (dictated by the EIA Regulations) which involves the identification of and assessment of direct, indirect and cumulative environmental impacts associated with a proposed project. The EIA process comprises two phases: i.e. **Scoping Phase** and **EIA Phase**. The EIA process culminates in the submission of an EIA Report (including an environmental management programme (EMP)) to the competent authority for decision-making. The EIA process is illustrated below:

The Scoping Phase for the proposed Oyster Bay Wind Energy Facility has been undertaken in accordance with the EIA Regulations published in Government Notice 28753 of 21 April 2006, in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998). This scoping process aimed at identifying potential issues associated with the proposed project, and defining 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 (including relevant government authorities) and interested and affected parties (I&APs). This chapter serves to outline the process which was followed during the Scoping Phase of the EIA process.

3.1 Objectives of the Scoping Phase

This Scoping Phase aimed to:

» Identify and evaluate potential environmental (biophysical and social) impacts and benefits of all phases of the proposed development (including design, construction, operation and decommissioning) within the broader study area through a desk-top review of existing baseline data and specialist studies.
» Define the scope of studies to be undertaken within the EIA process.

» 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 to be undertaken as part of the EIA Phase of the process.
» Identify potentially sensitive environmental features and areas on the site to inform the preliminary design process of the facility.

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

» Clarify the scope and nature of the proposed activities.
» Clarify the reasonable and feasible project-specific alternatives to be considered through the EIA process, including the "do nothing" option.
» Identify and evaluate key environmental issues/impacts associated with the proposed project, and through a process of broad-based consultation with stakeholders and desk-top specialist studies identify those issues to be addressed in more detail in the Impact Assessment Phase of the EIA process, as well as potentially sensitive environmental features and areas which should be considered in the preliminary design phase.
» Conduct an open, participatory and transparent public involvement process and facilitate the inclusion of stakeholders' concerns regarding the proposed project into the decision-making process.

3.2 Overview of the Scoping Phase

The Scoping Phase has been undertaken in accordance with the EIA Regulations published in Government Notice 28753 of 21 April 2006, in terms of NEMA. Key tasks undertaken within the scoping phase included:

» Consultation with relevant decision-making and regulating authorities (at National, Provincial and Local levels).
» Submission of a completed application form for authorisation in terms of Regulation 13 and 27 of Government Notice No R385 of 2006 to the competent authority (DEA).
» Undertaking a public involvement process throughout the Scoping process in accordance with Regulation 56 of Government Notice No R385 of 2006 in order to identify issues and concerns associated with the proposed project.
» Preparation of an Issues and Response Report detailing key issues raised by I&APs as part of the EIA Process (in accordance with Regulation 59 of Government Notice No R385 of 2006).
» Undertaking of independent specialist studies in accordance with Regulation 33 of Government Notice No R385 of 2006.
» Preparation of a Draft Scoping Report and Plan of Study for EIA in accordance with the requirements of the Regulation 29 Government Notice No R385 of 2006.

The tasks are discussed in detail below.

3.2.1 Authority Consultation and Application for Authorisation in terms of GN No R385 of 2006

As this is an **energy generation** project the National Department of Environmental Affairs (DEA) is the competent authority for this application. As the project falls within the Eastern Cape Province, the Eastern Cape Department of Economic Development and Environmental Affairs (Eastern Cape DED&EA) act as a commenting authority for the project. Consultation with these authorities has been undertaken throughout the Scoping process. This consultation has included the following:

» Consultation with DEA regarding the proposed project and the EIA process to be undertaken.
» Submission of an application for authorisation to DEA, with a copy submitted to Eastern Cape DED&EA. This application was accepted and the reference number **12/12/20/1585** allocated to the project. Authorisation was therefore granted to continue with the Scoping Phase of the project.

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

3.2.2 I&AP Identification, Registration and the Creation of an Electronic Database

The first step in the public involvement process was to identify relevant stakeholders and interested and affected parties (I&APs). This process was undertaken through existing contacts and databases, field research, recording responses to site notices and newspaper advertisements, as well as through the process of networking. Stakeholder groups identified include:

» Provincial and local government departments (including DoE, Eastern Cape DED&EA, South African Heritage Resources Agency (SAHRA), Department of Water Affairs (DWA), Department of Agriculture, South African Roads Agency (SANRAL), etc.)
» Government Structures (including the Provincial Roads Authority, municipal planning departments, etc.)
» Kouga Local Municipality and Cacadu District Municipality
» Potentially affected and neighbouring landowners and tenants
» Local authorities
» Conservation authorities
» Industry and business; and

» Community Based Organisations (CBOs) and other Non-governmental Organisations (NGOs).

All relevant stakeholder and I&AP information has been recorded within a database of affected parties (refer to Appendix C for a listing of recorded parties). While I&APs have been encouraged to register their interest in the project from the start of the process, the identification and registration of I&APs will be on-going for the duration of the EIA process. The project database will be updated on an on-going basis throughout the project process, and will act as a record of the parties involved in the public involvement process.

3.2.3 Notification of the EIA Process

In order to notify and inform the public of the proposed project and to invite members of the public to register as interested and affected parties (I&APs) newspaper adverts were placed in the following newspapers:

» *The Herald (29 October 2010)*
» *St Francis Chronical (02 November 2010)*

A second round of adverts will be placed in these newspapers to invite I&APs to attend the public meeting and review the draft Scoping Report. In addition, site notices were placed at the farm entrances and public places in accordance with the requirements of the EIA Regulations (See Appendix D for the adverts and site notices).

A flyer informing the community of Oyster Bay and Humansdorp on the EIA process and inviting people to the public meeting was distributed to the Oyster Bay residents as well as through the local post office in Humansdorp. In addition to the above advertisements and notices, key stakeholders and registered I&APs were notified in writing of the commencement of the EIA process by distributing a stakeholder letter. These parties included, inter alia:

» Relevant parties from municipalities potentially affected (directly or indirectly) by the proposed project
» Communities and potentially affected landowners
» Relevant organs of state having jurisdiction in respect of any aspect of the activity, including:
  * DED&EA
  * Department of Energy
  * Department of Water Affairs
  * Department of Agriculture – Land Care
  * South African Heritage Resources Agency (SAHRA)
  * Conservation bodies

- Department of Transport and Public Works and various District Roads Departments
- South African National Roads Agency
- Local and District Municipalities.

Copies of all the advertisements placed and notices distributed are contained in Appendix D of this report.

3.2.4 Public Involvement and Consultation

The aim of the public participation process conducted in the scoping phase of the process was primarily to ensure that:

» All potential stakeholders and I&APs are identified and consulted with
» Information containing all relevant facts in respect of the application is made available to potential stakeholders and I&APs
» 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 identify issues to be addressed in the EIA process.
» Comment received from stakeholders and I&APs is recorded.

In order to provide information regarding the proposed project and the EIA process, a background information document (BID) for the project was compiled at the outset of the process (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.

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 have been and will continue to be provided for I&APs to have their issues noted after the release of the Draft Scoping Report for public review, as follows:

» **Public meeting** in the study area (open meeting advertised in the local press)
» **Focus group meetings** (pre-arranged and stakeholders invited to attend)
» One-on-one **consultation meetings** where required (for example with directly affected or surrounding landowners)
» 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.**

Networking with I&APs will continue throughout the duration of the EIA process.

3.2.5 Identification and Recording of Issues and Concerns

Issues and concerns raised by I&APs during the scoping process will be consolidated in a Comments and Response Report (to be included in the final Scoping Report for submission to DEA). The Comments and Response Report will include responses from members of the EIA project team and/or the project developer to indicate how issues will be addressed in the EIA process, or 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.

3.2.6 Evaluation of Issues Identified through the Scoping Process

Issues (both direct and indirect environmental impacts) associated with the proposed project identified within the scoping process 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	Ecology	Appendix F
Chris Van Rooyen	Avifauna	Appendix G
Outeniqua Geotechnical Services cc	Geology and erosion potential	Appendix H
Terrasoils	Soils and Agricultural potential	Appendix I
MetroGIS	Visual Impact	Appendix J
Johan Binneman	Heritage	Appendix K
MENCO (M2 Environmental Connections cc)	Review of Noise Report done by RES	Appendix L
Tony Barbour (Environmental Consultant and Researcher)	Social Impact	Appendix M

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.

Specialist Scoping Reports are contained within Appendices F - M.

3.2.7 Public Review of Draft Scoping Report and Feedback Meeting

This is the **current stage** of the Scoping Phase. The Draft Scoping Report has been made available for public review from **22 November 2010 to 10 January 2011** at the following locations:

» Humansdorp Public Library
» St Francis Bay Library
» Jeffrey's Bay Public Library
» www.savannahSA.com

In order to cater for the community of Oyster Bay, which is an area known to consist of holiday homes, the public review period had been extended over the December / holiday season to allow visitors and homeowners to have access to the report, as the owners of the homes at Oyster Bay may / may not reside permanently in the area. Therefore, an extended public review period for the draft scoping report has been allowed.

In order to facilitate comments on the Draft Scoping Report, a public meeting will be held during the review period for the Draft Scoping Report as follows:

» **Date:** 06 December 2010
» **Time:** 18:00
» **Venue:** Oyster Bay Community Hall

In addition, all registered I&APs were notified of the availability of the report and public meeting by letter (refer to Appendix E).

3.2.8 Final Scoping Report

The final stage in the Scoping Phase will entail the capturing of responses from stakeholders and I&APs on the Draft Scoping Report in order to refine this 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.

3.3 Regulatory and Legal Context

The South African energy industry is evolving rapidly, with regular changes to legislation and industry role-players. The regulatory hierarchy for an energy generation project of this nature consists of three tiers of authority who exercise control through both statutory and non-statutory instruments – that is National, Provincial and Local levels. As wind energy development is a multi-sectoral issue (encompassing economic, spatial, biophysical, and cultural dimensions) various statutory bodies are likely to be involved in the approval process for wind energy facility project and the related statutory environmental assessment process.

3.3.1. Regulatory Hierarchy

At **National Level**, the main regulatory agencies are:

» *Department of Energy:* This department is responsible for policy relating to all energy forms, including renewable energy. Wind energy is considered under the White Paper for Renewable Energy and the Department undertakes research in this regard. This department is the controlling authority in terms of the Electricity Act (Act No 41 of 1987).
» *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.
» *Department of Transport - 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 Limited (SANRAL):* This department is responsible for all National road routes.
» *Department of Agriculture:* This department is responsible for agricurlture and fishery matters.

At **Provincial Level**, the main regulatory agencies are:

» *Eastern Cape – Department of Economic Development and Environmental Affairs (DED&EA).* This department is the commenting authority for this project.
» *Department of Transport and Public Works -Eastern Cape.* This department is responsible for roads and the granting of exemption permits for the conveyance of abnormal loads on public roads.

At **Local Level** the local and municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. In the Eastern Cape, both Municipalities i.e. *Kouga Local Municipality* and District Municipalities i.e. *Cacadu Municipality* play a role.

» In terms of the Municipal Systems Act (Act No 32 of 2000) it is compulsory for all municipalities to go through an Integrated Development Planning (IDP) process to prepare a five-year strategic development plan for the area under their control.
» Bioregional planning involves the identification of priority areas for conservation and their placement within a planning framework of core, buffer and transition areas. These could include reference to visual and scenic resources and the identification of areas of special significance, together with visual guidelines for the area covered by these plans.
» By-laws and policies have been formulated by local authorities to protect visual and aesthetic resources relating to urban edge lines, scenic drives, special areas, signage, communication masts, etc.

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

3.3.2 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 Draft Scoping Report:

» National Environmental Management Act (Act No 107 of 1998)
» EIA Regulations, published under Chapter 5 of the NEMA (GN R385, GN R386 and GN R387 in Government Gazette 28753 of 21 April 2006)
» Guidelines published in terms of the NEMA EIA Regulations, in particular:
  * Guideline 3: General Guide to Environmental Impact Assessment Regulations, 2006 (DEAT, June 2006)

* Guideline 4: Public Participation in support of the Environmental Impact Assessment Regulations, 2006 (DEAT, May 2006)
* Guideline 5: Assessment of alternatives and impacts in support of the Environmental Impact Assessment Regulations, 2006 (DEAT, June 2006)

Several other Acts, standards or guidelines have also informed the project process and the scope of issues evaluated in the scoping report, and to be addressed in the EIA. A listing of relevant legislation is provided in Table 4.1. A more detailed review of legislative requirements applicable to the proposed project will be included in the EIA phase.

Table 4.1: Initial review of relevant policies, legislation, guidelines and standards applicable to the proposed Wind Energy Facility Project EIA

Legislation	Applicable Sections
National Legislation	
Constitution of the Republic of South Africa (Act No 108 of 1996)	» 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) » Access to information (S32) » Right to just administrative action (S33) » Recognition of international agreements (S231)
National Environmental Management Act (Act No 107 of 1998)	» 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 R385, 386 & 387 of 21 April 2006) (published in terms of Chapter 5), with effect from 3 July 2006 » 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

Legislation	Applicable Sections
	emergency incident which may impact on the environment (S30) » Appeals against decisions made by authorities (S43)
Environment Conservation Act (Act No 73 of 1989)	» National Noise Control Regulations (GN R154 dated 10 January 1992)
National Heritage Resources Act (Act No 25 of 1999)	» Stipulates assessment criteria and categories of heritage resources according to their significance (S7) » Provides for the protection of all archaeological and palaeontological sites, and meteorites (S35) » 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)	» 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)	» National, provincial and local ambient air quality standards (S9 - 10 & S11) » Listed Activities (S21) » Measures in respect of dust control (S32) – no regulations promulgated as yet

Legislation	Applicable Sections
	» Measures to control noise (S34) - no regulations promulgated as yet
Conservation of Agricultural Resources Act (Act No 43 of 1983)	» 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)
National Water Act (Act No 36 of 1998)	» 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)
Aviation Act (Act No 74 of 1962)	» 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
Waste Act (Act No 59 of 2008)	» Waste management measures » Regulations and schedules (Schedule A & B) » Listed activities requiring waste licenses » Waste disposal practices (S20) » Contamination
National Forests Act (Act No 84 of 1998)	» Protected trees » Conservation of forests
National Environmental Protected Areas Act (Act No 57 of 2003)	» System of protected areas in South Africa (S9 – 16) » Regulation and prohibition of activities in Protected Areas (S37, 38 & 40)
National Roads Act (Act No 7 of	» Policy concerning use and management of

Legislation	Applicable Sections
1998)	national roads
Guideline Documents	
South African National Standard (SANS) 10328, Methods for environmental noise impact assessments in terms of NEMA No. 107 of 1998	» Prediction of impact that noise emanating from a proposed development would have on occupants of surrounding land by determining the rating level. » Noise limits are based on the acceptable rating levels of ambient noise contained in SANS 10103
Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads	» 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
The White Paper on Renewable Energy (2003)	» National targets for renewable energy generation
Planning Documents	
Cacadu District Municipality Integrated Development Plan (IDP) (2007-2012)	» The Cacadu District Municipality Integrated Development Plan (IDP) (2007-2012) identifies 7 key strategic priorities based on the Medium Term Strategic Framework (MTSF) published by the National Minister of Planning as a directive to all spheres of government in July 2009.
Kouga Local Municipality Integrated Development Plan (IDP) (2007-2012)	» The Kouga Local Municipality Integrated Development Plan (IDP) (2007-2012) identifies 5 Key Priority Areas (KPA) in line with the National standards to address the municipality's development objectives: * Infrastructure and Basic Services; * Socio-economic Development; * Institutional Transformation; * Good Governance and Public Participation; * Financial viability and Management.

3.4 Assumptions and Limitations of the EIA

Wind Energy Facilities are a fairly new development in South Africa and have not been implemented on a large scale, to date. Therefore certain gaps in knowledge, assumptions and uncertainties are likely to occur during the EIA process.

In conducting this EIA process, the following general assumptions have been made:

» The selection of the proposed development site (including details pertaining to the wind resource etc.) provided by RES is sufficient and defendable.

- Only one site is available for the establishment of the proposed facility and will be considered in the EIA, and no other sites are available to be included as alternative sites in the EIA. This is based on desktop wind analysis (with specific measurements on site planned) as well as on land availability, access to the site, grid connectivity, etc.
- It is assumed that the development site identified by RES represents a technically suitable site for the establishment of a wind energy facility and associated infrastructure.
- The EIA study is conducted based on a preliminary layout of the wind energy facility that will be provided by RES during the EIA Phase.

Details of specific assumptions, limitations and/ gaps in knowledge for each of the specialist studies undertaken are discussed in each individual report and not repeated here (refer to specialist studies contained in Appendix F - M for more details).

DESCRIPTION OF THE AFFECTED ENVIRONMENT CHAPTER 4

This section of the Draft Scoping Report provides a description of the environment that may be affected by the proposed Oyster Bay Wind Energy Facility. 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 desktop studies, 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 - M.

4.1 Location of the Study Area

The study area is located slightly to the south of the N2 that links Port Elizabeth to George / Knysna. The study site is located on the coastal plains south of the Cape Fold mountains in the Humansdorp region. The site lies approximately 6 km north of Oyster Bay and falls within the Kouga Local Municipality, in the Eastern Cape Province. Other settlements in the broader region include Humansdorp (~13 km north-east of the site) and Jeffrey's Bay (~24 km east of the site). Port Elizabeth lies ~84 km east of the site.

The study area for development encompasses a surface area of approximately 23km^2. The final footprint area to be utilised for the wind energy facility will be smaller than the area under consideration, and will be dependent on the final site layout and placement of the wind turbines. However, both the construction area and the final footprint of the facility is expected to be less than 20% of the study area.

In terms of its specific location, the facility is proposed on the following farm portions:

» Portion 3 of Farm Klein Rivier 713
» Portion 1, 2 , 3, 4 and the Remainder of Farm Rebok Rant 715
» Portion 1 and 3 of Farm Ou Werf 738
» Portion 5 of Farm Klippedrift 732
» Portion 10 and Portion 12 of Farm Kruis Fontein 681.

4.2 Character of the Region

The broader study area includes small towns and built up areas, scattered farms, homesteads and significant amounts of pasture lands. Cattle and sheep farming dominate the immediate site and its surrounds; however tourism plays a role in

the coastal towns along this part of the east coast of South Africa, such as St Francis Bay and Jeffrey's Bay. The towns of Humansdorp, Kruisfontein, St Francis Bay and Oyster Bay account for the highest population concentration within the region, which has an average of 7 persons per km^2, which is fairly low and indicates a sparsely populated region. Outside of the settlements, the region has an agricultural, rural and pastoral character, with scattered farmsteads and homesteads. Industrial infrastructure includes distribution power lines, both to the north and to the east of the site as well as three distribution substations (i.e. *Diep River, St. Francis Bay* and *Melkhout*). A number of roads are found in the study area and include the N2 national road, the R62, R102, R332 and R330 arterial routes and a number of lower order (gravel) secondary roads which also traverse the site.

The coastal foreland comprises a gently undulating coastal plain deeply incised by the Tsitsikamma, Kromme, and Klip Rivers. A striking feature of the landscape is the gravelled terraces at various contour intervals (200 m, 100 m, 60 m and 30 m) which are related to a descending sequence of high sea levels (Butzer & Helgren 1972). The coastal region is dominated by rocks of the Cape Supergroup, and Table Mountain quartzites and sandstones underlie most of the area. The coast is characterised by a series of halfmoon sandy bays, Slangbaai, Thysbaai, Seal Bay and St Francis Bay, all facing eastward.

Adjacent to the coast are small dune areas. These include the well-known Geelhoutboom dunes above the Klasies River Caves, Brandewynkop and the large dune field stretching from Oyster Bay to the mouth of the Kromme River.

4.3 Land Use Protected Areas and Conservation Areas

Agricultural fields (mainly sheep and cattle farming and associated pastures) dominates the land-use character on the site itself. Isolated patches of thicket could occur on Farm Rhebok Rant area (refer to Figure 4.1).

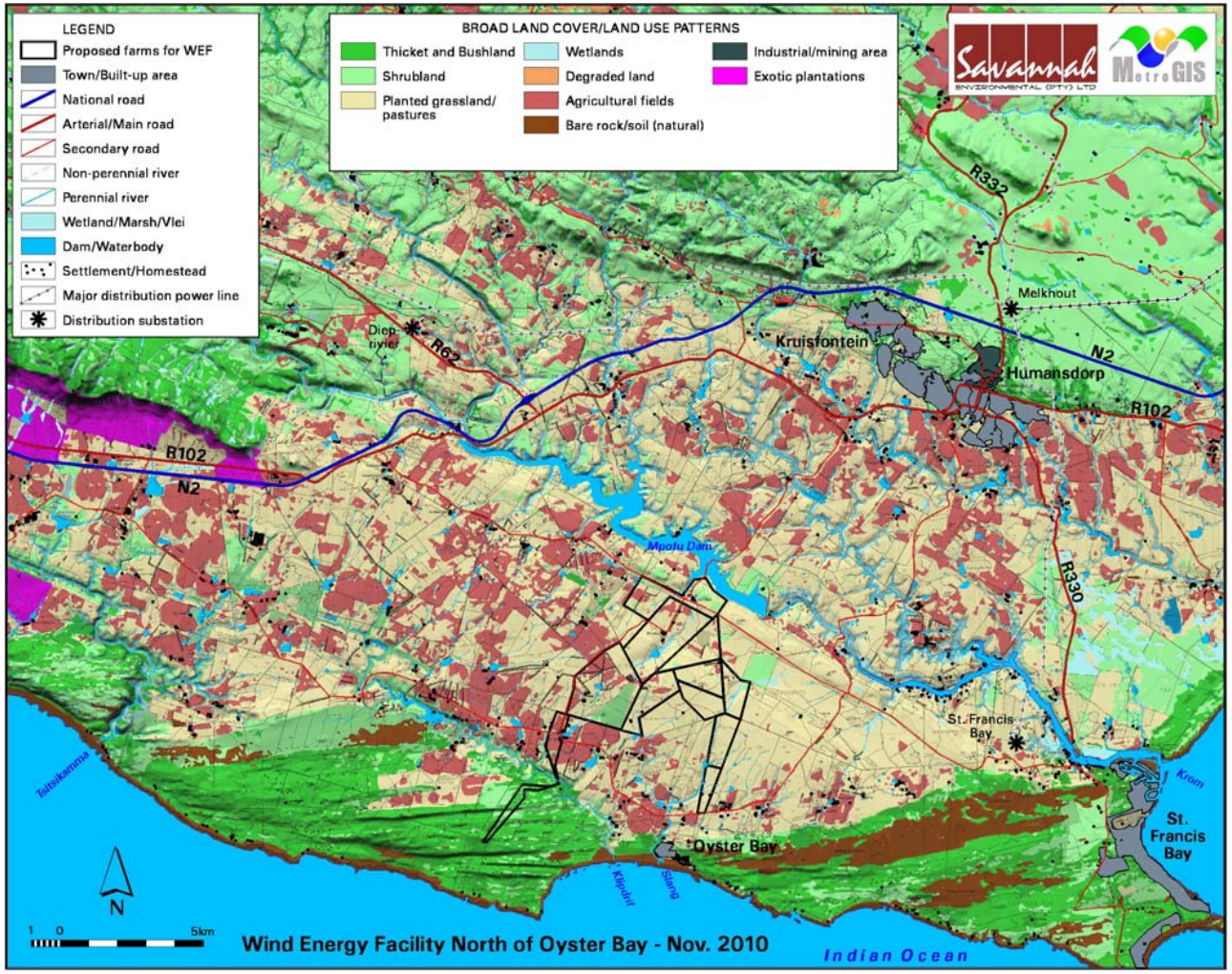

Figure 4.1: Land cover/land use map of the broader study area for the Oyster Bay Wind Energy Facility

4.4 Protected Areas in the Broader Region

Formally protected areas in the broader region include the following:

» A number of game farms including Jumanji and Thaba Manzi Game Farms (14km to the north) and Lombardini Game Farm (12km to the north east).
» The Huisklip Provincial Nature Reserve (~16km to the west).
» Private nature reserves including the Rebelsrus Private Nature Reserve (~2km east of Thyspunt) and the Eastcot Private Nature Reserve (~5km to the north east).
» National heritage sites including the Thyspunt National Heritage Site (~2km to the south east) and the Kromrivierspoort National Heritage Site (~12km to the north west).
» A number of small conservation areas are also dotted along the coastline.
» A state forest to the north-west of the site, as well as in small patches along the coastline.

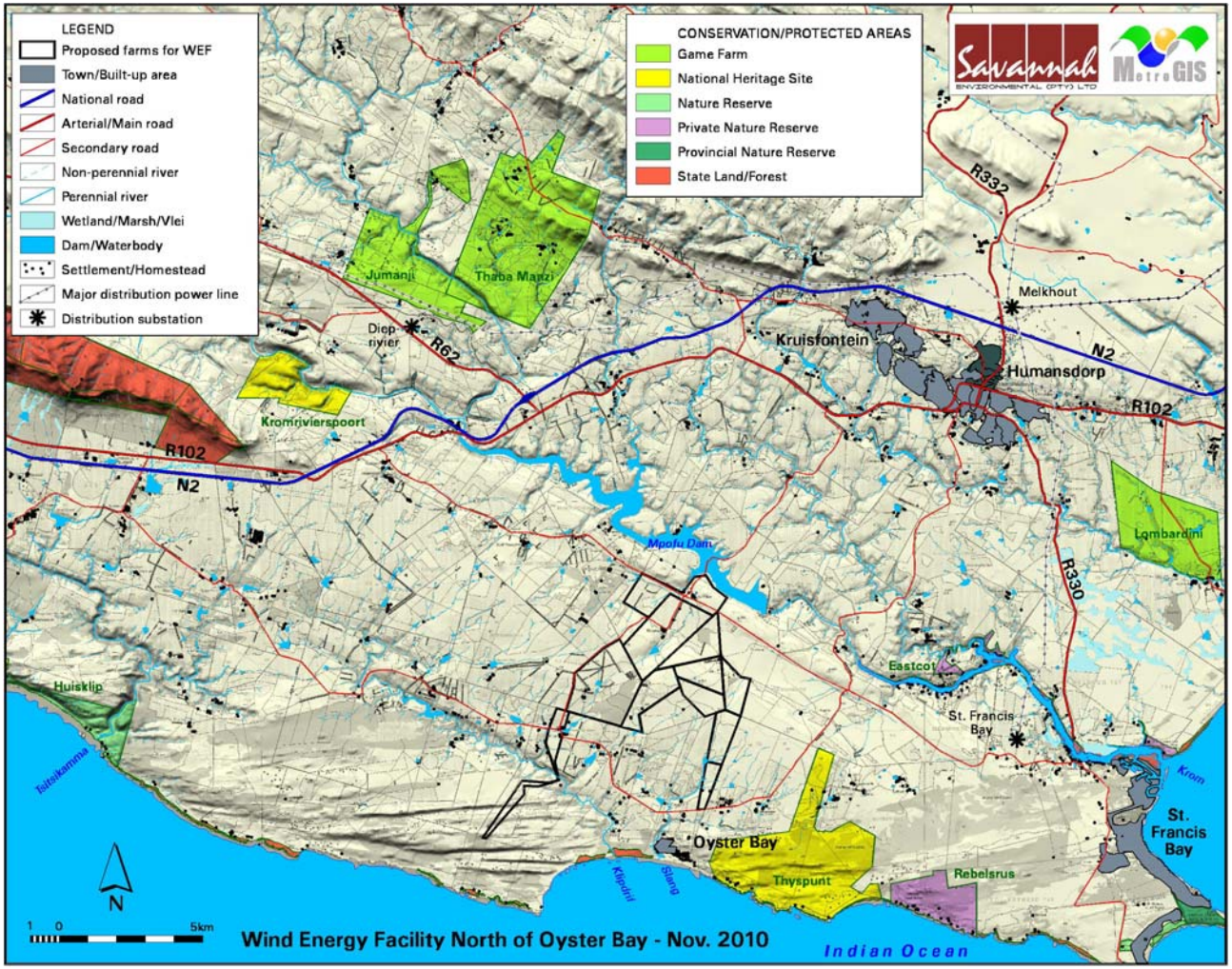

Figure 4.2: Protected areas / conservation map of the broader study area for the Oyster Bay Wind Energy Facility

4.5 Conservation Planning

There have been a number of regional conservation assessments produced within the Eastern Cape Province, including the following:

» Subtropical Thicket Ecosystem Programme (STEP)
» Succulent Karoo Ecosystems Programme (SKEP)
» National Spatial Biodiversity Assessment (NSBA)
» Eastern Cape Biodiversity Conservation Plan (ECBCP).

The ECBCP identifies Critical Biodiversity Areas (CBAs), which are terrestrial and aquatic features in the landscape that are critical for conserving biodiversity and maintaining ecosystem functioning (Berliner & Desmet 2007). The ECBCP identifies CBAs at different levels with decreasing biodiversity importance, as follows:

» PA: Protected areas.
» CBA 1: CR vegetation types and irreplaceable biodiversity areas (areas definitely required to meet conservation targets).
» CBA 2: EN vegetation types, ecological corridors, forest patches that do not fall into CBA 1, 1 km coastal buffer, irreplaceable biodiversity areas that do not fall into CBA 1.
» CBA 3: VU vegetation types.

The CBA 1 areas that fall within the study site are vegetation types of high conservation value, in this case Eastern Coastal Shale Band vegetation, classified as Endangered. The CBA 2 areas that fall within the study site are corridor areas, the forest patch and vegetation identified in the STEP project as being important (Southern Cape Dune Fynbos). The CBA 3 areas that fall within the study site are vegetation types of conservation importance (in this case Tsitsikamma Sandstone Fynbos). Despite the Oyster Bay site falling into these CBAs, it is important to note that the vegetation on the proposed development site is largely transformed due to cattle and sheep farming.

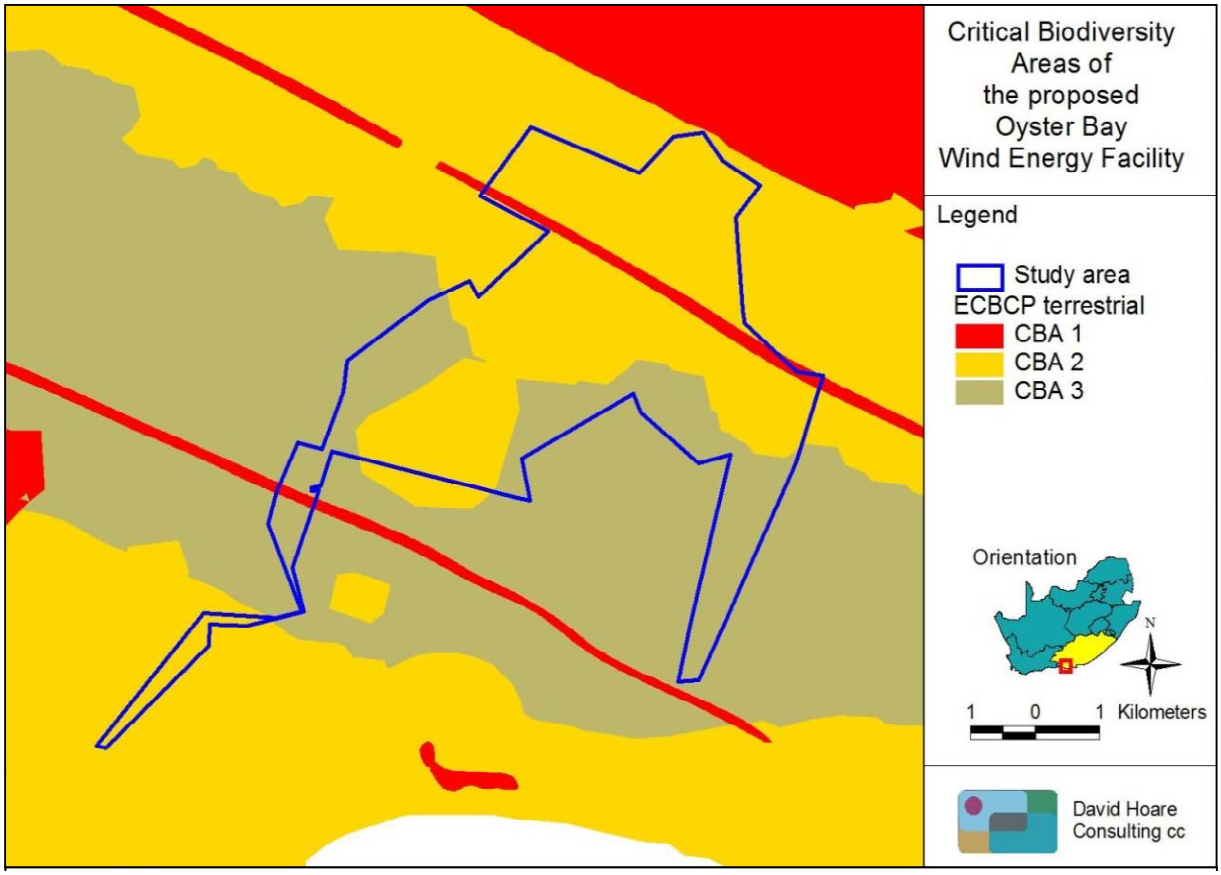

Figure 4.3: Important biodiversity areas of the study area (from ECBCP).

4.6 Climate

The Köppen-Geiger Climate Map indicates that this area falls within the marine temperate climatic region of South Africa which is characterised by frontal weather, leading to changeable, often overcast and moderate conditions. The study area has warm summers and mild winters. The average daily minima for the coldest months are above freezing. There are, on average, three days of frost per year. The proximity of the coast ameliorates all climate extremes, but the site is in the first range of low mountains inland of the coast and is therefore affected by the proximity of these mountains.

A weak bimodal pattern of rainfall exists in the study area with a slightly higher proportion of spring and autumn rainfall. Rainfall may, however, fall at any time of the year. The mean annual rainfall in the study area is estimated to be approximately 650 mm (Dent et al. 1989). In grasslands, all areas with less than 400 mm are considered to be arid grasslands.

4.7 Hydrology

The site occurs on the watershed between the Krom and Klipdrif Rivers, both of which flow into the sea relatively close to the site. There are a number of small streams dissecting the landscape. The ones in the northern part of the site drain into the Krom River and the ones in the southern two-thirds of the site drain into the Klipdrif River. The Klipdrif River flows through a small section of the southern part of the site (on Farm Klippe Drift 732). The presence of well-defined drainage lines are an indication of significant surface drainage. Directly north of the study area a large dam, the Impofu Dam, is situated within the Krom River.

4.8 Geology

The majority of the study area is underlain by Table Mountain Group rocks of the Cape Supergroup (Ordovician to Silurian age ~ 500-395Ma) which are unconformably overlain in the south-west portion of the study area by Nanaga Formation aeolian sands and aeolianite of Tertiary-Quaternary age (<65Ma). The geological sequence of the Table Mountain Group exposed in the study area consists of the basal Peninsula Formation quartzites, successively overlain by Cederberg Formation shales, Goudini Formation sandstone, Skurweberg Formation quartzites, and Baviaanskloof Formation sandstones.

The Table Mountain Group rocks are folded along a north-west to south-east trending anticline which plunges southeast, thus exposing a mirror image sequence of formations on either side of the axial plane. The rocks dip between 35 and 80°. There are no significant geological faults in the immediate vicinity of the study area and the region is considered to be seismically stable. There are no known important or interesting geological phenomena on the site.

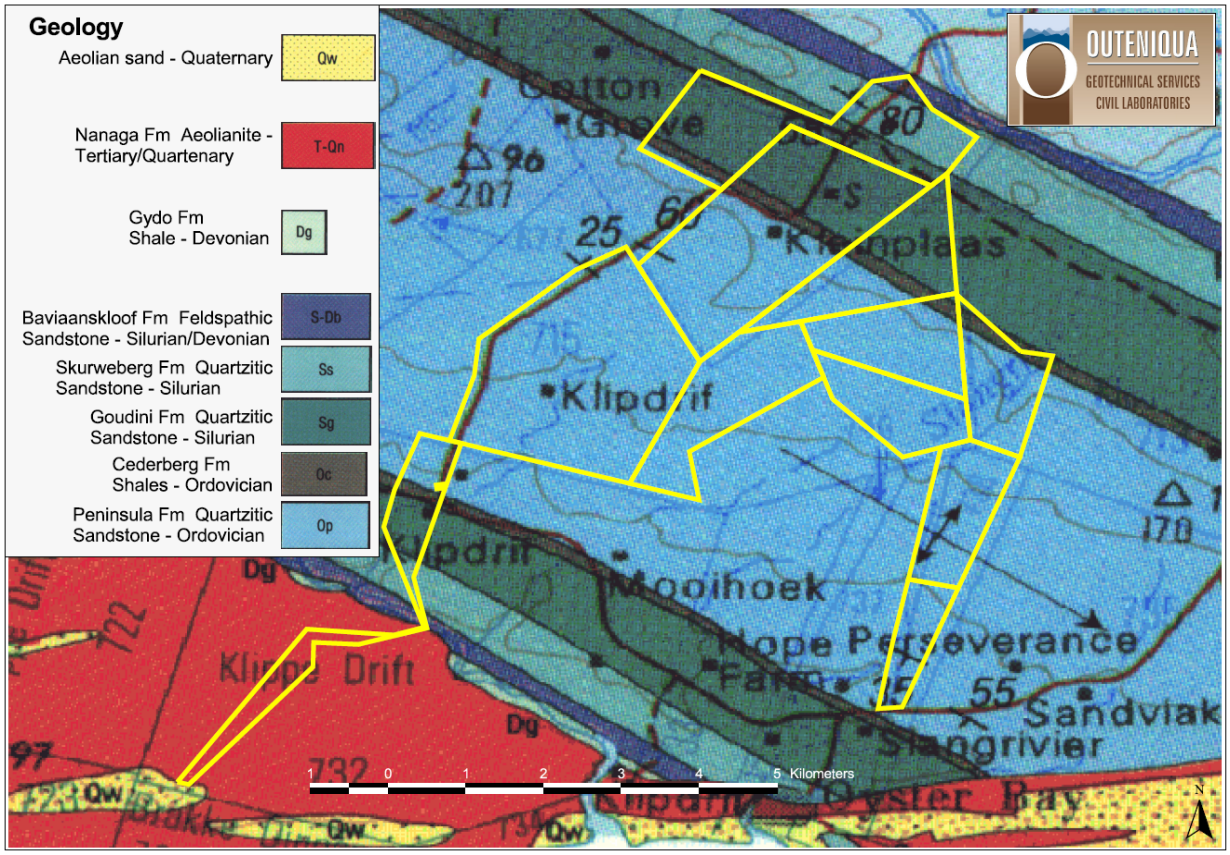

Figure 4.4: Geology of the study area

4.9 Biophysical Characteristics of the Study Area and Surrounds

4.9.1 Soils and Agricultural Potential

Soils / Land Types

The area lies predominantly in the Bb and Ha land types (Land Type Survey Staff, 1972 – 2006). The Bb land type is described as a "Pinthic catena: upland duplex and margalitic soils rare". A perfect catena is represented by (from higher to lower lying areas) Hutton, Bainsvlei, Avalon and Longlands soil forms. Gleyed soils, such as Rensburg, Willowbrook, Katspruit and Champagne soil forms, can occur in the valley bottom. Soils with hard plinthite are common in areas where sandstone underlies the area. Where water tables have not extended far beyond the valley bottom, red soils may dominate. In these cases plinthic soils are restricted to valley bottoms and pans.

The Ha land type is described as "Grey regic sands". These units accommodate areas in which deep, grey sands of the Fernwood soil form are a prominent feature. More than 80% of the Ha land type is made up of these grey and deep sands. The soils of the survey area fall into Class I, II and VI land capability. The soils of the area are mainly deep but may be difficult to cultivate owing to the

occurrence of E-horizons and podzol B-horizons. Cultivation practices would have to be managed carefully.

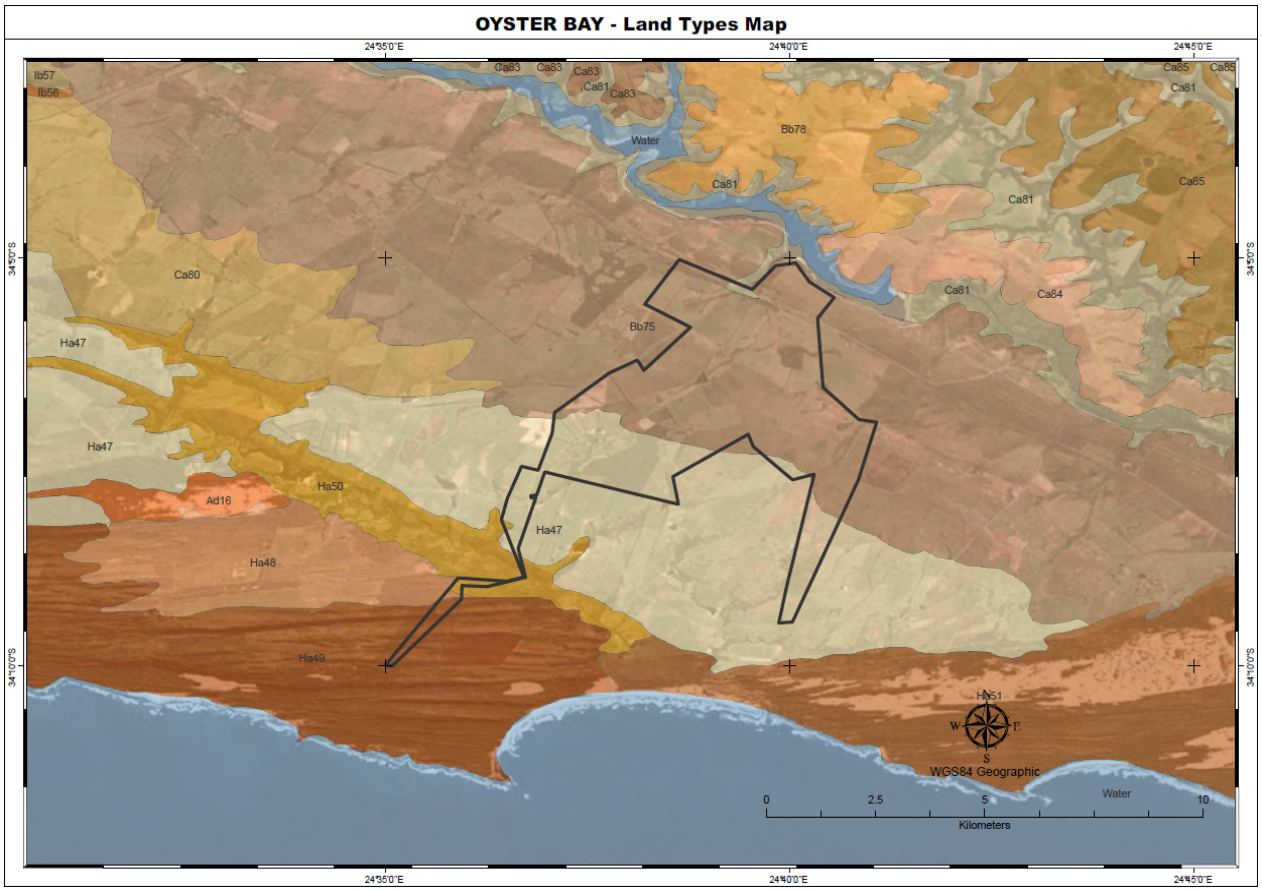

Figure 4.5 The survey area lies in the Bb and Ha land types

Agricultural Potential

Rainfall in this area is relatively high and should support dry-land agriculture, especially on soils of the Clovelly soil form. Close inspection of aerial photographs (Google Maps) indicate irrigation practices on site. The Kromriver is also situated near the site and might serve as a water source for irrigation.

The area can mainly be deemed to be of moderate to high agricultural potential. Currently, the majority of the site is used for cattle and sheep farming and pastures.

4.9.2 Vegetation

The study area occurs within the Cape Floristic Region, which is recognised as one of the principal centres of diversity and endemism in Africa (van Wyk & Smith 2001). Vegetation may be described at various hierarchical levels from Biome, to broad Vegetation Type and down to Plant Community level associated with local habitat conditions. According to this most recent vegetation map of the country,

the study area falls primarily within one main vegetation type, i.e. Tsitsikamma Sandstone Fynbos, which falls into the Fynbos Biome. There are also small areas of three other vegetation types apparently occurring on site, namely Eastern Coastal Shale Band Vegetation, Southern Afrotemperate Forest and Southern Cape Dune Fynbos as shown in Figure 4.6.

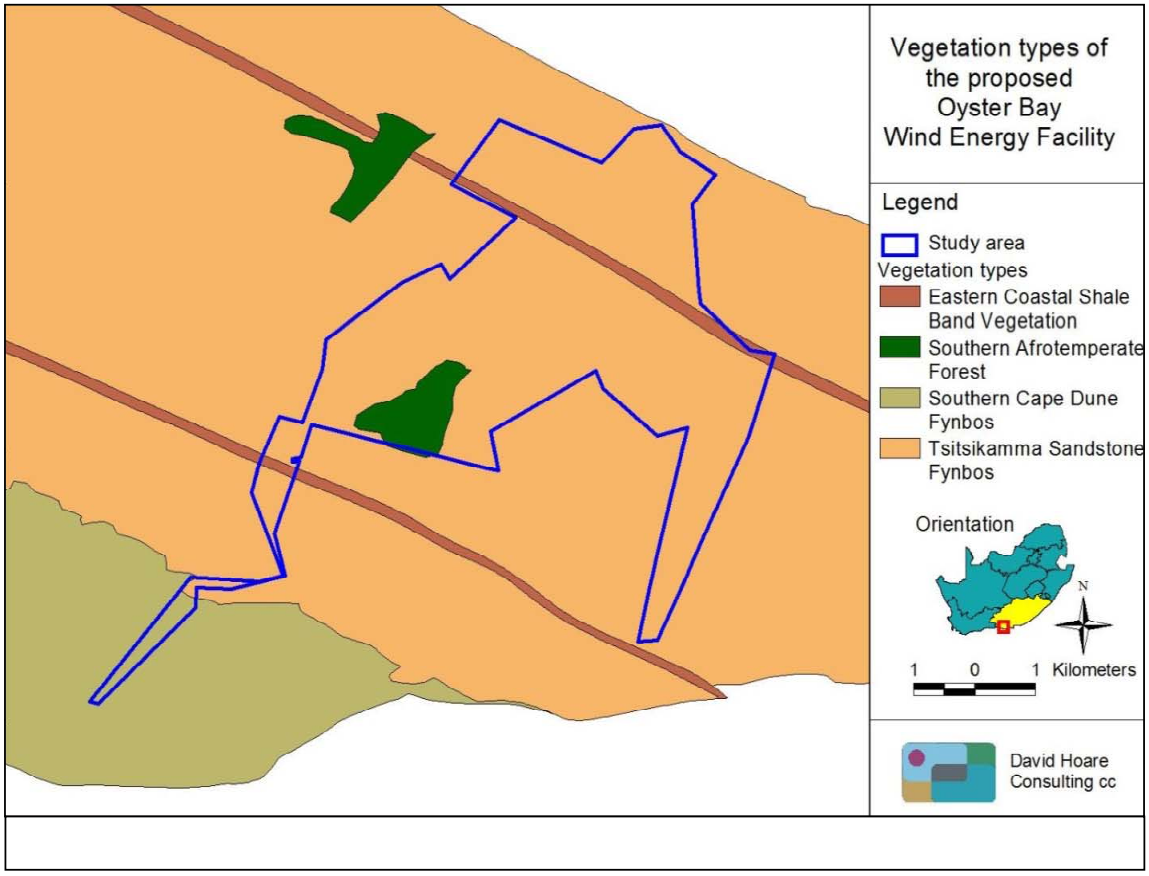

Figure 4.6: Vegetation types of the study site and surrounding areas.

» ***Tsitsikamma Sandstone Fynbos (vulnerable vegetation type) is*** found along the Tsitsikamma Mountains from Uniondale to Cape St Francis (Rebelo et al. 2006). This landscape consists of relatively low mountains with gentle to steep slopes. The vegetation type occurs on both the northern and southern slopes of the mountains. It is a medium-dense, tall proteoid shrubland over a dense, moderately tall ericoid-leaved shrubland (Rebelo et al. 2006). This vegetation type occurs throughout the site under assessment.

» ***Eastern Coastal Shale Band Vegetation (endangered vegetation type)*** occurs on the shale bands in the eastern Outeniqua, Langkloof, Tsitsikamma and Kareedouw Mountains and along the southern Cape coastal plains to around Oyster Bay (Rebelo et al. 2006). These shale bands form narrow strips 80 - 200 m wide that are smooth and relatively flat. The vegetation type ranges from thicket to renosterveld and fynbos, including all structural

types, although they are often grassy in character (Rebelo et al. 2006). This vegetation type occurs in two narrow bands through the study area, both of which appear to have been transformed by cultivation.

» ***Southern Afrotemperate Forest (least threatened vegetation type)*** occurs in Western Cape, Eastern Cape and Northern Cape, with the largest complex in the southern Cape along the narrow coastal strip between Humansdorp in the east and Mossel Bay (Mucina & Geldenhuys 2006). The vegetation type is a tall, multilayered afrotemperate forest dominated by yellowwoods (*afrocarpus falcatus* and *Podocarpus latifolius*), *Ocotea bullata*, *Olea capensis* subsp. *macrocarpa*, *Pterocelastrus tricuspidatus*, *Platylophus trifoliatus*, *Cunonia capensis*, *Heeria argentea*, *Metrosideros angustifolia*, *Podocarpus elongatus* and *Rapanea melanophloeos* (Mucina & Geldenhuys 2006). This vegetation type occurs as a patch in the central part of the site.

» ***Southern Cape Dune Fynbos (least threatened vegetation type)*** occurs in the Western and Eastern Cape from Wilderness and Buffels Bay near Knysna to Oyster Bay (Rebelo et al. 2006). The vegetation type occurs on the coastal dune cordons, often with steep slopes. It is a fynbos heath vegetation dominated by sclerophyllous shrubs with a rich restio undergrowth (Rebelo et al. 2006). This vegetation type occurs in the extreme southern part of the site.

4.9.3 Plant Species of Conservation Concern

Lists of plant species previously recorded in the quarter degree grids in which the study area is situated were obtained from the South African National Biodiversity Institute (these are listed in Appendix 1 of the Ecology Report – Appendix F). Additional species that could occur in similar habitats, as determined from database searches and literature sources, but have not been recorded in these grids are also listed. The species on this list were evaluated to determine the likelihood of any of them occurring on site. Of the species that are considered to occur within the geographical area under consideration, there were ten species recorded in the quarter degree grid in which the study area is located that are listed on the Red List that could occur in habitats that are available in the study area. According to IUCN Ver. 3.1 (IUCN, 2001) two of these are listed as Endangered, six as Vulnerable and two as Near Threatened. All except two of these species are highly likely to occur on site. The site is at the locality where the species have been previously recorded or the species have been recorded just adjacent to the site in similar habitats. The plant species / taxa of conservation concern include:

» *Osteospermum pterigoideum*
» *Gasteria nitida var. armstrongii*

» *Dioscorea elephantipes*
» *Erica glumiflora*
» *Erica zeyheriana*
» *Pauridia minuta*
» *Bobartia macrocarpa*
» *Rapanea gilliana*
» *Disa lugens var. lugens*
» *Satyrium princeps*
» *Pentaschistis longipes*
» *Protea coronata*
» *Selago rotundifolia*

4.9.4 Terrestrial Fauna

All Red List vertebrates (mammals, reptiles, amphibians, fish) that could occur in the study area are listed in Appendix 2 of the Ecology Report – Appendix F. Those vertebrate species with a geographical distribution that includes the study area and habitat preference that includes habitats available in the study area are discussed further. There are a number of mammal species of conservation concern that have a distribution that coincides with the study area. Only four of these are considered to have a possibility of occurring on site as a result of habitats available, i.e. the Brown Hyaena, the Fynbos golden mole and the Natal Long-fingered Bat, all listed as Near Threatened, and Duthie's Golden Mole, listed as vulnerable.

There are two reptile and no amphibian species of conservation concern that have a distribution that includes the study area and which could occur on site. The two reptile species are the Spotted Rock Snake (Rare) and the Yellow-bellied House Snake (Near Threatened). There are therefore no threatened (CR, EN or VU) reptiles or amphibian species that are likely to occur on site.

4.9.5 Protected Trees

Tree species protected under the National Forest Act are listed in Appendix 3 of the Ecology Report (Appendix F). Those that have a geographical distribution that includes the study area are *Curtisia dentata, Ocotea bullata, Pittosporum viridiflorum, Podocarpus falcatus, Podocarpus latifolius and Sideroxylon inerme* subsp. *inerme*.

Ocotea bullata occurs in montane forest. *Pittosporum viridiflorum* occurs along forest margins, in bush-clumps and in bushveld, often in rocky outcrops. *Podocarpus falcatus* is found in Afromontane forest. *Podocarpus latifolius* is found in coastal and Afromontane forest. *Sideroxylon inerme* subsp. *inerme* usually only

occurs in coastal areas, in dune thicket and forest, but may also occur on termitaria in bushveld.

Based on habitat preferences, any of these species could occur on or near the site. *Sideroxylon inerme* subsp. *inerme*, *Pittosporum viridiflorum*, *Podocarpus falcatus* and *Podocarpus latifolius* have been previously recorded in the grid in which the study site is located, as well as surrounding grids. If any of these species occur in the study area, the most likely places would be in the thicket in the drainage lines or in woodland or forest patches.

4.9.5 Avifauna

A total of 48 priority species potentially occurring in the study area were identified and are included within the Avifauna study (Appendix G). The proposed development site is situated within the Fynbos biome (Harrison *et.al*. 1997), which is characterised by a high diversity in plant species composition and endemism. This diversity is not paralleled in its avifaunal composition, and Fynbos is regarded as relatively poor in avifaunal diversity compared to other southern African biomes. The endemic Fynbos avifauna consists of the Cape Rockjumper (*Chaetops frenatus*), Victorin's Warbler (*Cryptillas victorini*), Cape Sugarbird (*Promerops cafer*), Orange-breasted Sunbird (*Anthobaphes violacea*), Protea Seedeater (*Crithagra leucopterus*) and Cape Siskin (*Crithagra totta*). The Black Harrier (*Circus maurus*), a southern African endemic, also uses the Fynbos biome extensively for breeding. In the study area, these endemics are either absent or very sparsely distributed. There are however populations of priority species which are not restricted to the Fynbos biome.

Micro habitats identified for this study area are described below. This should not be seen as exhaustive as additional micro-habitat might be identified during future field work:

» **Irrigated pastures:** The study area contains extensive cultivated pastures, most of which are irrigated. The area's most important economic activity is dairy farming, and the pastures have replaced most of the indigenous Fynbos, especially along the coastal flats. The pastures are important for several priority species such as Blue Crane (*Anthropoides paradiseus*), Black-winged Lapwing (*Vanellus melanopterus*) and Denham's Bustard (*Neotis denhami*) (see Table 1). In the summer months, large flocks of White Storks (*Ciconia ciconia*) frequent the pastures. Irrigated pastures are present on the farm Klippedrift 732/5, as well as on properties south of the study area.

» **Fynbos:** The remaining areas of Fynbos are of importance for priority species such as Secretarybird (*Sagittarius serpentarius*), Denham's Bustard, Black Harrier, Rock Kestrel (*Falco rupicolus*), Jackal Buzzard (*Buteo rufofuscus*) and

Steppe Buzzard (*Buteo vulpinus*) . Other species that are likely to be encountered here are Helmeted Guineafowl (*Numida meleagris*) and Red-necked Spur-fowl (*Phalaropus lobatus*) and, in degraded areas, Crowned Lapwing (*Vanellus coronatus*) and Spotted Thick-knee (*Burhinus capensis*). There are extensive remaining areas of Fynbos in the study area, especially on the farms Klippedrift 732/5 and Ou Werf 738/1 and 2.

» **Old lands and dry land pastures:** There are several areas in the study area where the original Fynbos vegetation was cleared when agriculture was practiced at some stage in the past (mostly wheat farming). These areas are now reverting back to a form of grassy Fynbos, which constitutes ideal habitat for Blue Crane, Denham's Bustard and Secretarybird. Some of the old lands have been planted with indigenous grasses which are intermingling with indigenous Fynbos. These areas are also very suitable for the species mentioned above, as well as foraging Black Harrier and White-bellied Korhaan (*Eupodotis senegalensis*). Raptors such as Lanner Falcon (*Falco biarmicus*) will also hunt for birds in the cleared areas. Old lands are present on several of the properties in the study area.

» **Dams:** The area contains several dams and water bodies, mostly man made but some also natural and seasonal. These dams and pans, depending on the shape, can be important for some bird species. Dams with shallow sloping sides are suitable for a wider range of species. In the context of this study, shallow dams with sloping sides are important roost sites for Blue Cranes and White Storks. These dams will also be frequented by a variety of waders, ducks and flamingos, most of which are priority species.Directly north of the study area a large dam, the Impofu Dam, is situated in the Krom River. Dams are present on several properties, with large dams on Rebok Rant 715 and Kruis Fontein 681/12. Several dams are also present on adjoining properties south of the study area.

» **Wetlands:** There are many wetlands in the study area, which may be of importance to a variety of priority species, including Blue Crane and African Marsh Harrier (*Circus ranivorus*). Prominent wetlands are present on Kruis Fontein 681/10 and 12, and Klein River 713/3.

4.10 Social Characteristics of the Study Area and Surrounds

4.10.1. Municipal and Administrative Context

The study area is located within the Kouga Local Municipality (KLM) (EC108). The KLM is one of ten Category-B Municipality[5] that constitute the Cacadu District Municipality (CDM) (DC10). The municipality is approximately 2 419 km² in size (~4% of the greater Cacadu District Municipality) and is bordered in the north by the Sundays River and Baviaans Local Municipalities, in the east by the Nelson Mandela Metropolitan area (Port Elizabeth), in the south by the Indian Ocean and in the west by the Kou-Kamma Local Municipality. Jeffery's Bay is the seat of the KLM. Major towns in the KLM include Jeffrey's Bay, St Francis Bay and Humansdorp. Smaller settlements include Hankey, Patensie, and Oyster Bay. Other settlements in the Kouga region include, Andrieskraal, Aston Bay, Centerton, Gamtoos Mouth, Kruisfontein, Kwanomzamo, Loerie, Ocean View, Oyster Bay, Paradise Beach, Pellsrus, Ramaphoza Village, Sea Vista, Thornhill, Tokyo Sexwale, Umzamowethu and Weston. .

The KLM is comprised of 10 wards. The proposed site is located in Ward 1. Ward 1 also includes Oyster Bay and St. Francis Bay. Jeffery's Bay is located in ward 3 while Humansdorp is located in Ward 5.

4.10.2 Dominant Economic Sectors

The KLM had the second largest economy in the CDM (after the Makana Local Municipality). The largest sectors, according to the 2001 Census, were Agriculture, forestry and Fishing (8.6%), Community Services (7.7%), Wholesale & Retail trade (4%); Construction (2.8%), Manufacturing (1.8%) and Business services (1.5%) with a relatively smaller contribution from the Transport and Communications (0.5%). In 2001, 73% was ascribed to an Undetermined sector. However, taking into account the employment figures below, it is assumed that the relative contributions of the sectors described above are higher than indicated in the 2001 Census.

The largest sectors in terms of employment within the KLM in 2001 were Agriculture, Forestry & Fishing (~20.1%), Community Service (~20%), Trade (~15%), Manufacturing (~12%), Finance (~15%) and construction (~8%). Major employers in the KLM are the game (hunting), tourism, deciduous fruit and dairy industries.

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

4.10.3 Population

The Cacadu District's total population projection for 2006 was estimated at 6 527 747 people, with the KLM accounting for 18 % (73 274) of this figure (Community Survey, 2007). The average annual growth rate within the KLM is ~2.4% (Kouga Local Municipality IDP, 2007-2012).

In 2001, just under half of the population was classified as Coloured (47.7%) followed by Black African (33.4%) and White (18.7). These demographics are reflected in the dominant languages within the Municipality, with 64.9% of the population Afrikaans speaking, 29% isiXhosa speaking and 4.9% English speaking. The KLM IDP (2007-2012) indicates that the Municipality's population is highly urbanised, with more than 70% of its households located in urban areas.

According to Census 2001 data, the total population of Ward 1 (within which the site falls under) was 4 967. More recent data could not be sourced, but it is assumed that the population would have increased given the positive population growth rate (2.5%) for the region between 1996 & 2010 noted in the Kouga IDP (2007-2012).

4.10.4 Education Levels

According to 2001 Census data, approximately 18% (corresponding to an absolute total of 657 people) of the population of Ward 1 aged 15 and older were estimated to be functionally illiterate/ innumerate in 2001. Given the strong correlation between education and skills levels it may be assumed that a significant portion of the study area's working age population have only sufficient skills for elementary jobs. Ward 1, however, does show more skilled labour as reflected in the fact that 29% of the population have a Std 10/Grade 12 qualification and ~18% have a tertiary level of education. It is unknown whether this portion of the population is made up of permanent residents in the area since the KLM has a high seasonal/holiday population.

4.10.5 Employment

The employment statistics presented indicate that approximately 53% of the population of Ward 1 was employed in 2001. The unemployment rate was relatively low with respect to the provincial and national and averages, estimated at ~10% as opposed to the provincial average of ~32% (Eastern Cape State of the Environment Report, 2004).

4.11 Heritage Profile

The archaeology of the coastal zone of the Oyster Bay site (5 km inland from the coast) is well-known and has been investigated in some detail by archaeologist Johan Binneman in the past. Heritage practitioners also conducted surveys along the adjacent coast for the proposed Eskom Nuclear Power Station at Thyspunt. These studies indicate that the coastal zone from the Klasies River in the west to the Krom River in the east is one of the richest and most important archaeological cultural landscapes in South Africa. Little, however, is known about the archaeology of the adjacent inland area, mainly because no systematic research has been conducted within the area proposed for development. However, the wider region is rich in archaeological sites, and similar sites and materials may be found on the proposed site for development. This may include stone tools dating to 1,5 million years old, fossil bone and stone tools from the past 120 000 years, campsites and material from San and KhoiSan people dating from past the 10 000 years and human remains. There are steep valleys which may house small shelters/caves where possible archaeological deposits and/or rock paintings may be found (see Appendix 1 of the Heritage Study for a list of possible archaeological sites that maybe found in the area - Appendix K).

Adjacent to the coast are small dune areas, remnants of a far larger system in the past. These include the well-known Geelhoutboom dunes above the Klasies River Caves, Brandewynkop and the large dune field stretching from Oyster Bay to the mouth of the Kromme River. The latter is an extensive dune field of parallel longitudinal dunes which run in the direction of the prevailing winds (west to east), and are referred to as hairpin dunes (Tinley 1985). These large shifting sand dunes are underlain by ferricretes, calcretes and fossilized dune sands which are situated on top of Table Mountain Sandstones. Due to the continuous movement of the dunes, many archaeological and palaeontological sites are exposed all the time while simultaneously others are covered. Apart from shell middens, all the other archaeological sites mentioned above may occur in the inland areas. There is also a possibility of encountering painted rock shelters and caves within the river valleys.

SCOPING OF ISSUES ASSOCIATED WITH THE OYSTER BAY WIND ENERGY FACILITY CHAPTER 5

The potential impacts of the construction and operational phases for development of the proposed wind energy facility is described and evaluated in this chapter. This chapter serves to describe and evaluate the identified potential environmental impacts associated with the wind energy facility project, and to make recommendations for further studies required to be undertaken in the EIA phase. The scoping process has involved input from specialist consultants, the project proponent, stakeholders and the public. Specialist scoping reports are included within Appendix F to M.

Environmental issues associated with **construction and decommissioning** activities may include, among others, noise impacts, soil erosion, and impacts on ecology.

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

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

Table 5.1 and Table 5.2 provide a summary of the findings of the scoping study undertaken for the construction and operation phases of the proposed project respectively. Impacts of the proposed wind energy facility are evaluated, and recommendations are made regarding further studies required within the EIA phase of the process.

In identifying and evaluating impacts associated with the proposed project, it has been assumed that during the **operational phase** the area affected will be limited and comprise up to 80 turbines (with a hub height of up to 120m each), access roads, a substation and power line footprint. During **construction,** an area within the approximately 2300ha area being considered for the wind energy facility footprint could suffer some level of disturbance and impact as a result of the required activities on site. However, once construction is complete, less than 10% of this area will be permanently impacted by infrastructure associated with the wind energy facility.

The **cumulative impacts** associated with the proposed wind energy facility are expected to be associated with the scale of the project, i.e. up to a maximum of 80 turbines will be located on the proposed site. The potential direct cumulative impacts associated with the project are expected to be associated predominantly with the potential visual impact, potential noise impacts and potential impacts on avifauna (birds) and bats 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. There are no existing wind energy facilities in the study area. There are number of other wind energy facilities being proposed in the Kouga Local Municipality of the Cacadu District. These include the Jeffrey's Bay wind project at Jeffrey's Bay, Redcap Investments project, Zuurbron project, Broadlands project, and the proposed Deep River wind energy facility near Humansdorp.

Table 5.1: Evaluation of potential impacts associated with the **construction phase** of the proposed Oyster Bay wind energy facility

Potential Visual Impacts:

The number of observers and their perception of a structure determine the concept of visual impact. If there are no observers or if the visual perception of the structure is favourable to all the observers, there would be no visual impact.

It is necessary to identify areas of high viewer incidence and to classify certain areas according to the observer's visual sensitivity towards the proposed wind energy facility and its related infrastructure. It would be impossible not to generalise the viewer incidence and sensitivity to some degree, as there are many variables when trying to determine the perception of the observer; regularity of sighting, cultural background, state of mind, purpose of sighting, etc. which would create a myriad of options.

Issue	Nature of Impact	Extent of Impact	'No go' areas
The potential visual impact of the construction of the wind turbines and ancillary infrastructure.	Construction of the wind turbines, substation at the facility, associated power lines and internal access roads could cause an impact on observers residing in close proximity of the facility and road users	Local	None.

Gaps in knowledge & recommendations for further study:

» Visual impacts during the construction phase are expected to be limited to the site and of short duration. These impacts are therefore not expected to be of significance and will not require detailed assessment in the EIA phase.

Potential Impacts on Geology and Soils

The proposed activity may have certain impacts on the geological environment. However, this will be confined to the extent of the construction footprint of the site. The geological environment includes the parent rock and the soil overburden. Important or prominent geological features (geosites) that contribute to the aesthetic scenery or geological interest in the area, such as fossil sites, prominent rock outcrops or features must also be considered in the impact study. Geological features, such as caves, middens, fossils etc. which are important from historical, cultural, archaeological or religious heritage standpoint will be covered the heritage study. There are no significant geological faults in the immediate vicinity of the study area and the region is considered to be seismically stable.

The study area drains into tributaries of the Klipdrif and Krom Rivers. The presence of well-defined drainage lines on the site are an indication of significant

surface drainage. The amount of surface run-off has implications for water erosion potential.

The degradation of the natural soil, in various manners, is the main geological impact associated with the proposed activity. However, these impacts can be mitigated to acceptable levels. Erosion sensitivity is higher in areas underlain by thick accumulations of unconsolidated, fine-grained soils of low-plasticity occur, such as colluvium or topsoil and Quaternary sand deposits such as the Nanaga Formation. Erosion sensitivity is higher on steep slopes or at the base of steep slopes where hydraulic energy of run-off is higher. The Erosion Index for South Africa indicates that the site is located within an area that is ranked between 11 and 15 (on a scale from 1 (highest potential) to 19 (lowest)). This means that the erosion sensitivity is moderate to low. This indication is primarily based on terrain and geology. It is estimated that 90% of the study area is underlain by soils with a low to moderate sensitivity to erosion. However, moderate to high erosion sensitivity is anticipated in areas underlain by Nanaga Formation, which occurs on Portion 5 of Farm Klippedrift 732.

Issue	Nature of Impact	Extent of Impact	'No go' areas
Soil removal could affect the parent rock material on the site.	Removal of soil due to excavations for foundations, underground services and access roads.	Local	None.
Soil alteration	Alteration of soil texture, density, structure and chemistry due to soil mixing, wetting, stockpiling and compaction	Local	None.
Soil pollution	Pollution of in situ soil due to spillage of hazardous substances such as fuel, oil and cement.	Local	None.
Soil erosion could cause change in the geomorphology for the site.	Loss of soil by water or wind erosion.	Local	None, however drainage lines require further investigation and could be soil erosion "hot spots" as well as parts of the site underlain by the Nanaga formation (such as Portion 5 of Farm Klippedrift 732).
Indirect impact by siltation downstream/ downwind of the site.	Alteration of soil processes due to abnormal siltation arising from accelerated erosion.	Regional	None.

Gaps in knowledge & recommendations for further study:

» A basic geotechnical engineering assessment of the site should be undertaken in the EIA phase to determine the constraints on the development which may affect the positioning of the facility.
» Conduct a site visit to confirm the physical and geological information and to collect visual information pertaining to the soil types and their geotechnical engineering properties.

Potential Impacts Agricultural Potential and Land Capability

The site can vary between moderate to high agricultural potential. The soils of the area are mainly deep but may be difficult to cultivate owing to the occurrence of E-horizons and podzol B-horizons. Rainfall in this area is relatively high and should support dry-land agriculture, especially on the soils of the Clovelly soil form. Close inspection of aerial photographs (Google Earth) indicate irrigation practices. The Krom River is also situated near the site and could serve as a potential water source.

The soils of the survey area fall into Class I, II and VI. These are defined as:

» Class I: Land with few or no limitations or hazards. With good management this class is suitable for long, continued cropping with no, or minimal, conservation practices.
» Class II: Land subject to certain limitations or hazards. It is suitable for cropping with adequate protection measures, which may sometimes include special management practices and regular rotations.
» Class VI: Land which has such severe soil and/or slope limitations that cropping must be excluded, but which is productive under perennial vegetation, but is susceptible to moderate erosion.

Note that the footprint of the wind energy facility is limited to less than 10% of the site, and that existing land use on the site man continue in areas where infrastructure will not occur during construction.

Issue	Nature of Impact	Extent of Impact	'No go' areas
Compaction, stripping and stockpiling of soil usually result in: » Loss of the original spatial distribution of natural soil forms and horizon sequences. » Loss of natural topography and drainage pattern.	The nature of the impact on soils includes the compaction and possibly the stripping and stockpiling of soil for construction purposes. Heavy machinery traffic on the soil surface could constitute further impacts on soil, resulting in impacts on agricultural potential.	Local (site only)	None.

» Loss of original soil depth and soil volume. » Loss of original fertility and organic carbon content. » Soil compaction will adversely affect root development, effective soil depth and general soil fertility (in certain instances extensive surface crusting can occur that has a negative impact on re-vegetation efforts).			

Gaps in knowledge & recommendations for further study:

» A further study and investigation into the impact of the wind energy facility on agricultural potential or land-use / land capability will be done, taking into consideration the "draft" guidelines for wind energy facilities developed by the Department of Agriculture. .

Impacts on Avifauna (birds)

During construction of the wind energy facility, there could be an impact on the birds such as habitat loss, habitat destruction, disturbance and displacement of bird species, which could be caused by activities such clearing of the turbine foundations and access road and excavations. Avian microhabitats are likely to occur near irrigated pastures, remaining areas of Fynbos, old lands and dry land pastures, farm dams, wetlands and rivers (such as the Klipdrift River).

The study area could support more than 48 priority bird species. It can be reasonably inferred that sensitive species such as White-bellied Korhaan, Denham's Bustard and Blue Crane could be affected by the noise (and the movement) of the construction of the turbines.

Issue	Nature of Impact	Extent of Impact	'No go' areas
Changes/loss of avifauna habitat.	Construction of the wind turbines, substation at the facility, associated power lines and internal access roads would result in an impact on habitats occurring on the site.	Local	No specific 'no go' areas have been identified at this stage though this will be investigated further during the EIA phase.
Temporary to long-term displacement of avifauna due to disturbance.	Displacement may occur during both the construction (and operational) phase of the wind energy facility, and would be caused by the construction of the	Local: The scale and degree of disturbance will vary according to site- and species-specific	No specific 'no go' areas have been identified at this stage though this will be

	turbines and associated infrastructure (including noise and vibration impacts), or as a result of vehicle and personnel movements on the site. Unfortunately, few studies of displacement due to disturbance are conclusive, often because of the lack of before-and-after and control-impact (BACI) assessments.	factors and must be assessed on a site-by-site basis.	investigated further during the EIA phase.

Gaps in knowledge & recommendations for further study:

» It is not possible at this stage to determine with confidence the relative significance of the various potential impacts on avifauna, mainly because too little information is available on the relative abundance and movements of local populations of the implicated bird species.
» The significance of impacts will be investigated in more detail during the EIA phase after spending time at the site.

Potential Impacts on Ecology

A number of direct risks to ecosystems would result from construction of the proposed wind energy facility, as follows:

» Clearing of land for construction
» Construction of access roads
» 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

Areas of ecological sensitivity are shown in Figure 5.1.

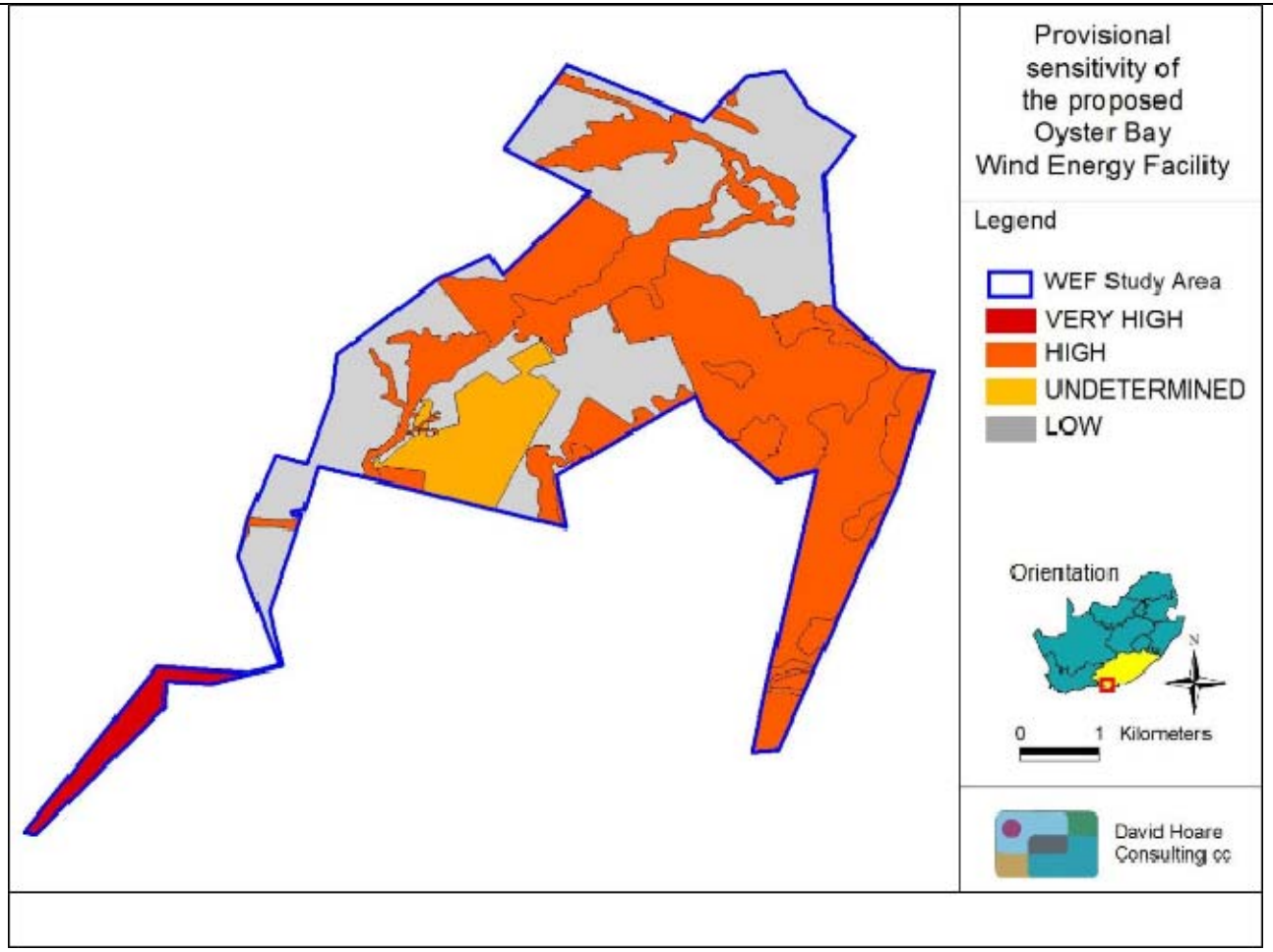

Figure 5.1: Preliminary ecological sensitivity within different parts of the Oyster Bay study area

The preliminary ecological sensitivity assessment identifies at a high (regional) level those parts of the study area that have high conservation value, or that may be sensitive to disturbance. Areas containing untransformed natural vegetation, high diversity or habitat complexity, Red List organisms or systems vital to sustaining ecological functions are considered sensitive. In contrast, any transformed area that has no importance for the functioning of ecosystems is considered to have low sensitivity. There are a number of features that need to be taken into account in order to evaluate sensitivity in the study area.

These include the following:

» vegetation of conservation importance: this is based primarily on the ECBCP assessment , the Draft Ecosystem List and the fact that the site falls within the Cape Floristic Region.
» perennial and non-perennial rivers and streams (such as the Krom River and Klipedrift River) and wetlands: this represents a number of ecological processes including groundwater dynamics, hydrological processes, nutrient cycling and wildlife dispersal.
» potential occurrence of populations of Red List organisms, including flora and fauna that have been evaluated as having a high chance of occurring within remaining natural habitats within the study area (as listed in the Ecology report – See Appendix F).
» estuaries and estuarine habitats that occur off-site, but which may be affected by activities on site.

It has been evaluated that:

» there are three mammal species of conservation concern that could potentially be affected by the proposed wind energy facility, i.e. the Brown Hyaena and the Fynbos Golden Mole, listed as Near Threatened, and Duthie's Golden Mole, listed as Vulnerable. In addition, there is one near threatened reptile species that has a distribution that includes the study area and which could occur on site, i.e. the Yellow-bellied House Snake.
» There are eight Red List plant species that have a geographic distribution that includes the site and which have a high chance of occurring in the study area. This includes two species classified as Endangered, five as Vulnerable and one as Near Threatened. There is also one Vulnerable species and one Near Threatened species that have a medium probability of occurring on site. Most of the species that have a high probability of occurring on site would probably occur within the dune habitat in the southern part of the site – Farm Klippedrift.
» There are a number of protected tree species that have a geographic distribution that includes the study area appear on this list, including the following: *Curtisia dentata, Ocotea bullata, Pittosporum viridiflorum, Podocarpus falcatus, Podocarpus latifolius and Sideroxylon inerme* subsp. *inerme*. They all occur primarily in forest or woodland habitat or in drainage lines. Based on the assessment of available habitat, *Sideroxylon inerme* is considered to be highly likely to occur on site and the remaining species could occur on site.
» The site contains a number of streams and drainage lines in which wetlands occur. More importantly, one of the major wetland systems on site constitutes part of the catchment for two estuaries on the coast downstream of the site (the Klipdrif and Krom River estuaries).

Issue	**Nature of Impact**	**Extent of Impact**	**'No go' areas**
Impacts on biodiversity includes any impacts on populations of individual species of concern (flora and fauna), including protected species, and on overall species richness. This includes impacts on genetic variability, population dynamics, overall species existence or health and on habitats important for species of concern.	This impact could result from the excavation of the turbine foundations and access roads.	Local to regional.	No 'no-go" areas have been identified, however sensitive areas of high ecological sensitivity have been identified as shown in Figure 5.1.

Impacts on sensitive habitats includes impacts on any sensitive or protected habitats, including, for example, indigenous forest, thicket and wetland vegetation, that leads to direct or indirect loss of such habitat.	This impact could result from establishment of laydown areas; cabling; disturbance around turbines; power line connection and installation.	Local	No 'no-go" areas have been identified, however sensitive areas of high ecological sensitivity have been identified as shown in Figure 5.1.
Impacts on ecosystem function include impacts on any processes or factors that maintain ecosystem health and character.	Construction activities.	Local to regional.	No 'no-go" areas have been identified, however sensitive areas of high ecological sensitivity have been identified as shown in Figure 5.1.

Gaps in knowledge & recommendations for further study:

» Impacts on vegetation will be assessed in terms of the EIA Regulations as well as all other relevant guidelines and legislation.
» The ecological sensitivity of the site will be ground-truthed during field surveys.

Potential impacts on Heritage Resources

Little is known about the archaeology of the site, mainly because no systematic research has been conducted within the area proposed for development. However, the wider region is rich in archaeological sites, and similar sites and materials may be found on the proposed site for development. This may include stone tools dating to 1,5 million years old, fossil bone and stone tools from the past 120 000 years, campsites and material from San and KhoiSan people dating from past the 10 000 years and human remains. There are steep valleys which may house small shelters/caves where possible archaeological deposits and/or rock paintings may be found (see Appendix 1 of the Heritage Study for a list of possible archaeological sites that maybe found in the area - Appendix K).

Adjacent to the coast are small dune areas, remnants of a far larger system in the past. These include the well-known Geelhoutboom dunes above the Klasies River Caves, Brandewynkop and the large dune field stretching from Oyster Bay to the mouth of the Kromme River. The latter is an extensive dune field of parallel longitudinal dunes which run in the direction of the prevailing winds (west to east), and are referred to as hairpin dunes. These large shifting sand dunes are underlain by ferricretes, calcretes and fossilised dune sands, which are situated on top of Table Mountain Sandstones. Due to the continuous movement of the dunes, many archaeological and palaeontological sites are exposed all the time while simultaneously others are covered. Apart from shell middens, all the other archaeological sites mentioned above may occur in the inland areas. There is also a possibility of encountering painted rock shelters and caves within the river valleys.

Issue	Nature of Impact	Extent of Impact	'No go' areas

Palaeontology (buried fossils)	The nature of impacts relates to disturbing and destroying fossil material through excavations, while the extent would be local.	Local	No 'no- go' areas have not been identified at this stage.
Archaeology	The nature of impacts relates to disturbing and destroying archaeological material through excavations. .	Local	No 'no- go' areas have not been identified at this stage.
Graves	The nature of impacts to graves relates to their disturbance and possible destruction through excavations.	Local	No 'no- go' areas have not been identified at this stage.
Cultural landscape/sense of place.	Limited and moderate impacts to the sense of place relates to the addition of man-made features to a landscape that has a particular character due to the presence in it of certain features, considering the industrial character of the study area.	The extent of the impact will be determined through the Visual Impact Assessment	No 'no- go' areas have not been identified at this stage.

Gaps in knowledge & recommendations for further study:

» Little is known about the archaeology of the site, mainly because no systematic research has been conducted within the area proposed for development. However, the wider region is rich in archaeological sites, and similar sites and materials may be found on the proposed site for development.

» A Phase 1 Archaeological Impact Assessment (AIA) will be required to determine how many specific sites might be impacted. The AIA might result in some areas within the site being recommended for preservation, in which case appropriate mitigation could involve altering a position of a turbine to avoid impacts.

Potential noise impacts

Noise during the construction phase will be of a short term and temporary nature. However, potential noise sensitive receptors could occur in close proximity to the site such as homesteads. During the EIA phase construction activities such as the (potential) borrow pit, concrete batching/delivery, foundation preparation, the digging of trenches and increased traffic (deliveries and movement onsite) will be considered, taking cognisance of the worst-case scenario (close proximity to a potential sensitive receptor). Potential sources of noise from construction activities is likely to occur from heavy construction machinery such as excavators, flat-bed trucks, cranes , blasting (if required) and so forth.

Issue	Nature of Impact	Extent of Impact	'No go' areas
Noise impacts (construction equipment noise)	» (potential) borrow pit. » concrete batching/delivery.	Local	Cannot be determined at this stage.

	» foundation preparation » the digging of trenches		
Noise impacts	Increased traffic therefore increases in noise from vehicles due to deliveries and movement onsite.	Local	Cannot be determined at this stage.

Gaps in knowledge & recommendations for further study:

» It is recommended that the potential noise impact associated with this wind energy facility be investigated in more detail in the EIA phase by conducting noise modelling (Refer to noise report contained in Appendix L for detailed information on the noise study to be undertaken).

Potential Impacts on the Social Environment:

Potential social issues during the construction phase includes:

» Development and implementation of appropriate labour recruitment strategies in order to maximise opportunities for local residents in the area and minimise the potential negative impacts associated with opportunistic in-migration of labour from outside the region.
» The development of suitable training strategies, specifically bearing in mind the generally low education and skills levels in the local area.
» The appropriate siting of construction camps on the site, should they be required.
» Adequate on-site management of construction crews in order to manage risks related to infrastructural damage, veld fires and stock/game losses on site adjacent properties.
» Maximising opportunities to local and regional Small Medium and Micro Enterprises (SMMEs) and other businesses to provide a range of services (this may include, but not limited to, catering, laundry, transport).
» Potential impacts on road surfaces in the study area, associated with the movement of heavy equipment onto the site.
» Potential impacts on traffic flows along roads in the study area associated, with the movement of heavy equipment onto the site.

Issue	Nature of Impact	Extent of Impact	'No go' areas
Risk to road and farm infrastructure	Influx of job seekers into the area	Local, Regional and National	N/A
Creation of employment and business opportunities and community beneficiation.	(Positive impact)	Local, Regional and National	N/A

Gaps in knowledge & recommendations for further study:

» Assessment of impacts such as safety and security issues, dust and noise, damage to roads caused by heavy vehicles.

» The identification and assessment of social impacts will be guided by the specialist SIA Guidelines (adopted by DEA&DP in the Western Cape, and supported by DEA for use in all provinces).

» A detailed public consultation process will be undertaken during the EIA phase of the project. The consultation process for the SIA will be separate to the consultation process for the EIA. In this regard the consultation process for the SIA will focus on one-on-one interviews with key stakeholders and, where necessary, workshops and meetings with community representatives.

Table 5.2: Evaluation of potential impacts associated with the **operation phase** of the proposed Oyster Bay wind energy facility

Potential Impacts on soil, land use, land capability and agricultural potential:

Significant impacts during the operation of the wind energy facility on soil are not anticipated. During the operation of the wind energy facility, it is unlikely that the existing land-use of the site (grazing/agricultural land-use) will be impacted upon, due to the wind turbines being self-operated (apart from maintenance activities) and the footprint of the wind turbines and associated infrastructure (substation, power line and maintenance building) occupying a limited footprint. In addition, most agricultural activities can continue between the turbines once operational. The agricultural potential of the site is moderate to low .

Issue	Nature of Impact	Extent of Impact	'No go' areas
Loss of agricultural land	Land that is no longer able to be utilised due to presence of infrastructure (limited to the footprint of the wind turbines, power line and ancillary infrastructure).	Local - Site only (Confined to areas within the site where turbines (~ 15 x 15 m) and where other infrastructure will be located)	None identified

Gaps in knowledge & recommendations for further study:

» It is recommended that sufficient space be found within the study area for the establishment of the facility without unduly affecting current land uses. This should be undertaken by the developer during the development of the preliminary and final layout of the facility, with consultation of the landowner.

» A further study and investigation into the impact of the wind energy facility on agricultural potential or land-use / land capability will be done., taking into consideration the "draft" guidelines for wind energy facilities developed by the Department of Agriculture.

Potential Visual Impacts:

The result of the **preliminary viewshed analyses** for the proposed facility is shown in **Figure 5.3.** The initial viewshed analyses were undertaken from 50 preliminary vantage points within the proposed development area at offsets of 120m above average ground level (i.e. the approximate maximum hub height of the 3MW proposed wind turbines). This was done in order 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.

The viewshed analysis is not based on the preliminary turbine layouts and will be refined once a layout of the facility is completed and will be regenerated per turbine position (and actual proposed turbine height) during the EIA phase of the project.

Figure 5.3 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 following is evident from the viewshed analyses:

» The proposed facility would have a large core area of potential visual exposure on the site itself, and within a 5km offset of the site. Almost the entire area within 5km is visually exposed to the wind energy facility. This includes the Mpofu Dam and a number of farms/homesteads and the town of Oyster Bay.
» Potential visual exposure is also high in the medium distance (i.e. between 5 and 10km). The receptors that are visually exposed to the proposed wind energy facility include the town of Kruisfontein and a number of individual farms/homesteads. Only narrow strips along the incised river valleys and pockets along the coastline are visually shielded from the proposed wind energy facility by virtue of the topography.
» In the longer distance (i.e. beyond 10km), visual exposure is somewhat reduced and becomes interrupted by the undulating topography in the west and north. Visual exposure to the east remains high. Receptors exposed to potential visual exposure include most parts of the towns of Kruisfontein, Humansdorp and St Francis Bay, as well as most of the individual farms/homesteads which occur in this range.
» The facility will be visible for almost the entire length of the N2 and the R102 which cross the entire study area (and bypass the site in the medium distance).
» Most of the R330 (beyond 10km) will experience potential visual impact and interrupted sections of the R62 and the R332 will be visually exposed beyond the 10km radius.
» All the secondary roads within 10km of the proposed wind energy facility will potentially be exposed to visual impact for long, continuous stretches.

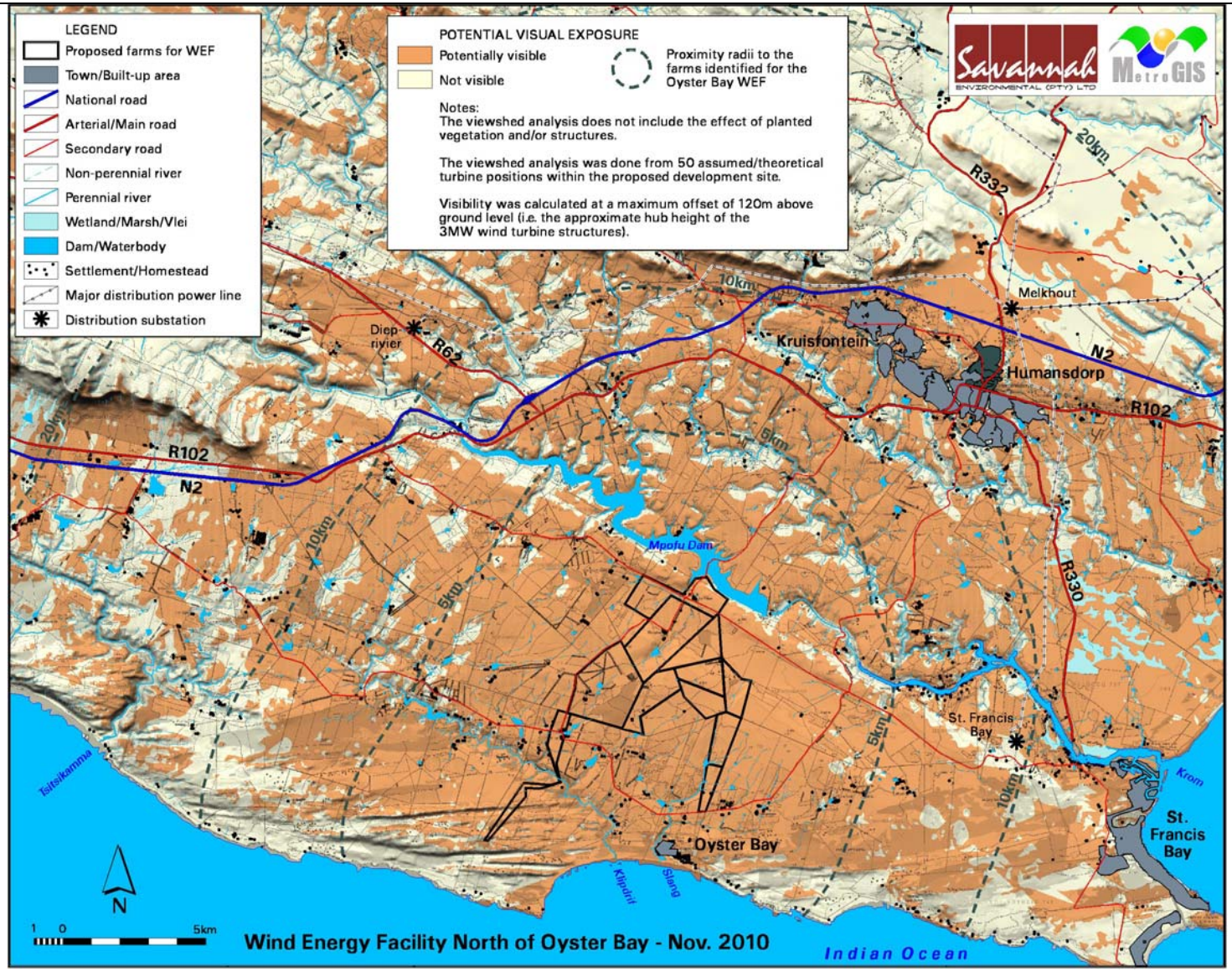

Figure 5.3: Map indicating the potential visual exposure of the proposed wind energy facility (note: the *visible area* indicates areas from which any

number of wind turbines (with a minimum of one turbine) may be visible).

» Conservation areas within the study area are also visually exposed to the proposed facility. The visual exposure of these areas is as follows:
  » Thyspunt National Heritage Site (3km to 7km away) will experience high visual exposure in the north of the site.
  » Rebelsrus Private Nature Reserve (8km to 10km away) will be visually screened, except on its northern boundary.
  » Eastcot Private Nature Reserve (7km away) will be almost entirely exposed.
  » Lombardini Game Farm (15km away) is will also be likely almost entirely visually exposed.
  » Jumanji and Thabe Manzi Game Farms and the Kromrivierspoort National Heritage Site (10km to 15km away) as well as are likely to be visually exposed for discontinuous patches within the reserves.
  » The Huisklip Provincial Reserve (12km to 16km away) and the State Forest (>12km away) will be mostly screened from potential visual exposure, with the exception of isolated patches within the reserves.

It is envisaged that the facility structures would be largely visible to observers (i.e. people travelling along roads, residing at homesteads or in the towns, and tourists visiting the region), especially within a 0-10km radius of the site and would constitute a high visual prominence, potentially resulting in a visual impact.

Issue	Nature of Impact	Extent of Impact	'No go' areas
The visibility of the facility to, and potential visual impact on, observers travelling along the arterial and secondary roads within the study area.	Visual exposure to wind turbines and associated infrastructure.	Local and/ or regional	Cannot be determined at this stage.
The visibility of the wind energy facility to, and visual impact on settlements (such as Oyster Bay) and homesteads.	Visual exposure to wind turbines and associated infrastructure.	Local and/ or regional	Cannot be determined at this stage.
The visibility of the facility to, and visual impact on protected and conservation areas and their buffer zones.	Visual exposure to wind turbines and associated infrastructure.	Local and/ or regional	Cannot be determined at this stage.
The potential impact of the facility on the visual character or sense of place of the region, with specific reference to the tourist routes and tourist destinations.	Visual exposure to wind turbines and associated infrastructure.	Local and/ or regional	Cannot be determined at this stage.
Potential cumulative visual impacts.	Visual exposure to wind turbines and associated infrastructure.	Local and/ or regional	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:

» Additional spatial analyses be undertaken in order to create a visual impact index that will further aid in determining potential areas of visual impact. This exercise should be undertaken for the core wind energy facility as well as the ancillary infrastructure, as these structures (e.g. the substation and power line) are envisaged to have varying levels of visual impact at a more localised scale.

» The site-specific issues (as mentioned in the Visual Impact Assessment- Appendix J) 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.

Impacts on Avifauna (birds and Bats):

Bird (and bat) deaths are one of the most controversial biological issues related to wind turbines. In order to address this issue in South Africa, the Endangered Wildlife Trust (EWT) and BirdLife South Africa (BLSA) have combined efforts to lobby for the appropriate consideration of the potential negative effects of wind energy production.

Bats have been found to be particularly vulnerable to being killed by wind turbines. It has long been a mystery why they should be so badly affected since bat echo-location allows them to detect moving objects very well. A recent study in America has found that the primary cause for mortality is a combination of direct strikes and barotrauma (bats are killed when suddenly passing through a low air pressure region surrounding the turbine blade tips causing low pressure damage the bat's lungs, Baerwald *et al*. 2008). The relative importance of this impact on bat populations depends on which species are likely to be affected, the importance of the site for those species and whether the site is within a migration corridor for particular bat species. It has been evaluated that there is one Near Threatened bat species that could occur site or in the surrounding areas, the Natal Long-fingered Bat. This species is most likely to be affected by the operation of the wind energy facility to a greater extent than the construction of the facility.

Birds have been found to be affected primarily by direct collisions with wind turbines. The effect on birds is therefore similar to the effect of power lines or tall buildings. The risk of collision therefore increases proportionately to the amount of infrastructure on a site. The most vulnerable species are those that are already classified as threatened species, including those classified as critically endangered, endangered or vulnerable. For any other species a loss of individuals or localised populations is unlikely to lead to a change in the conservation status of the species unless the impact occurs across a wide area that coincides with their overall distribution range. Loss of a population or individuals could lead to a direct change in the conservation status of the species. This may arise if the proposed infrastructure is located where it will impact on such individuals or populations or the habitat that they depend on. Consequences may include:

1. fragmentation of populations of affected species;
2. reduction in area of occupancy of affected species; and
3. loss of genetic variation within affected species.

Figure 5.4: Location of the proposed Oyster Bay Wind Energy Facility in relation to avifauna sensitive areas

These may all lead to a negative change in conservation status of the affected species, which implies a reduction in the chances of the species overall survival chances. The study area could support more than 48 priority bird species. It can be reasonably inferred that sensitive species such as White-bellied Korhaan, Denham's Bustard and Blue Crane will be affected by the noise (and the movement) of the construction of the turbines. The sensitivity map (**Figure 5.4)** indicates the spatial distribution of sensitive areas in the study area. The high sensitive areas could be wetlands and dams which are critically important habitat for a large number of priority species. The area of medium avifauna sensitivity could be old lands, pastures and Fynbos which are important habitat for many priority species. The areas of low avifauna sensitivity could be artificial woodland is not important habitat for most priority species.

Issue	Nature of Impact	Extent of Impact	'No go' areas
Avifauna habitat loss: displacement.	Operation – noise, movement and excavations.	Local	Cannot be determined at this stage, however areas of sensitivity have been highlighted for further investigation.
Bird and/ bat mortality due to power line infrastructure	Electrocution on associated infrastructure such as power lines.	Local to Regional	Cannot be determined at this stage, however areas of sensitivity have been highlighted for further investigation.
Bird and/ bat mortality due to wind turbines	Collision with turbine blades.	Local to Regional	Cannot be determined at this stage, however areas of sensitivity have been highlighted for further investigation.

Gaps in knowledge & recommendations for further study:

» Due to wind energy facilities being a new development in South Africa, little is known on the interaction of avifauna with wind energy facilities with regard to endemic species in the country. Research done in other countries will be used in combination with fieldwork.

Potential noise impacts:

Noise can have an effect on the environment and on the quality of life enjoyed by individuals and communities. The effect of noise can therefore be a material consideration in the determination of applications for Environmental Authorisation for a wind energy facility. Commonly the most significant noise occurs during the operational phase of a wind energy facility. There are two quite distinct types of noise source within a wind turbine - the mechanical noise produced by the gearbox, generator and other parts of the drive train and the aerodynamic noise produced by the passage of the blades through the air. Since the early 1990's there has been a significant reduction in the mechanical noise generated by wind turbines, and it is now usually less than, or of a similar level to, the aerodynamic noise. Aerodynamic noise from wind turbines is generally unobtrusive.

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 proposed wind energy facility is located in a rural/agricultural area approximately 6 km north of the town of Oyster Bay in the Eastern Cape Province of South Africa. The dominant land use within the proposed site and the surrounding area is linked to agriculture and game farming. This environment would be described acoustically as a "rural district", as per SANS 10103 (Noise Regulation of South Africa). The wind energy facility should not seek to increase the existing noise level by more than 5dB so as to avoid widespread complaints. To do so the wind farm would need to ensure it does not exceed an Leq level of 38.3dB(A)[3]. The acoustic acceptability of the proposed wind energy facility will be determined during the EIA phase through noise modelling. The significance of the noise impact for the proposed wind energy facility shall be determined by comparing the noise levels produced by the proposed operation of the wind turbines with appropriate noise limits at nearby residential properties. Noise sensitive receptors (people residing in farm houses / homesteads) that occur in close proximity to the Oyster Bay site, are shown **Figure 5.5.**

Issue	Nature of Impact	Extent of Impact	'No go' areas
Noise impacts associated with the operation of the wind energy facility	The noise will be a combination of the cumulative effects of up to 80 wind turbines operating at night.	Local to Regional (i.e. beyond the site boundaries). The noise could impact on receptors up to 5km from the boundary of the facility (worst case scenario – wind blowing from wind energy facility towards receptor and climatic factors favouring noise propagation).	None at this stage.

Gaps in knowledge & recommendations for further study:

To make an assessment of the acoustic impact of the proposed wind energy facility, it is proposed the following steps shall be undertaken by RES in-house noise specialists (note that the noise study will be independently reviewed by a specialist noise consultant):

» **Identification of Turbine Noise**

The noise emission characteristics of the wind turbines as measured in accordance with IEC 61400:11 "Wind Turbine Generator Systems – Part 11: Acoustic Noise Measurement Techniques" shall be adopted for use in any assessment.

» **Identification of Nearest Neighbour Locations**

For the proposed locations of the wind turbines, the nearest, or most noise sensitive, neighbours shall be determined by inspection of relevant maps, aerial photography and through site visits - for the area considered the likely sensitive locations have been identified as shown in Figure 5.5. It is only the nearest,

most critical properties at which any assessment must be undertaken as the suitability of the proposed development at these properties ensures suitability at more remote locations. Likewise, if individual properties are considered adequately represented by another property they may not be individually listed in the assessment.

» **Estimation of Noise Levels at Nearest Neighbour Locations**

An estimate of noise levels at the nearest neighbours, using the ISO 9613 Part 2 model, shall be made. This model0 has been identified as most appropriate for use in such sites [ETSU, 2000]. A specific interpretation of the ISO 9613 Part 2 propagation methodology shall be employed as recommended by a group of independent acousticians experienced in wind farm noise issues working for both wind farm developers, local planning authorities and third parties in an article published as detailed in the UK Institute of Acoustics bulletin publication in February 2009 [Acoustics Bulletin, 2009]. The ISO9613:2 model is expected slightly over-estimate noise levels at nearby dwellings, as demonstrated by measurement-based verification studies [ETSU, 2000). The predicted noise level shall be changed from the L_{Aeq} to the L_{A90} descriptor (to allow comparisons to be made) by the use of an adjustment factor of -2 dB(A), as specified by ETSU-R-97.

» **Determination of Acoustic Criteria**

» **Evaluation of Acoustic Impact**

The acceptance of the proposed wind farm shall be established by comparing the noise levels produced by the proposed operation of the wind turbines with appropriate noise limits at nearby residential properties. Should the appropriate noise levels be exceeded than due regard may be given to the adoption of higher noise limits, in accordance with ETSU-R-97 and the likely community response as suggested by SANS 10103. Other relevant noise including vibration, low frequency noise, infrasound & amplitude modulation, shall be considered appropriately with due regard to available literature and current industry knowledge.

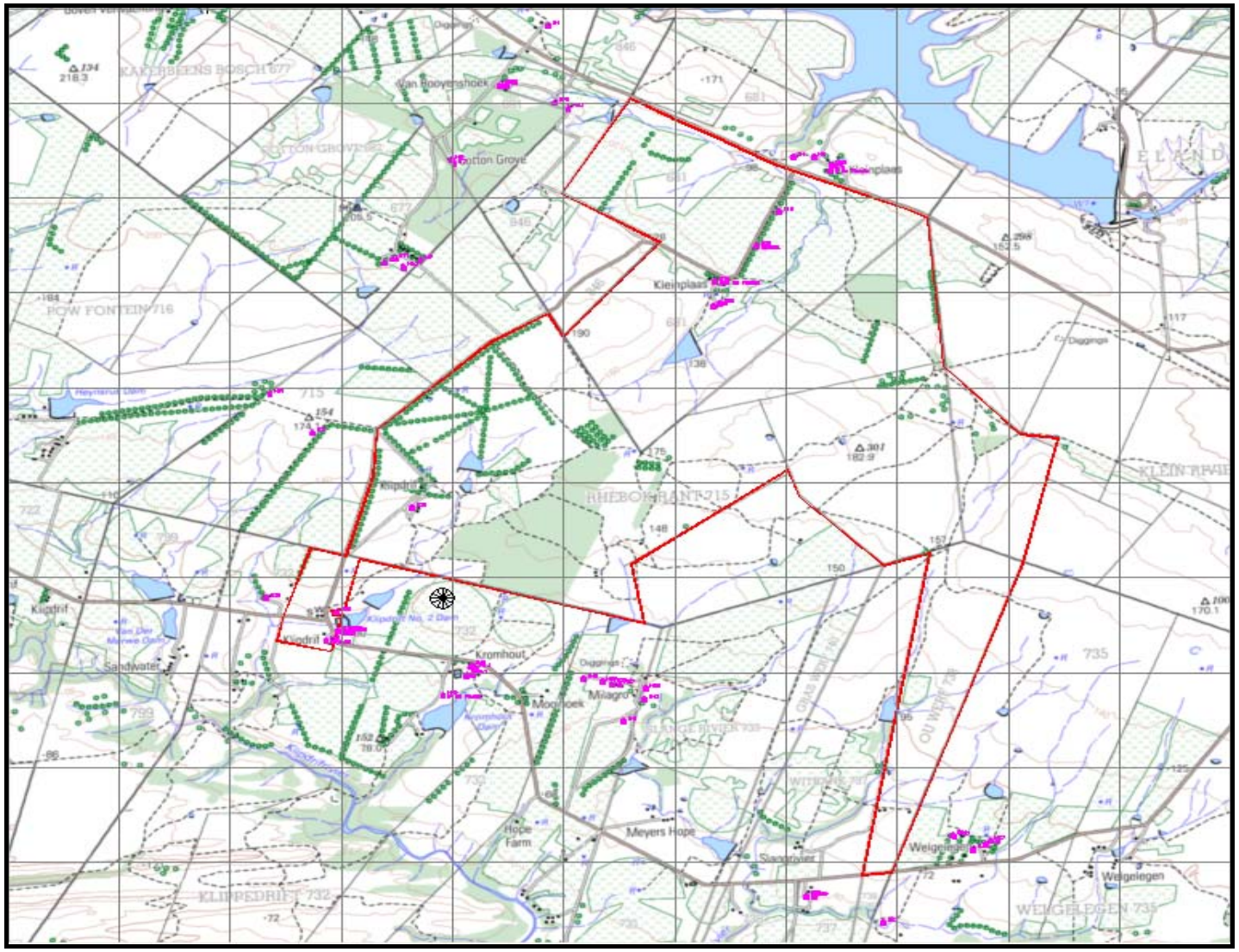

Figure 5.5: Development Boundary of Oyster Bay site and Nearest Neighbours. *Pink house icons represent occupied houses to be considered in noise assessment. The red line represents the site boundary 1km grid squares shown.*

Potential Social Impacts:

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
Potential impacts on existing tourism and tourism potential of the area.	Impact closely linked to visual impacts, associated with turbines and associated infrastructure, particularly the power line.	Local-regional	To be identified though EIA Phase
Potential visual and sense of place impacts on existing receptors, including nearby	Increase infrastructure in the study area	Local	N/A

rural and urban residences such as Oyster Bay.			
Creation of opportunities to local business 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 downstream economic opportunities for the local, regional and national economy.	(Positive impact)	Local-regional	N/A
Provision of clean, renewable energy source for the national grid.	(Positive impact)	Local, Regional and National	N/A
Minor indirect reduction of water use in national energy production	(Positive impact)	Local, Regional and National	N/A
Development and implementation of 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.	(Positive impact)	Local-regional	N/A

Gaps in knowledge & recommendations for further study:

The potential impacts on rural sense of place and tourism have the potential to be exacerbated by the cumulative impacts associated with other wind energy facilities proposed for the area. This issue will need to be addressed as part of the social impact assessment (SIA).

» The identification and assessment of social impacts will be guided by the specialist SIA Guidelines.
» A detailed consultation process will be undertaken during the EIA phase of the project. The consultation process for the SIA will be separate to the consultation process for the EIA.
» The most important issues that are likely to be raised and will need to be assessed during the EIA include:
  * Provision of clean, renewable energy source for the national grid
  * Creation of employment and business creation opportunities during the operational phase
  * Impact on rural sense of place. The impact on sense of place is also linked to the associated power lines
  * Impact on tourism, both locally and regionally
  * Impact on farming activities

CONCLUSIONS CHAPTER 6

RES is proposing to establish a commercial wind energy facility and associated infrastructure (referred to as the Oyster Bay Wind Energy Facility) on a site located approximately 6km north of Oyster Bay in the Eastern Cape Province. An area which falls within the Kouga Local Municipality has been identified for consideration within an Environmental Impact Assessment (EIA). It is proposed for a cluster of up to 80 wind turbines to be constructed over an area of approximately ~23 km^2 in extent. Associated infrastructure proposed includes a substation, access roads and a power line.

The Draft Scoping Report for the proposed Oyster Bay Wind Energy Facility in the Eastern Cape Province has been undertaken in accordance with the EIA Regulations published in Government Notice 28753 of 21 April 2006, in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998).

This Draft Scoping Report is aimed at detailing the nature and extent of this facility, identifying potential issues associated with 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 Draft Scoping Report are the result of on-site inspections, desk-top evaluations of impacts identified by specialists, and the parallel process of public participation. The public consultation process is extensive and every effort is being made to include representatives of all stakeholder groupings in the study area and the Province.

A summary of the conclusions of the evaluation of the proposed wind energy facility 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 7 of this report.

6.1. Conclusions drawn from the Evaluation of the Proposed Site for Development of a Wind Energy Facility

The study area is located south of the N2 that links Port Elizabeth to George/Knysna. The study site is located on the coastal plains south of the Cape Fold mountains in the Humansdorp region. The site lies approximately 6km north of Oyster Bay. Other settlements in the broader region include Humansdorp (~13 km north-east of the site) and Jeffrey's Bay (~24 km east of the site). In terms of its specific location, the facility is proposed on the following farm portions:

» Portion 3 of Farm Klein Rivier 713
» Portion 1, 2 , 3, 4 and the Remainder of Farm Rebok Rant 715
» Portion 1 and 3 of Farm Ou Werf 738
» Portion 5 of Farm Klippedrift 732
» Portion 10 and Portion 12 of Farm Kruis Fontein 681

The wind energy facility is proposed to accommodate up to 80 wind turbines, appropriately spaced to make use of the wind resource on the site as well as taking into account various constraints from a technical and engineering perspective. In identifying and evaluating impacts associated with the proposed wind energy facility, it has been assumed that although during operation the area affected will comprise up to 80 turbines (depending on which turbine types are ultimately chosen by the developer), access roads, a power line and a substation, during construction of the wind energy facility, some level of environmental disturbance will occur on the site. However, once construction is complete, less than 10% of the study area will be permanently impacted by infrastructure associated with the wind energy facility.

The main issues identified through this scoping study associated with the proposed wind energy facility are summarised in Tables 6.1 and 6.2 below.

Table 6.1 Potential impacts associated with the construction phase

Potential Negative Impacts	» Soil degradation / soil erosion / loss » Impacts on biodiversity due to the site falling within fynbos vegetation » Impact on heritage resources (loss of archaeological material/heritage sites) » Limited construction noise and visual disturbances
Potential Positive Impacts	» Job creation (direct and indirect)

Table 6.2 Potential impacts associated with the operation phase

Potential Negative Impacts	» The visibility of the facility to, and visual impact people within 10km of the wind energy facility » Collision or mortality of certain avifauna (birds) species and bats with the wind turbines and power line » Noise impacts on receptors in close proximity to the facility.
Potential Positive Impacts	» Creation of employment and business creation opportunities » Potential up and down-stream economic opportunities for the local, regional and national economy » Provision of clean, renewable energy source for the national grid » Assistance towards provision of secure power supply in South Africa

The majority of potential impacts identified to be associated with the construction of the proposed wind energy facility are anticipated to be localised and restricted to the proposed site itself, while operational phase impacts range from local to regional. No environmental fatal flaws were identified to be associated with the site. However, areas of potential environmental sensitivity were identified through the scoping phase. These areas of sensitivity are illustrated in the sensitivity map (refer to Figure 6.1).

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. This map does not represent no-go areas but rather an outline of potentially sensitive areas identified through scoping. These potentially sensitive areas will, therefore, be further investigated and assessed through detailed specialist studies (including field surveys) during the EIA phase. The map will be further refined in the EIA phase. In order to assess potential impacts within sensitive areas, the preliminary layout for the wind energy facility will be considered in the EIA phase.

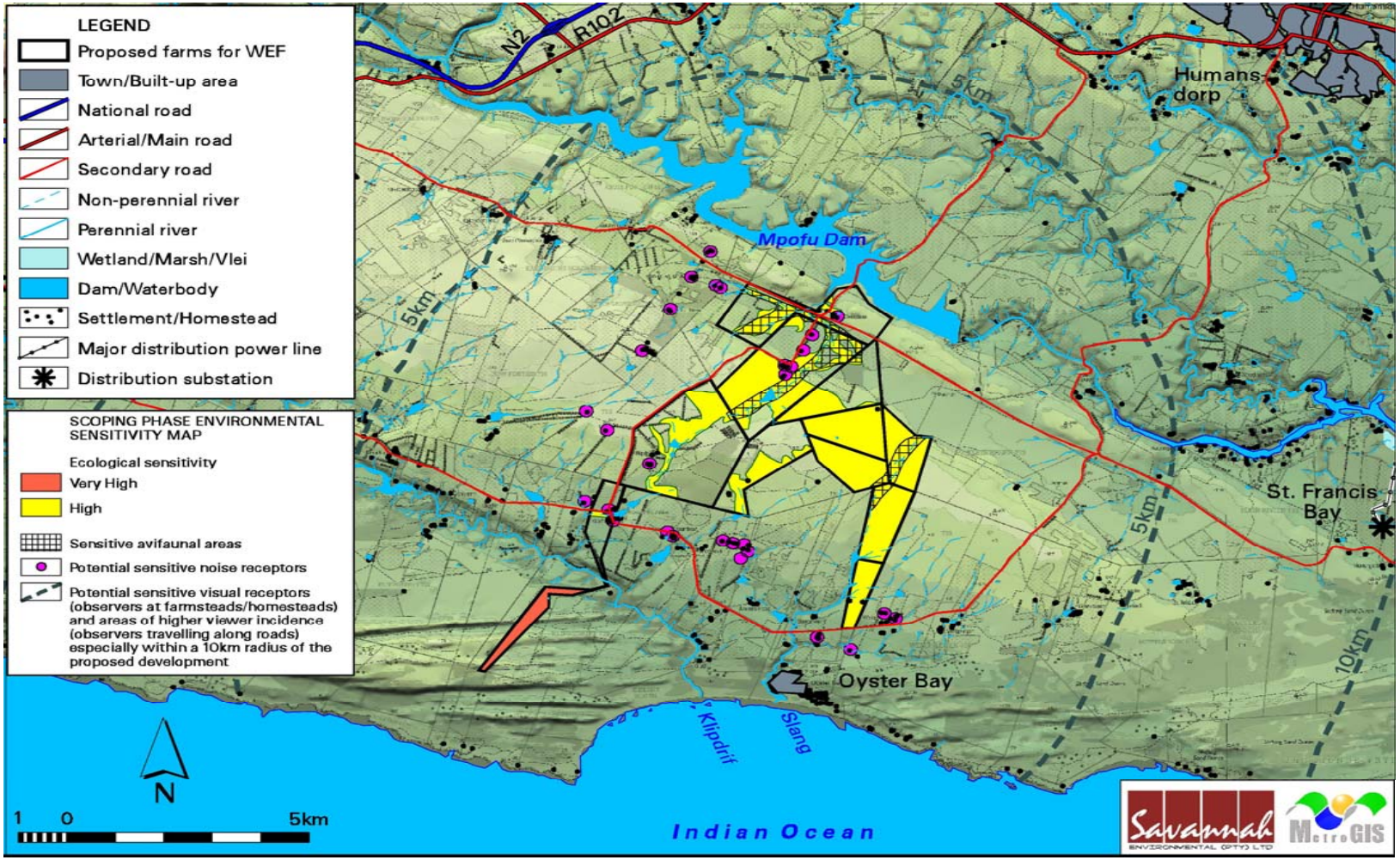

Figure 6.1: Environmental Sensitivity Map for the proposed Oyster Bay Wind Energy Facility

The potentially sensitive areas/environmental features/issues that have been identified for further study include:

» Areas containing untransformed natural vegetation (Fynbos or other), high diversity or habitat complexity, Red List organisms or systems (such as rivers, wetlands or dunes) as vital to sustaining ecological functions are considered sensitive. Any transformed area that has no importance for the functioning of ecosystems is considered to have low ecological sensitivity.
» The study area could support more than 48 priority bird species. It can be reasonably inferred that sensitive bird species such as White-bellied Korhaan, Denham's Bustard and Blue Crane could be affected by the noise (and the movement) of the construction of the turbines. The sensitivity map indicates the spatial distribution of avifauna sensitive areas in the study area. The high sensitive areas could be wetlands and dams which are critically important habitat for a large number of priority species. The area of medium avifauna sensitivity could be old lands, pastures and Fynbos which are important habitat for many priority species. The areas of low avifauna sensitivity could be artificial woodland is not important habitat for most priority species.
» The presence of noise sensitive receptors (possibly homesteads) has been determined at a desktop level this stage; noise modelling will provide more input for turbine positioning and noise mitigation for potential noise sensitive receptors, if necessary.
» Visual impacts could be an issue for observers within 10km of more of the wind energy facility, specifically tourist areas such as St Francis Bay, conservation areas (Thyspunt National Heritage Site which is located 3km to 7km away) and nature reserves in the area.

Understanding which area of the site would be least impacted by the development of such a facility, RES should prepare the detailed infrastructure layouts for consideration within the EIA phase. Through the EIA phase more detailed studies will be conducted, and further sensitive areas will be marked, more accurately and in more detail than in this Draft Scoping Report.

6.2. Evaluation of the Potential Issues with Associated Infrastructure - Power Line

In order to connect the wind energy facility to the power grid, an overhead power line will be required to be established from the wind energy facility's substation to the connection point on the electricity grid – possibly at Melkhout Substation which is located ~20km north of the site. Potential issues identified to be associated with the proposed overhead power lines include impacts on flora, fauna and ecological processes, impacts on avifauna as a result of collisions and electrocutions, potential impacts on heritage sites and visual impacts. The

potential impacts associated with the power line will be considered in detail within the EIA phase. Recommendations regarding a preferred alignment and appropriate mitigation measures (if required) will be made. Other infrastructure such as the substation location, access roads and the maintenance facility will also be considered in the EIA phase based on the preliminary layout to be provided by RES.

PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT CHAPTER 7

A detailed description of the nature and extent of the proposed Oyster Bay Wind Energy Facility 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 the Draft Scoping Report. This 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. 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.

7.1. 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 feasible alternatives (including the 'do nothing' alternative) will be assessed.

7.2. Authority Consultation

Consultation with the regulating authorities (i.e. DEA and Eastern Cape DEDEA) will be undertaken and will continue throughout the EIA process. On-going consultation will include the following:

» Submission of a Final Scoping Report following a 30-day public review period (and consideration of comments received).
» A consultation meeting with the DEA and Eastern Cape DEDEA in order to discuss the findings of the Scoping Report/EIA report and the issues identified for consideration in the EIA process, if requested and required by the authorities.
» An opportunity for authorities to visit and inspect the site.
» Submission of a Final Environmental Impact Assessment Report following a 30-day public review period.

7.3. Consideration of Alternatives

The following project alternatives will be investigated in the EIA:

» **The 'do nothing' alternative:** RES does not establish the Oyster Bay Wind Energy Facility (maintain status quo).
» **Site-specific alternatives:** in terms of actual turbine positions and positions of the associated infrastructure on the site (i.e. access roads, substation/s, etc. over a 23km^2 area).
» **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. The wind energy facility is planned to connect to the Eskom electricity distribution network/grid and use the existing Melkhout substation, which lies ~20km north of the site.

7.4. Assessment of Potential Impacts and Recommendations regarding Mitigation Measures

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 7.1. The specialists involved in the EIA Phase are also reflected in Table 7.1. 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 and technology), as well as the alternative alignments of the proposed overhead power line and access road/s.

Table 7.1: 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 ecology (flora, fauna and ecosystems)	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 Energy Facility: » The presence and distribution of wetlands and drainage lines on site will be confirmed. This will be done primarily using aerial photograph interpretation, but will be confirmed in the field using topographic and floristic indicators. » Searches will be undertaken in the thicket in the drainage lines to determine whether any protected trees occur on site or not. The species that is likely to occur on site is *Sideroxylon inerme*, but other species may also occur. » The presence of species of concern will be evaluated during the EIA phase. This will be done by assessing habitat suitability for those species that have been assessed as potentially occurring in the area. The lists provided in this Scoping Report will form the basis for those assessments and surveys. Particular attention will be paid to those species classified as threatened (VU, EN or CR) or Critically Rare, including eight plant species (*Erica glumiflora, Erica zeyheriana, Bobartia macrocarpa, Disa lugens var. lugens, Rapanea gilliana, Satyrium princeps, Pentaschistis longipes* and *Selago rotundifolia*) and one animal species, Duthie's Golden Mole. There are also a number of plant and animal species classified as Near Threatened that could occur on site, including the plants, *Pauridia minuta* and *Protea coronata*, and the animals, the Brown Hyaena, the Natal Long-fingered Bat, the Fynbos Golden mole and the Yellow-bellied House Snake.	David Hoare Consulting
Impacts on avifauna (birds)	» A specialist avifauna study to be undertaken in the EIA phase. » The details of a pre-construction monitoring plan will be developed. » The EIA phase will emphasise the outcome of the site visit, which in turn will include: * Surveys of species within the study area to determine the relative importance of local populations of 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 – nesting or roosting sites (stands of trees) and foraging areas (croplands, wetlands, dams).	Chris van Rooyen Consulting

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	* Identification of the least sensitive/lowest risk areas to locate wind turbines within the broader study area. » The results will include a more detailed assessment of all impacts, recommended mitigation where necessary (particularly with reference to the siting of turbines) and, perhaps most importantly, a comprehensive, 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.	
Geology, soil and erosion potential	» Conduct a site visit to confirm the physical and geological information used in this report and to collect visual information pertaining to the soil types and their geotechnical engineering properties. » Assess the present state of erosion, identify critical areas in terms of erosion and produce a map identifying these areas. » Detailing the environmental issues and potential impacts pertaining to soil degradation and erosion. » Assess the potential direct and indirect impacts using a weighting system that assigns a value to the categories (extent, duration, magnitude, probability) and arrives at a total which depicts the significance of the particular impact. » Assess the contribution of the proposed activity in the cumulative impact of the development in the area. » Comparatively assess any feasible alternatives (if any). » Provide mitigating measures to input into the EMP.	Iain Paton of Outeniqua Geotechnical Services

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
Noise impacts	The specialist study to be undertaken in the EIA phase will include: » A site visit to obtain information regarding background noise levels, the prevailing meteorological conditions during this background noise level survey, as well as confirming and identifying potential sensitive receptors, » Sensitive receptors will be investigated during the EIA phase, and any additional receptors will be identified. Their relative sensitivity to noise impacts will be determined. » The noise emission characteristics of the wind turbines as measured in accordance with IEC 61400:11 "Wind Turbine Generator Systems – Part 11: Acoustic Noise Measurement Techniques" shall be adopted for use in any assessment. » An estimate of noise levels at the nearest neighbours, using the ISO 9613 Part 2 model, shall be made. This model0 has been identified as most appropriate for use in such sites [ETSU, 2000]. A specific interpretation of the ISO 9613 Part 2 propagation methodology shall be employed as recommended by a group of independent acousticians experienced in wind farm noise issues working for both wind farm developers, local planning authorities and third parties in an article published as detailed in the UK Institute of Acoustics bulletin publication in February 2009 [Acoustics Bulletin, 2009]. The ISO9613:2 model is expected slightly over-estimate noise levels at nearby dwellings, as demonstrated by measurement-based verification studies [ETSU, 2000). The predicted noise level shall be changed from the L_{Aeq} to the L_{A90} descriptor (to allow comparisons to be made) by the use of an adjustment factor of -2 dB(A), as specified by ETSU-R-97. » The acceptance of the proposed wind energy facility shall be established by comparing the noise levels produced by the proposed operation of the wind turbines with appropriate noise limits at nearby residential properties. Should the appropriate noise levels be exceeded than due regard may be given to the adoption of higher noise limits, in accordance with ETSU-R-97 and the likely community response as suggested by SANS 10103. Other relevant noise including vibration, low frequency noise, infrasound & amplitude modulation, shall be considered appropriately with due regard to available literature and current industry knowledge.	Phillip King of RES will prepare the noise report and Morne De Jager from MENCO will be the independent reviewer and provide into the noise study.
Impacts on heritage sites	A Phase One - Heritage Impact Assessment (HIA) and survey will be required to identify heritage sites falling within the proposed development footprint. The specialist study to be undertaken in the	Johan Binneman

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	EIA phase will include: » Assessments of the significance of identified heritage sites, and recommend mitigation measures, if appropriate. » This study will incorporate both archaeology and relevant aspects of general heritage, although it is anticipated that the contribution of the latter will be very minor. » Based on the outcome, some form of mitigation may be required. Buffer zones may need to be proposed around any significant sites or structures where other suitable mitigation is not possible.	
Visual impact assessment	The specialist study to be undertaken in the EIA phase will include: » Sensitive receptors should be identified and the severity of the visual impact assessed within the EIA phase of the project. » Photo simulations of critical viewpoints should be undertaken, where required, in order to aid in the visualisation of the envisaged visual impact. » Additional spatial analyses should be undertaken in order to create a visual impact index that will further aid in determining potential areas of visual impact. This exercise should be undertaken for the core wind energy facility as well as the ancillary infrastructure, as these structures (e.g. the substation and power line) are envisaged to have varying levels of visual impact at a more localised scale. The site-specific issues (as mentioned in the Visual Impact Assessment - Appendix J) 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.	Lourens du Plessis of MetroGIS
Social Impact Assessment	The approach to the social impact assessment will include: » 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/optimisation and management measures to be implemented.	Tony Barbour (Environmental Consultant and Researcher)

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
Agricultural Potential, Land Use and Land Capability Investigation	the Environmental Impact Assessment (EIA) phase will include a survey of the area to verify the deductions made from the desktop study (scoping report) on the impact of the wind energy facility on agricultural potential, land use and land capability as lined to and in terms of: » Soil form and distribution; » Agricultural potential; » Current and possible land use; » Land Capability; and » Possible occurrence of wetland areas.	Johan van der Waals from Terra Soils.

7.5 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 RES 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. An EIA report will be compiled, and 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 plan**
- 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.

7.6. Public Participation Process

A public participation process will be undertaken by Savannah Environmental. 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 identify additional issues of concern or highlight positive aspects of 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:

» Focus group meetings (pre-arranged and stakeholders invited to attend).
» One-on-one consultation meetings (for example with directly affected landowners).
» 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 from stakeholders, a public meeting and key stakeholder meeting will be held during this public review period.

7.7. 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 7.1.

Table 7.1: Envisaged key milestones of the programme for the EIA phase of the project

Key Milestone Activities	Proposed completion date[6]
Public review period for Draft Scoping report	22 December 2010 – 10 January 2011
Finalisation and Submission of Environmental Scoping Report	January 2011
Authority acceptance of the Environmental Scoping Report and Plan of Study to undertake the EIA	February 2011
Undertake detailed specialist studies and public participation process	February 2011 – March 2011
Make draft EIA Report and draft EMP available to the public, stakeholders and authorities	April 2011
Submit Final EIA Report to DEA for review and decision-making	May 2011

[6] Indicative dates only

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