Draft Scoping Report

Proposed Roggeveld Wind Farm, Northern Cape and Western Cape
DEA Ref: 12/12/20/1988

G7 Renewable Energies (Pty) Ltd

September 2010

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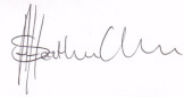
Proposed Roggeveld Wind Farm, Northern Cape and Western Cape

September 2010

Prepared by: Katherine Degenaar and Claire Alborough
DEA Reference: 12/12/20/1988
ERM Reference: 0117424
www.erm.com/G7_Renewable_Energies

For and on behalf of Environmental Resources Management	
Approved by: Stuart Heather-Clark	
Signed:	
Position:	Partner
Date:	29 September 2010

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ACRONYMS

DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning
DENC	Northern Cape Department of Environment and Nature Conservation
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EIR	Environmental Impact Assessment Report
EMP	Environmental Management Plan
ERM	Environmental Resources Management
I&APs	Interested & Affected Parties
IDP	Integrated Development Plan
NEMA	National Environmental Management Act
NGOs	Nongovernmental Organisations
ToR	Terms of Reference

ABBREVIATIONS

%	Percent
R	South African Rand
MW	Mega Watts
kV	Kilovolt
cm	Centimetres
m	Metres
km	Kilometres
kg	Kilograms

Alternative: A possible course of action, in place of another, that would meet the same purpose and need (of the proposal). Alternatives can refer to any of the following but are not limited to: alternative sites for development, alternative projects for a particular site, alternative site layouts, alternative designs, alternative processes and alternative materials.

Blade: The part of the turbine that is moved by the wind, there are three blades on a typical wind turbine.

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. This includes the economic, social, cultural, historical and political circumstances, conditions and objects that affect the existence and development of an individual, organism or group.

Environmental Assessment: The generic term for all forms of environmental assessment for projects, plans, programmes or policies. This includes methods/tools such as environmental impact assessment, strategic environmental assessment, sustainability assessment and risk assessment.

Hub: The centre of a wind generator rotor, which holds the blades in place and attaches to the shaft.

Hub Height: The distance from ground level to the centre of the hub.

Impact: The positive or negative effects on human well-being and / or on the environment.

Interested and Affected Parties (I&APs): Individuals, communities or groups, other than the proponent or the authorities, whose interests may be positively or negatively affected by the proposal or activity and/or who are concerned with a proposal or activity and its consequences.

Lead Authority: The environmental authority at the national, provincial or local level entrusted in terms of legislation, with the responsibility for granting approval to a proposal or allocating resources and for directing or coordinating the assessment of a proposal that affects a number of authorities.

Mitigate: The implementation of practical measures to reduce adverse impacts or enhance beneficial impacts of an action.

Nacelle: The protective covering over a generator or motor.

Rotor: Consists of the blade and hub, the mechanical link between the blades and the low-speed shaft.

Rotor Diameter: The diameter of a circle swept by the rotor measured from blade tip to blade tip.

Scoping: The process of determining the spatial and temporal boundaries (i.e. extent) and key issues to be addresses in an environmental assessment. The main purpose of scoping is to focus the environmental assessment on a manageable number of important questions. Scoping should also ensure that only significant issues ands reasonable alternatives are examined.

Significance: Significance can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change (i.e. intensity, duration and likelihood). Impact significance is the value placed on the change by different affected parties (i.e. level of significance and acceptability). It is an anthropocentric concept, which makes use of value judgements and science-based criteria (i.e. biophysical, social and economic).

Stakeholder engagement: The process of engagement between stakeholders (the proponent, authorities and I&APs) during the planning, assessment, implementation and/or management of proposals or activities.

Wind measuring mast: A mast installed prior to wind farm development to monitor wind speed and direction.

1 INTRODUCTION

G7 Renewable Energies (Pty) Ltd, hereafter referred to as G7, appointed Environmental Resources Management Southern Africa (Pty) Ltd, hereafter referred to as ERM, as independent environmental consultants to undertake the Environmental Impact Assessment (EIA) process for the proposed development of a wind energy facility at the Roggeveld site, in the Western and Northern Cape (Central Karoo and Namakwa Districts respectively). The proposed facility would utilise wind turbines to generate electricity that will be fed into the National Power Grid. The facility will have an energy generation capacity of up to 750 MW.

1.1 PURPOSE OF THIS REPORT

This Scoping Report has been compiled as part of the EIA process in accordance with the regulatory requirements stipulated in the EIA Regulations promulgated in terms of Section 24(5) of the National Environmental Management Act (NEMA) (Act No. 107 of 1998), as amended.

The Scoping Report provides a description of the proposed project activities, alternatives considered, the EIA methodology, and issues and concerns identified by the project team and/or raised by interested and affected parties (I&APs). A Plan of Study for the EIA, which includes the terms of reference for specialist studies, is also included.

1.2 APPLICABLE LEGISLATION

A detailed description of all legislation pertaining to the proposed Roggeveld Wind Farm project, and the permitting thereof, is contained in *Annex A*. This legislation includes the following:

- National Environmental Management: Protected Areas Act 57 0f 2003
- National Water Act (Act No. 36 of 1998)
- National Environmental Management: Biodiversity Act (Act No. 10 of 2004);
- National Heritage Resources Act (Act No. 25 of 1999);
- Electricity Regulation Act (Act No. 4 of 2006);
- Aviation Act (Act No. 74 of 1962);
- Occupational Health and Safety Act (Act No. 85 of 1993);
- Subdivision of Agricultural Land Act (Act No. 70 of 1970); and
- Noise Control Regulations, Environment Conservation Act (Act No. 73 of 1989).

The relevant legislation pertaining to the Environmental Authorisation for development projects is the National Environmental Management Act

(NEMA) (No. 107 of 1998) as amended and the Environmental Impact Assessment (EIA) Regulations of 2006 promulgated under NEMA. The relevance of this legislation is summarised below.

1.2.1 National Environmental Management Act

NEMA requires that activities be investigated that may have a potential impact on the environment, socio-economic conditions, and cultural heritage. The results of such investigation must be reported to the relevant authority. Procedures for the investigation and communication of the potential impact of activities are contained in Section 24 (7) of the Act.

Section 24(C) of the Act defines the competent decision-making authority which is normally the provincial environmental department. However, as set out in Section 4.1 of the 'Guideline on Environmental Impact Assessments for Facilities to be Included in the Electricity Response Plan', GN 162 of 2010, all EIA applications from Independent Power Producers (IPPs) or those involving co-generation, where these are included in the National Energy Resource Plan (NERP), the National Department of Environmental Affairs (DEA) shall be the competent authority.

1.2.2 EIA Regulations

The EIA Regulations (Government Notice R386 and R387) identify the activities which may have a detrimental effect on the environment including: *"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 R385 sets out the procedures and documentation for Scoping and EIA that need to be complied with.

Note that on 18 June 2010 new EIA Regulations (Government Notice No R. 543, 544, 545 and 546) were promulgated in terms of Section 24(5) of NEMA. These regulations came into effect on 1 August 2010, replacing the regulations of 21 April 2006. However the regulations provide for transitional situations and Section 76(1) states that: *'An application submitted in terms of the previous NEMA regulations and which is pending when these Regulations take effect, must despite the repeal of those regulations be dispensed with in terms of those previous NEMA regulations as if those previous NEMA regulations were not repealed'*. Therefore since the application for this proposed Project was submitted to the DEA on 10 June 2010, prior to the commencement of the new regulations, and no new listed activities have been identified, the application will continue under the 2006 EIA Regulations as if they had not been replaced.

1.3 THE PROJECT PROPONENT

G7 Renewable Energies (Pty) Ltd is a South African company specialising in wind energy project developments. Established in 2007, G7 is geared to manage industrial wind energy generation projects from the feasibility stage, to the installation stage which includes the commissioning and operating of

productive wind farms. G7 has a portfolio of potential developments in the Western and Northern Cape, with the combined capacity to generate several hundred MW. G7's Managing Directors share an ambition of enabling the South African electric grid to function using up to 20 percent of wind energy by 2020.

G7's scientific background has enabled it to create highly specialised wind measurement and analysis tools. These include a mesoscale wind atlas, which can be used to calculate wind speed and consistency across a large area at high-resolution enabling G7 to locate and validate optimum sites for wind farm development. Thus, enabling them to reduce the market risk by ensuring that the sites they have earmarked for development are more likely to lead to commercially viable projects.

G7 Vision:

- Create sustainability and improve citizen's lives while contributing to the success of the renewable energy industry
- Lead the renewable energy industry through maintaining high standards and professionalism

G7 Mission**:**

- Create jobs through our contribution to the growth of the wind energy industry, achieve highest quality standards and become a leader in the African wind energy industry
- Create a spirit of enthusiasm and cooperation with respect of one another's knowledge within the team

1.4 EIA PRACTITIONER

1.4.1 ERM Southern Africa

ERM is the independent practitioner that is undertaking the EIA for the proposed Roggeveld Farm. ERM and the specialists appointed by ERM during the course of this EIA have no financial ties to nor are they a subsidiary, legally or financially, of G7. Remuneration for the services by the Applicant (G7) in relation to this EIA is not linked to approval by any decision-making authority and ERM has no secondary or downstream interest in the development.

ERM is a global, multi-disciplinary environmental consulting firm that was founded in 1971. In 2003 ERM established a permanent presence in Southern Africa, and ERM Southern Africa is now one of the largest totally focused environmental consulting firms in the region. ERM's Impact Assessment and Planning Team in South Africa includes more than 30 environmental and social consultants and support staff who focus primarily on EIAs in a range of industry sectors throughout the region for clients such as Chevron, Transnet,

Engen, Shell, Anglo Platinum and Eskom. ERM has 10 registered Environmental Assessment practitioners who have been registered through the South African Interim Certification Board.

1.4.2 Project Team

The project team for the Roggeveld Wind Farm EIA will include ERM consultants and support staff and external specialists. Details of the external specialists that form part of the team are provided in *Section 6*. Details of ERM's core project team are provided below.

Table 1.1 ERM Core Project Team

Partner in Charge	**Stuart Heather-Clark** BSc Civil Eng (hons), MPhil Environmental and Geographical Science, Registered EAPSA Practitioner
Project Manager	**Katherine Degenaar** BSc (hons), MSc Environmental Management
Assistant Project Manager	**Claire Alborough** BSc (hons), MPhil Marine and Environmental Law

Stuart Heather-Clark is the Partner in Charge for the project and has overall responsibility for the team and delivery of the EIA study. Stuart has more than 15 years experience in the field of Impact Assessment in South Africa, and is the Practice Leader for Impact Assessment and Planning Team in ERM Southern Africa. Katherine Degenaar is a Senior Consultant with ERM and has over 6 years experience as an EIA practitioner, including extensive experience of renewable energy EIAs. Katherine acts as Project Manager of the team and will be supported by Claire Alborough as Assistant Project Manager. Claire has over 3 years experience as an EIA practitioner in South Africa.

1.5 STRUCTURE OF THIS REPORT

The structure of this Scoping Report is as follows:

Table 1.2 Report Structure

Section	Contents
Section 1 Introduction	Contains a brief description of the proposed activity, applicable legislation and an outline of the report structure
Section 2 Approach and Methodology	Outlines the approach to the EIA study and summarises the process undertaken for the project to date
Section 3 Project Description	Includes the project justification, a detailed description of the proposed activities and the consideration of alternatives
Section 4 Biophysical and Social Baseline	Describes the receiving environment, including biophysical and socio-economic aspects
Section 5 Issues and Concerns	Provides a summary of key issues raised and the potential impacts associated with the proposed development
Section 6 Plan of Study for EIA	Provides concluding comments about the proposed activity and outlines the terms of reference for specialist studies to address identified key issues
Section 7 Way forward	Describes the next steps in the EIA process
Section 8 References	Provides all references used in the Scoping Report

In addition, the report includes the following annexures:

- *Annex A:* Detailed description of all legislation that is applicable to the proposed project
- *Annex B:* Site Photolog
- *Annex C:* Public Participation Documentation
- *Annex D:* Comments and Responses Report
- *Annex E:* DEA approval to proceed with Scoping Study
- *Annex F:* Criteria for pre-feasibility environmental and social high-level site screening study.

1.6 OPPORTUNITY TO COMMENT ON THE SCOPING REPORT

I&APs and authorities are provided with an opportunity to comment on any aspect of the proposed activity and this Scoping Report. The Scoping Report will be available at Laingsburg and Sutherland Libraries and on the project's website (http://www.erm.com/G7_Renewable_Energies). A notification letter has been sent to all registered and identified I&APs to inform them of the release of the Scoping Report and where the report can be reviewed.

Comments should be forwarded to ERM at the address, tel. /fax numbers or e-mail address shown below. All comments must be received before 12th November 2010.

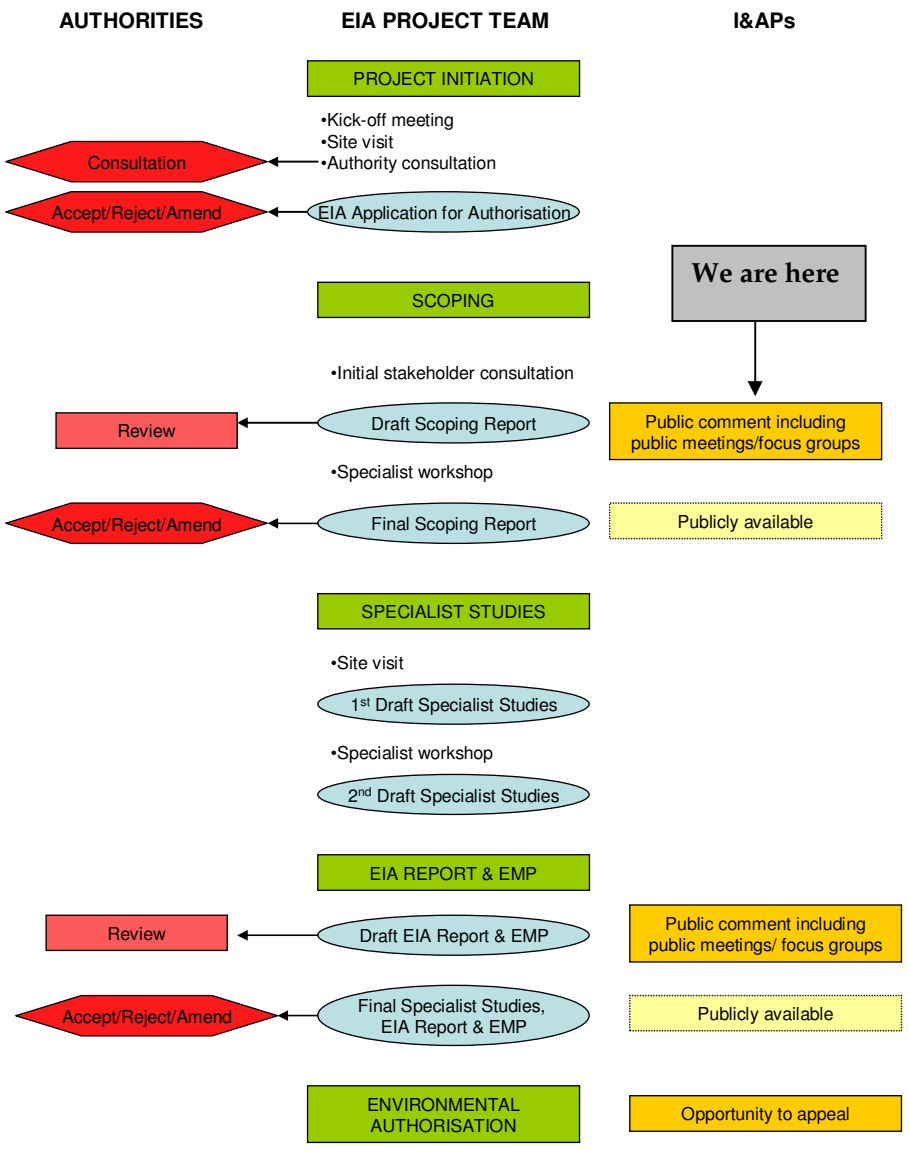
Att: Claire Alborough
G7 Roggeveld Wind Farm EIA
DEA ref: 12/12/20/1988
ERM ref: 0117424
ERM Southern Africa (Pty) Ltd
Postnet Suite 90,
Private Bag X12
Tokai, Cape Town,
7966
Tel: (021) 702 9100; Fax: (021) 701 7900
E-mail: claire.alborough@erm.com

The EIA process consists of the following phases:

- Environmental and Social Scoping Phase
- Specialist Studies Phase
- Integration and Assessment Phase

An EIA process flow diagram is provided in *Figure 2.1.*

Figure 2.1 EIA Process Flow Diagram



2.1 SCOPING PHASE

The first phase of the EIA process is a Scoping Study, which is guided by the legislative requirements described in *Annex A*, with an emphasis on public involvement. This project is currently in this phase of the EIA process.

The various tasks and consultation activities undertaken thus far by ERM during the Scoping Study are described below.

2.1.1 *Initial Site Visit and Project Initiation*

Key members of ERM's project team carried out an initial site reconnaissance visit with G7 on 21st July 2010. The purpose of the site visit was to familiarise the project team with the project proposal and Study Area and to begin the environmental and social screening and scoping process. Site notices were erected and public notices and Background Information Documents (BIDs) were distributed during this visit.

2.1.2 *Public Participation*

The following tasks relating to public participation have been undertaken as part of this Scoping Study:

- A preliminary database has been compiled of neighbouring landowners, authorities (local and provincial), Non-Governmental Organisations and other key stakeholders (see *Annex C*). This database of registered I&APs will be expanded during the ongoing EIA process.

- The project was advertised in Die Burger (Afrikaans) and Cape Times (English) on Wednesday 21st July 2010 and Die Noordwester (Afrikaans and English) on Friday 23rd July 2010 (see *Annex C)*. The advertisements informed the public of the project and requested them to register as I&APs if they would like to participate in the EIA process. I&APs that responded to the advertisements were included on the project database.

- A Background Information Document (BID) (see *Annex C*) was compiled and distributed to I&APs. The purpose of the BID was to convey information on this project and to invite I&APs to register their interest in the project. Proof of the BID distribution is attached as *Annex C*.

- On-site notices were placed at the site in July 2010 and photos showing the site notices are attached in *Annex C*.

- Throughout the EIA process to date, issues and concerns raised by I&APs and authorities, and communicated to ERM will be recorded in a Comments and Response Report which will be submitted with the Final Scoping Report at the close of the public participation period. A record of

all I&AP comments and responses to the end of August 2010 is provided in *Annex D.*

- This Scoping Report has been released for a 40-day public and authority comment period. A notification letter has been sent to all registered and identified I&APs to inform them of the release of the report and where the report can be reviewed.

Public meetings/Open day will be held during the Scoping Phase to afford I&APs and the general public the opportunity to comment on the project and engage with the EIA team. Notification of these meetings was sent to all registered I&APs when the draft Scoping Report was released for comment. Comments and Responses report will be drafted to address all comments raised and appended to the Final Scoping Report.

Authority Consultation

Authority consultation and involvement up until the release of the Scoping Report for comment included:

- Submission of an EIA Application for Authorisation form was submitted to DEA on 16th July 2010. DEA's Acknowledgement of Receipt and approval to proceed with the Scoping Study was received on 20th July 2010, reference 12/12/20/1988 and is attached as *Annex E*; and

- Authorities meeting with DEA and ERM on 29th June 2010 to discuss and agree on the proposed approach to the Scoping/EIA.

2.1.3 Proposed Timeframe for the EIA

Below is an estimated process schedule for the EIA. A more detailed Plan of Study for the EIA is included in *Section 6*.

Table 2.1 Estimated EIA Schedule

Task	Date
Stakeholder Comment on Scoping Report and Plan of Study for EIA	Oct/Nov 2010
Finalise Scoping Report and Plan of Study for EIA and submit to DEA	Nov 2010
Specialist studies	Sept – Dec 2010
Prepare Draft EIR and EMP	Dec 2010 - Jan 2011
Stakeholder Comment on Draft EIR and EMP	Feb/Mar 2011
Finalise and submit EIR and EMP to DEA	Apr 2011

2.2 SPECIALIST STUDIES PHASE

A number of specialist studies have been identified to address key issues of concern. The findings of these studies will be incorporated into the Environmental Impact Report (EIR). Further information related to the approach to the specialist studies and the impact assessment is contained in the Plan of Study for EIA in *Section 6*.

2.3 *INTEGRATION AND ASSESSMENT PHASE*

The final phase of the EIA is the Integration and Assessment Phase, which is described in detail in the Draft Plan of Study for EIA (*Section 6)*. A synthesis of the specialist studies, which addresses the key issues identified during the Scoping Phase, will be documented in a Draft EIR. Relevant technical and specialist studies will be included as appendices to the Draft EIR. The Draft EIR will be made available to I&APs for a 40-day comment period and a notification letter will be sent to all registered and identified I&APs to inform them of the release of the Draft EIR and where the report can be reviewed.

Comments received on the Draft EIR will be assimilated and the EIA project team will provide appropriate responses to all comments. A Comments Report will be appended to the Final EIR, which will be submitted to DEA for decision-making.

All registered I&APs will be notified when an Environmental Authorisation has been issued by DEA. A 40-day appeal period will follow the issuing of the Environmental Authorisation.

3 PROJECT DESCRIPTION

3.1 PROJECT JUSTIFICATION

Global dependence on fossil fuels, rising fossil fuel prices and concern for the impacts of climate change has resulted in increasing international pressure on countries around the world to increase their share of energy from renewable sources. Targets for the promotion of renewable energy now exist in more than 58 countries around the world and wind energy is emerging as an important component of the energy market in a number of countries. Globally, wind turbines currently generate more than 1 percent of global electricity.

In South Africa the government has developed a policy framework (the White Paper on Renewable Energy) and set a target of sourcing 10,000 GWh from renewable energy projects by 2013 (1). This amounts to approximately 4 percent of South Africa's total estimated energy demand by 2013. In the Western Cape provincial government has also made it's commitment to improving sustainability by setting a goal of generating 15 percent of all energy from renewable resources by 2014 (2). South Africa's Integrated Resource Plan (IRP 2010) (3) also sets targets for the reduction of CO_2 emissions by 34 percent by 2020; a goal that the renewable energy plays a major role in achieving.

Emergency load shedding in South Africa during 2007 and 2008 highlighted the challenges facing South Africa in terms of electricity generation, transmission and distribution. The National Energy Response Plan (NERP), drafted at the time, acknowledged the role that independent power producers (IPPs) (including those harnessing renewable energy resources) can play in ensuring sustainable electricity generation, and sets a goal that 30 percent of all new power generation will be derived from IPPs (1).

In 2009, the establishment of the Renewable Energy Feed in Tariff (REFIT) in South Africa presented opportunities for the renewable energy industry, promoting competiveness for renewable energy with conventional energy generation technologies under an enabling market mechanism which offers a Feed in Tariff for each unit of energy that is produced from renewable resources. Through REFIT there will be a heightened demand throughout the renewable energy sector (wind, solar, hydro, biomass and geo-thermal) due to the set prices for electricity which are determined and licensed by the National Energy Regulator of South Africa (NERSA).

The intention of G7 in establishing wind energy facilities is to develop wind resources to generate electricity, reduce South Africa's dependence on non-

(1) National Energy Regulator of South Africa **South Africa Renewable Energy Feed-In Tariff** (2009) NERSA Publications.
(2) Western Cape Sustainable Energy Policy (2010) Western Cape Provincial Government.
(3)Department of Energy Integrated Resource Plan (2010)

renewable fossil fuel resources and contribute to climate change mitigation. The proposed Roggeveld Wind Farm project would contribute to providing a future of increased energy security and sustainability whilst providing energy to facilitate South Africa's continuing development. A summary of the project motivation is provided in *Box 3.1* below.

Box 3.1 Project Motivation

- Reduce South Africa's dependence on fossil fuel resources
- Improve reliability and range of electrical services
- Meet demand for diversified energy sources
- Ensure the future of sustainable energy use
- Reduce CO_2 emissions and the nation's carbon footprint
- Contribute to targets for emission reduction as outlined in IRP 2010
- Promote environmental, social and economically sustainable development
- Contribute to reaching South Africa's goal of 10,000 GWh of renewable energy by 2013
- Contribute to meeting the NERP goal of 30 percent of all new energy from IPPs
- Support the Western Cape's target of 15 percent renewable energy by 2014

In addition to the energy produced by the wind energy facility, the proposed project has the added advantage of income generation through the sale of the electricity produced, which can supplement the income of marginally productive farms and be used to fund community development projects.

3.2 PROJECT LOCATION

The proposed wind energy facility is located to the west of the R354, approximately 45 km south of Sutherland and 30 km north of Matjiesfontein. The site is located in both the Western and Northern Cape Provinces, on parts of the following farms (see *Table 3.1*).

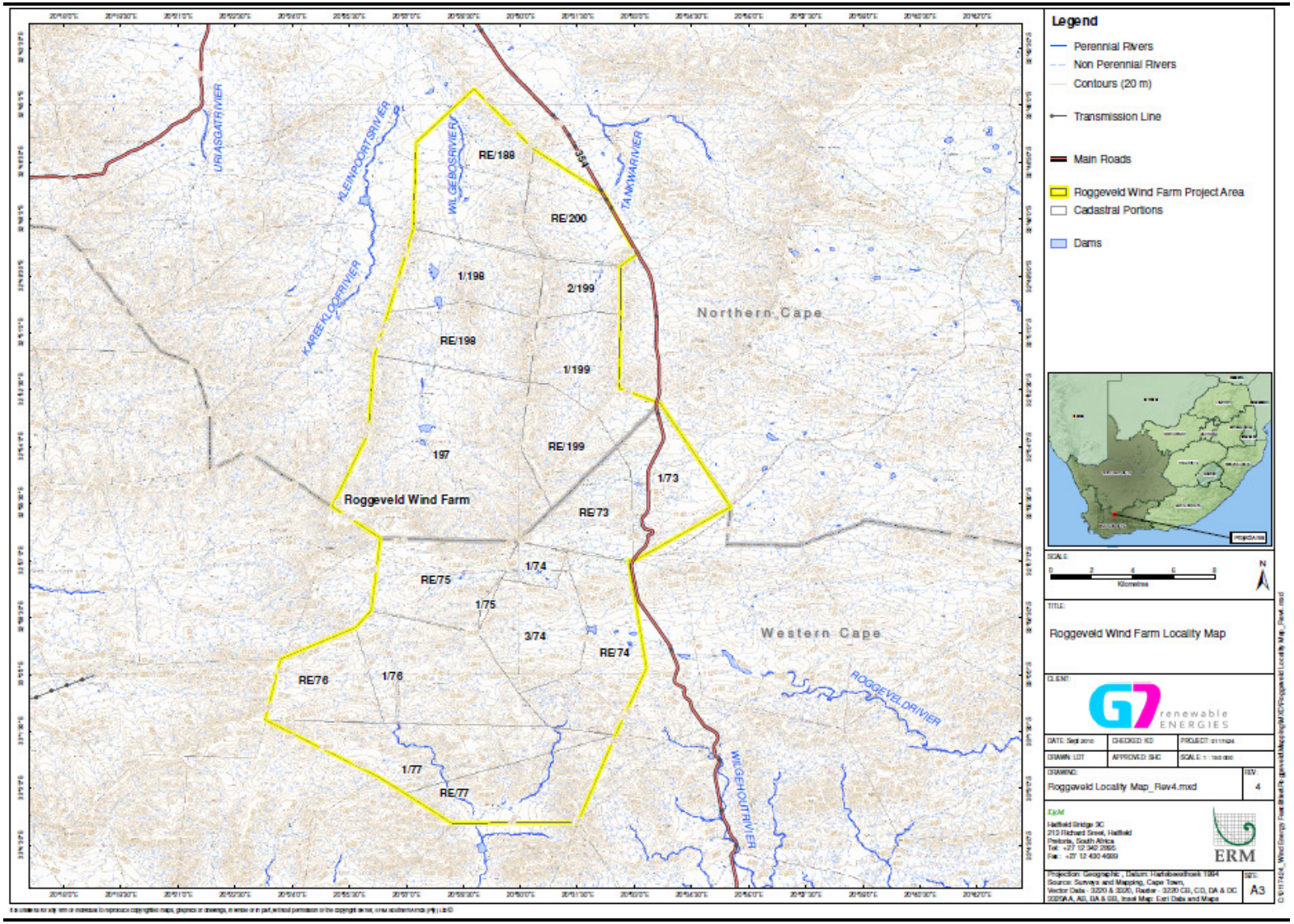
Table 3.1 Roggeveld Wind Farm Location

Farm Name	Farm Number	Province
Ekkraal	RE/199	Northern Cape
Bon Esperance	RE/73	Western Cape
Wilgebosch Rivier	188	Northern Cape
Rietfontein	197	Northern Cape
Karreebosch	RE/200	Northern Cape
Ek Kraal	2/199	Northern Cape
Klipbanks Fontein	RE/198	Northern Cape
Klipbanks Fontein	1/198	Northern Cape
Bon Esperance	1/173	Western Cape
Ek Kraal	1/199	Northern Cape
Barendskraal	1/76	Western Cape
Barendskraal	RE/76	Western Cape
Fortuin	1/74	Western Cape
Brandvalley	RE/75	Western Cape
Hartjies Kraal	1/77	Western Cape
Brandvalley	1/75	Western Cape
Fortuin	3/74	Western Cape
Fortuin	RE/74	Western Cape

Farm Name	Farm Number	Province
Hartjies Kraal	RE/77	Western Cape

The approximate site boundary is shown in *Figure 3.1*. The proposed Roggeveld Wind Farm is located adjacent to the main bulk transmission line network that runs from the Western Cape to major cities in northeast of South Africa.

Figure 3.1 Site Location



* For full size image see separate link on website to *Figure 3.1*.

3.3 PROJECT COMPONENTS

It is anticipated that once operational the facility will generate up to 750 MW of electricity which will be fed into the National Power Grid. The key components of the proposed wind farm include the following, which are discussed in more detail below:

- Wind turbines
- Electrical connections
- Substation
- Access roads and site access
- Additional project infrastructure

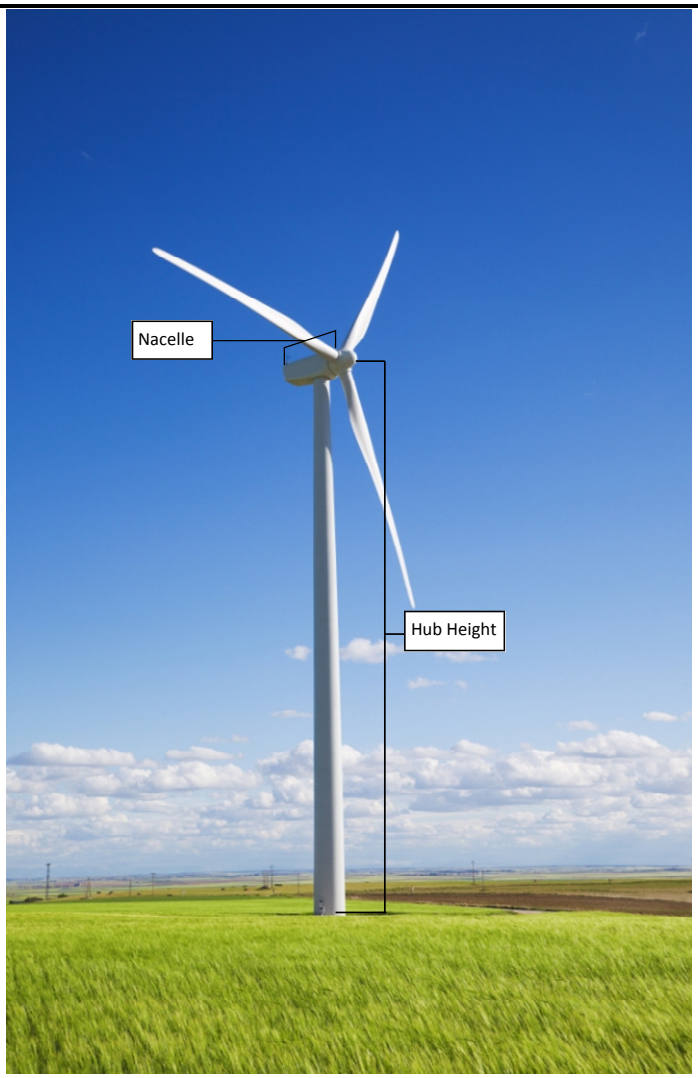
3.3.1 *Wind Turbines*

There will be up to approximately 250 wind turbines on the site. *Figure 3.2* below shows a typical wind turbine similar to the type envisaged for the Roggeveld Wind Farm. Modern wind turbine designs include a tubular tower, three blades and a nacelle which houses a generator, gear box and other operating equipment. Each of the turbines at the Roggeveld Wind Farm will have an individual capacity of up to 3 MW. The turbines will be approximately 80 m high (to the turbine hub), with a blade diameter of approximately 90—100 m.

Each turbine will have a concrete foundation of approximately 5 m x 5 m (1) at its base and a gravel hard standing and lay-down area (of approximately 2,500 m^2) adjacent to the turbine foundation. The hard standing area will be used for construction activities and for turbine maintenance during operation. The hard-standing will be compacted in order to facilitate the use of a crane during construction and maintenance activities. Each turbine will be accompanied by an electrical transformer. Some or all of the turbines may need to be lit to meet Civil Aviation Association health and safety requirements.

(1) The dimensions refer to the visible area of the foundation at ground level, not the size of the foundation below the surface.

Figure 3.2 Typical Wind Turbine



3.3.2 Electrical Connections

The turbines will be connected to each other, and the turbine rows will be connected to a new substation that will be built as part of the development (see below). The electricity generated by the facility will be fed into the national grid network via existing 400 kV overhead lines that pass through the south of the site. The existing 400 kV lines that pass though the site are the Komsberg/Muldersvlei and Baccus/Komsberg lines, which link with the Droerivier/Komsberg 1 and Droerivier/Komsberg 2 lines at the Komsberg 400 kV booster station, which is located to the southeast of the proposed wind farm.

A number of different electrical connection options are being considered as part of the development. The final design of the electrical connections will be based on a number of environmental, technical and economic considerations which will be explored during the EIA process and detailed project design

phase. Possible development options that are being investigated include the following:

- Connections between the turbines using medium voltage underground electrical cabling.

- Connections between the turbines using medium voltage overhead transmission lines (66 kV) that would be strung between the turbine towers.

- Connection of the turbine rows to the substation using medium voltage underground electrical cabling.

- Connection of the turbine rows to the substation using medium voltage overhead transmission lines (66 kV or 132 kV).

- Depending on the final location of the substation, the development may include a 132 kV overhead transmission line within the site area (up to approximately 10 km) between the new substation and the existing transmission lines that run through the south of the site.

3.3.3 Substation

A new substation facility will be build as part of the development, to facilitate connection of the wind farm to the national grid network via the existing transmission facilities as outlined above. Depending on the final location of the substation, an overhead electrical connection may be built to connect the substation to the existing transmission lines (see above). The substation will be a single-storey building of approximately 2,500 m^2 in size; it will house electrical equipment and will be fenced for security and safety. The substation complex will also house site offices, storage areas and ablution facilities.

3.3.4 Access Roads and Site Access

The site will be accessed via the R354. Some existing public roads may need to be upgraded to facilitate the transport of the turbines and other construction materials to the site. Within the site area existing farm tracks will be uses, some existing farm tracks with be up-graded and new gravel roads may be constructed to facilitate movement of construction and maintenance vehicles.

It is likely that there will be two or more site access roads including one accessing the south of the site from the R354 and one accessing the north of the site from the R354. There may also be a site access road accessing the centre of the site from the R354. In addition to site access roads there will be a network of access roads between each of the turbines. Site access roads will be up to 6 m wide with drainage trenches adjacent to the road.

A number of different site access road options are being considered as part of the development. The final design of the access roads will be based on a number of environmental, technical and economic considerations which will be explored during the EIA process and detailed project design phase.

3.3.5 Additional Project Infrastructure

Additional infrastructure that will be required for the project includes the following:

- Four wind measuring masts (lattice structure; 60 m high) will be erected to collect data on wind conditions for the duration of the project lifetime.
- Site fencing (as required).
- A temporary site compound (during construction).
- A temporary construction lay-down area of approximately 3,000 m^2 (hard-standing) for the storage of vehicles and material.

Within the site storage area there will be bunding (1) for transformers or any other oil containing equipment to ensure full containment in the event of any oil leakage.

Small borrow pits (subject to the appropriate permits) may be developed within the site area. The size of the pits would depend on the terrain, suitability of the subsurface soils and the requirement for granular material for access road construction and other earthworks. Should borrow pits be required these would be reinstated as far as possible at the end of construction using surplus material excavated from foundations or other site excavations. An on-site batching plant may also be developed (subject to the appropriate permits) to mix concrete on site.

3.4 PROJECT PHASES AND ACTIVITIES

The project life-cycle can be divided into five generic phases. These phases are outlined in the sections below.

3.4.1 Site Selection, Pre-feasibility Assessment and Permitting

The Roggeveld Wind Farm site was selected by G7 as potentially suitable from a wind resource perspective and once landowner agreements had been granted the wind measurement campaign commenced with the erection of a temporary 15 m wind monitoring mast (pre-August 2010) and four permanent 60 m wind monitoring masts (to be constructed during October - December 2010) (2). During the site selection phase G7 commissioned an environmental

(1) A concrete spill containment area

(2) The 60 m masts do not require approval as part of the EIA process. The masts have been granted temporary authorisation under Land-Use Planning Ordinance of 1985. A further status that gives the mast the same lifetime as the project will be applied for through the land-use planning authorisation of the wind farm.

and social pre-feasibility assessment of the site and several others. This study, which was undertaken by Coastal and Environmental Services (CES) (2009) included a high-level screening of potential environmental and social issues or 'fatal flaws'. The Roggeveld site was selected by G7 as one of five priority sites and the EIA and other permitting processes have now commenced.

3.4.2 Detailed Development Design

The site has been chosen based on a number of technical, financial, environmental and social criteria but the detailed design of the development has not yet been concluded. The final design of the facility including the turbine layout, exact size and type of turbine, and location of other project components will be determined using information gathered from the wind measuring masts, the information gathered during the specialist studies phase and environmental and social considerations described in the EIA.

3.4.3 Construction

Prior to the installation of the wind turbines, the site will be prepared as required; this would include the following activities:

- Vegetation clearance
- Subcontractor mobilisation
- Erection of fencing
- Construction/upgrading of on-site access roads
- Construction of site office and storage facilities
- Levelling of hard-standing areas
- Laying of turbine foundations
- Laying of underground cables
- Stringing of overhead transmission lines
- Substation construction

The turbines and other construction materials will be delivered to site via public roads on low-bed trucks. Once the turbine components have arrived on site turbine assembly and the electrical connections will be completed. *Figure 3.3* shows a wind turbine during assembly. After the completion of the internal electrical connections between the turbines, turbine function testing will take place to verify the correct operation of the facility. In total, the entire construction period (including site preparation and turbine erection) would take approximately 24 months if undertaken as one phase.

Due to the size of the development it is possible that the construction and commissioning of the wind farm may be undertaken in one or more phases; the construction timescales for any one phase would depend on the size of the phase but each phase would take no longer to construct than the timescales

identified above which presume that the entire development is constructed as one phase.

During the construction period only limited numbers of local people would be directly employed by the project; namely for site security, manual labour, transportation of goods and other similar services. The turbine assembly and testing would be undertaken by a highly-skilled team of turbine construction specialists (the majority of which would likely be from overseas as a workforce of this type is not currently available in the South African market). As part of the project, opportunities to train South African's to be skilled wind farm construction staff will be identified.

Figure 3.3 ***Turbine Installation***

3.4.4 Operation

Once construction of the facility is complete and it becomes operational it is expected that the wind farm will have a minimum life span of up to 25 years. Regular maintenance will be required to ensure that the turbines are kept in optimal working order. Most day to day facility operations will be done remotely through the use of computer networks but some limited maintenance and repair activities will be undertaken on site. During

operation the wind farm can function in parallel with daily farming activities due to the relatively small footprint of the turbines, hard-standing areas and access roads. A small team of up to 15 wind farm maintenance specialists (including trainees) would be employed by the project during the operations phase. Some additional ancillary employment positions will be created by the project.

3.4.5 Decommissioning

Once the facility has reached the end of its life the turbines may be refurbished and continue operating as a power generating facility, or the facility can be closed and decommissioned. If decommissioned, all the components of the wind farm would be removed and the site would be rehabilitated. The concrete foundations of the turbine would be removed to below ground level and would be covered with topsoil and be replanted to allow a return to agricultural land use (cultivation and grazing). Some access roads may be also be removed and rehabilitated at the request of the landowner.

3.5 CONSIDERATION OF ALTERNATIVES

3.5.1 Site Location

As part of the site selection process G7 undertook an extensive and detailed technical site selection study in order to identify suitable sites for wind energy facilities in South Africa, and specifically within the Western and Northern Cape Provinces. The sites that were selected for proposed wind energy facilities are considered highly desirable from a technical perspective, which considers the following factors.

- Wind resource: Analysis of available wind data indicated that the site has sufficient wind resource to make a wind energy facility financially viable. Wind resource monitoring has begun at the site (initially with a temporary 15 m mast and subsequently with four permanent 60 m masts) and at least one year of detailed data will be collected before analysis of the wind resource is undertaken to inform the detailed development design.

- Site extent: Sufficient land was secured under long-term lease agreements to allow for a minimum number of wind turbines to make the project feasible.

- Grid access: Grid access and distance to the closest grid connection point were key considerations for site location.

- Land suitability: The current land use of the site is an important consideration in site selection in terms of limiting disruption to existing land use practices. Agricultural land was preferred as the majority of farming practices can continue in parallel to the operation of the wind

farm once the construction and commissioning of the project is complete. Sites that facilitate easy construction conditions (relatively flat, limited watercourse crossings, lack of major rock outcrops) are also favoured during site selection.

- Proximity to aerodromes: The proximity to aerodromes and possible interactions with these facilities was considered as part of site selection.

- Landowner support: The selection of sites where the land owners are supportive of the development of renewable energy is essential for ensuring the success of the project.

- Environmental and social high-level screening: As discussed in *Section 3.4.1* above, CES was contracted by G7 to conduct a pre-feasibility assessment for a number of potential wind energy facility locations throughout South Africa. A preliminary desk top assessment was conducted to provide a preliminary assessment of the environmental risks and potential fatal flaws associated with proposed wind farm site alternatives countrywide. Further details of the criteria that were used for this assessment are provided in *Annex F.*

The consideration of the above criteria resulted in the selection of the preferred site. No further site location alternatives will be considered in the EIA process.

3.5.2 Site Layout Alternatives

The turbine layout and project component design may undergo a number of iterations based on technical aspects of the project such as detailed site specific wind data and construction conditions, and the environmental and social considerations which will be explored during the EIA process.

From a technical perspective, the turbine layout depends on a number of factors including:

- wind strengths and directions at the site (as summarised by the site wind rose);
- the intensity of wind turbulence determined from on site measurements and data modelling; and
- the characteristics of the turbine model, including hub height, rotor diameter and generator size.

An indicative project layout will be developed for the project using the resource data that is currently available. After initial field surveys by the EIA team, particular areas posing additional environmental and social constraints or specific unsuitable turbine locations will be identified and fed back to the technical team in the form of a constraints map. The technical team will then

generate a revised turbine layout design taking these environmental and social constraints into consideration.

The output of this process will encompass the consideration of layout alternatives and will be used in the assessment of impacts in the EIR.

3.5.3 Grid Connection Alternatives

The options of the connection of the wind energy facility to Eskom's national grid are subject the on-going discussions between G7 and Eskom. The only connection option which is considered viable for the site is a connection directly into the existing transmission facilities that traverse the site. The alternative grid connection scenario would involve a longer overhead transmission line to an alternative grid connection point which is not considered technically, financially or environmentally preferable given the availably of an existing grid connection option within the site area.

3.5.4 Technology Alternatives

Wind energy is considered to be the most suitable renewable energy technology for this site, based on the site location, ambient conditions and energy resource availability. A number of different wind turbine models are available with different dimensions and outputs. The preferred turbine supplier has not yet been selected but different turbine models suitable for installation will be considered with a range of outputs and rotor diameters.

3.5.5 No-Go Alternative

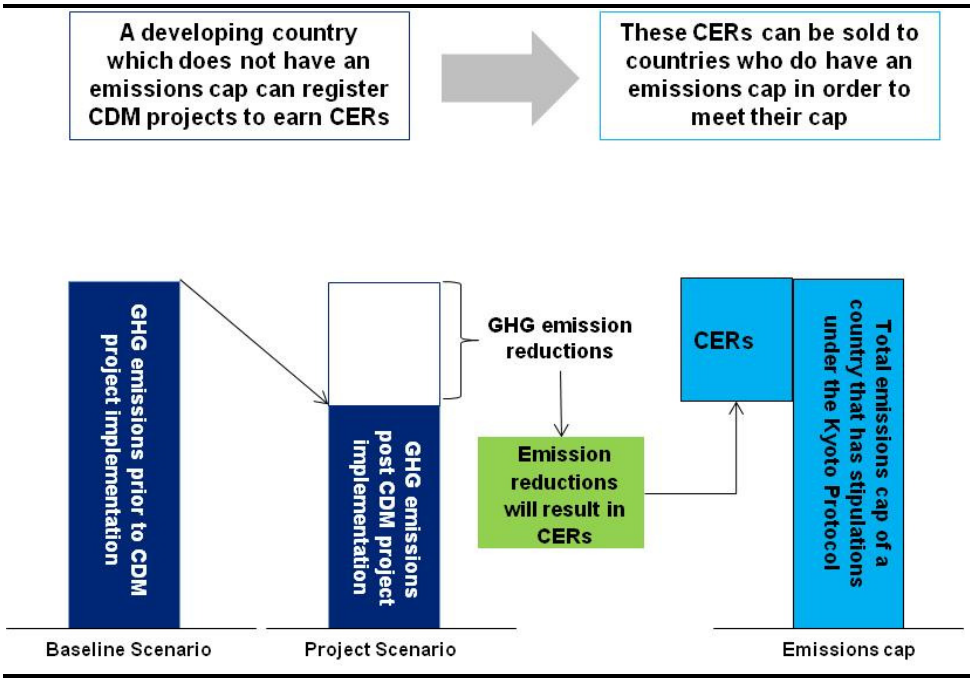
The no-go alternative implies that the proposed project would not be executed. Assuming that the wind energy facility would not be developed at the proposed site, there would be no increase in electricity generation from the facility, no CO_2 offsets associated with the proposed development and no economic benefit to the landowners associated with the potential income generated through the operation of the facility, no job creation and there would be no contribution to meeting South Africa's targets for renewable energy generation. There would also be no negative environmental and social impacts associated with the development of a wind energy facility.

3.6 CLEAN DEVELOPMENT MECHANISM REGISTRATION

The proposed Roggeveld Wind Farm will generate electricity which will be supplied onto the national grid. The electricity generated by this facility will displace grid electricity which is primarily coal-based and, as such, has a high Greenhouse Gas (GHG) emission factor. Part of the project planning includes an application for the project to be registered under the Clean Development Mechanism (CDM) of the Kyoto Protocol. The CDM allows developing countries such as South Africa to implement GHG emission reduction projects and generate carbon credits. These carbon credits are also known as Certified

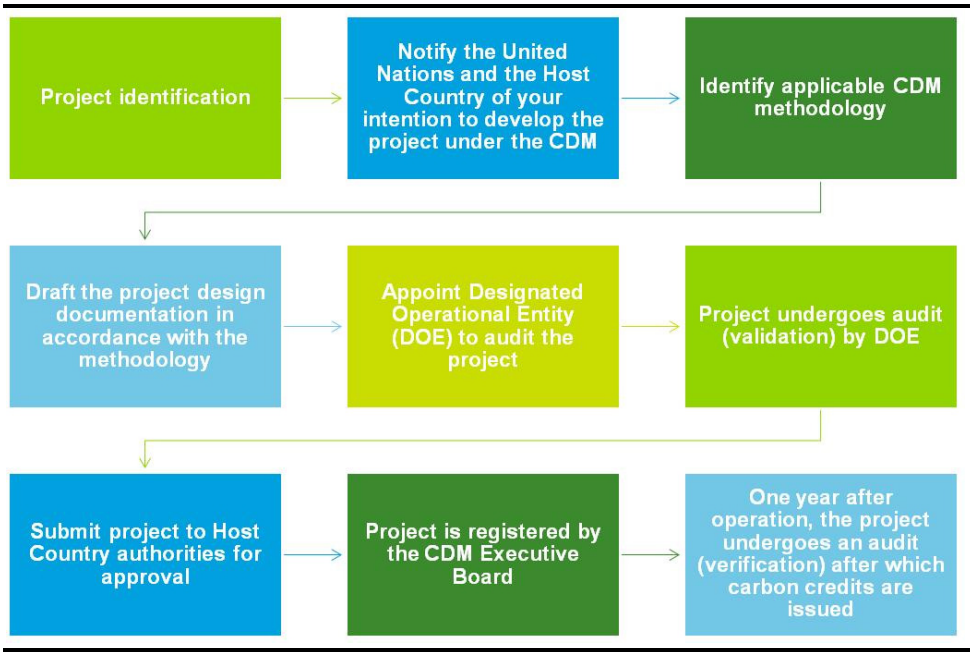
Emission Reductions (CERs). One MWh of electricity generated by the proposed Roggeveld Wind Farm would be equivalent to one carbon credit (one CER). The carbon credits are sold to developed countries to assist in achieving the GHG emission reduction targets committed to under the Kyoto Protocol. This process is illustrated in *Figure 3.4* below.

Figure 3.4 *CDM Process Illustration*



The revenue from the sale of the CERs will contribute to offsetting a portion of the costs associated with the project as well as overcoming some of the barriers associated with the development of wind energy facilities. The CDM is administered and governed by the United Nations Framework Convention on Climate Change (UNFCCC). The process to develop the project and apply for registration under the CDM is shown in *Figure 3.5* below.

Figure 3.5 CDM Project Development



The project is in the process of preparing an application for registration under the CDM. This CDM registration process is not part of the EIA process and is not being undertaken by ERM. G7 has commissioned Deloitte & Touche as independent CDM consultants. General information on the CDM can be found at www.unfccc.int and for further information on the CDM registration for the Roggeveld Wind Farm please contact Joslin Andrews at Deloitte & Touche (josandrews@deloitte.co.za or +27 (0) 11 806 5952).

4 BIOPHYSICAL AND SOCIAL BASELINE

The environment consists of the entire complexity of interacting geological, biological, social, economic and cultural factors, which influence the lives of individuals and communities. It is thus essential that the effects of any proposed development on all aspects of the environment be assessed before a decision to proceed is taken. The environmental and social baseline conditions of the Study Area for this project are described briefly in this section while specialist studies will explore issues such as ornithology, vegetation, visual, heritage resources, noise and socio-economic considerations more fully and assess the impacts the proposed development may have on these aspects as part of the specialist studies and integration and assessment phases of the EIA.

4.1 BIOPHYSICAL BASELINE

This Section focuses on the biophysical components of the environment.

4.1.1 Climate

The Roggeveld site is located in the Karoo Highland region. The climate is arid to semi-arid, but temperatures are tempered by the altitude of the region. Rainfall occurs throughout the year although the peak seasons are autumn and winter. Mean annual precipitation is approximately 290 mm, ranging from 180 – 410 mm rainfall per year. The hottest month in the summer is January and the coldest month in the winter is July. The predominant wind direction is from the northwest. The incidence of frost is relatively high with between 20 to 50 frost days recorded per year.

4.1.2 Topography

The highest point within the site is 1,450 m above sea level. The site area and surrounds feature a network of numerous hills, mountains and ridges, interspersed by valleys below the high ground, which are located at approximately 700 - 1,000 m above sea level. The dominant orientation of the ridges within the site area is north-south. A wider, open valley with undulating hills lies to the east of the site at approximately 1,000 – 1,200 m above sea level.

4.1.3 Geology and Soils

The site is underlain by the Adelaide Subgroup which forms part of the lower Beaufort Group and is Permian in age. This subgroup consists of fine grained sandstone and course arkose, alternating with green and brownish-red mudstone. Jurassic aged dolerite intrusions in the form of dykes and sills are also associated with this Subgroup.

4.1.4 Surface Water and Groundwater

The aquifer beneath the site is classified as a fractured aquifer which has a groundwater yield potential of between 0.5 to 2.0 l/s and electrical connectivity values vary between 20 to 795 mS/m. The aquifer is fractured and groundwater is associated with joints and fractures of dolerite contact zones with country rock, decomposed dolerite and zones of semi-weathered dolerite. The Department of Water Affairs and Forestry (1) classifies the regional aquifer as a major aquifer with moderate vulnerability (likelihood of contaminants reaching a receptor) and low susceptibility (potential significance of contaminants reaching a receptor).

Within the site area there are numerous small non-perennial watercourses that flow from areas of high ground into and along valleys within the site. Tributaries of two perennial rivers, the Wilgebosrivier and Furrowrivier flow from within the site area to beyond in the north and south of the site respectively. Other perennial watercourses that are located in the areas surrounding the site include the following:

- Kereekloofrivier (approximately 2 km west of site)
- Matjiesfontein se Kloof (approximately 5 km west of the site)
- Roggeveldrivier (approximately 5 km east of the site)

Given the size of the site and varied topography it is likely that the site is located within a number of different watersheds.

Within the site area and beyond there are a number of farm dams. To the east of the site, topography maps show a number of waterbodies which may be dams or non-perennial pans.

4.1.5 Flora and Fauna

The Roggeveld site is located in the Rain Shadow Karoo Bioregion. In this region the Succulent Karoo Biome overlaps in areas with the Fynbos Biome. The vegetation types found on and around the site are described below.

Central Mountain Shale Renosterveld occurs predominantly on the southern portion of the site. Hill slopes and broad ridges support tall shrubland dominated by renosterbos and non-succlent Karoo shrubs. Geophytic flora occurs in more open, wetter, rocky habitats. This vegetation type is considered to be least threatened (Rouget *et al*. 2004).

(1) Department of Water Affairs and Forestry. (1999) Aquifer Classification of South Africa, 1: 3 000 000.

Koedoesberge-Moordenaars Karoo occurs in a broad area of the Karoo, predominantly on the northern portion of the site. Low succulent scrub with scattered tall shrub and patches of 'white' grass typify this vegetation type, and it is considered to be least threatened (Rouget *et al*. 2004).

During the site visit, it was confirmed that the habitats of the site and surrounds are dominated by open Karoo shrub land. Based on initial site investigations the site is considered to be a suitable foraging site for birds of prey which are known to use ridges and escarpments (and their associated wind conditions such as updrafts) for soaring flight activities during hunting and territorial display. The valley and lower ground within the site are likely to support breeding and foraging birds and small mammals such as buck. Lower-lying areas of the site are considered to be suitable foraging habitats for bats.

4.1.6 Protected and Conservation Areas

Cape Nature has indicated that much of the proposed site has been determined to be a Critical Biodiversity Area (CBA) (1).

4.2 SOCIO-ECONOMIC BASELINE DESCRIPTION

The purpose of this section is to describe the socio-economic environment within which the proposed project is located. The proposed development will have benefits on a national level in terms of enhancing electricity supply although the proposed site is located in very small portions of the Western Cape and Northern Cape Provinces.

4.2.1 Administrative Structure

The proposed project is located within both the Northern Cape and Western Cape Provinces; the respective District and Local Municipalities are illustrated in *Table 41.1*.

Table 4.1 Administrative Jurisdictions of the Proposed Roggeveld Site

Province	District Municipality	Local Municipality
Northern Cape	Namakwa	Karoo Hoogland
Western Cape	Central Karoo	Laingsburg

The Provincial government is responsible for providing the strategic vision and framework for the Province. They are responsible for ensuring cooperation and collaboration between municipalities and that each municipality performs their respective functions. In turn, each of the District

(1) Bioregional plans are spatial plans published in terms of the Biodiversity Act. These map Critical Biodiversity Areas based on provincial or fine-scale biodiversity plans. These plans are used to inform land-use planning and environmental assessments, among others. According to SANBI CBAs should remain in a natural or near-natural state with no further loss or degradation of natural habitat.

Municipalities is responsible for the development of Integrated Development Plans (IDPs) and for the overall provision of services and infrastructure within the District.

4.2.2 Population Size and Growth

The Namakwa District Municipality had a population of 126,494 during the 2007 Community Survey. This was a population increase of 10.3 percent as compared to the population originally recorded in 2001 (108,111) (1). The population of Karoo Hoogland Local Municipality was 10,424 during the 2007 Community Survey. It had slightly decreased from the population recorded during the 2001 Census of 10,542 (2).

The population of the Central Karoo District Municipality was approximately 56,230 at the time of the 2007 Community Survey. This indicated a decline in population numbers as compared to the 2001 population figure of 60,483; a seven percent overall decline (3). Laingsburg Local Municipality had a population of 7,330 during the 2007/2008 financial year (4). This represented an increase in the population compared to the results of the 2007 Community Survey which stated that the population in the area was 5,156.

4.2.3 Economy and Livelihoods

The Namakwa District Municipality's economy is characterised by an undiversified economy, with an over reliance on mining (52.36 percent) (5). The relative contribution of this sector is, however, declining. The mining sector had an average annual growth rate of 0.3 percent between 2001 and 2007. Wholesale and retail trade, catering and accommodation is the next largest contributor to the GDP (6) (13.2 percent), followed by finance and business services (7.8 percent), general government services (6.7 percent) and community, social and personal services (5.9 percent) (7).

The economy of the Central Karoo District Municipality is small but was one of the biggest contributors to the GDP of the Western Cape Province in 2004 with an annual growth rate of 4.2 percent (8). The growth of the economy was largely driven by fast growing sectors such as transport and manufacturing, financial and business services, wholesale and retail, communications and construction (9). The contribution made by these sectors to the economy of the District Municipality between 1995 -2004 is outlined below:

(1) Community Survey, 2007
(2) Community Survey, 2007
(3) Central Karoo Vision 2010
(4) Laingsburg Municipality SDF, July 2007
(5) Namakwa District Municipality Profile, 2008
(6) Gross Domestic Product is a measure of a country's overall official economic output

(7) Namakwa District Profile, 2008
(8) Central Karoo District Municipality IDP, 2007 -2011
(9) Central Karoo District Municipality IDP, 2007 - 2011

- transport and communication (20.8 percent) of which transport made up approximately two thirds;
- finance and business services (18.4 percent);
- wholesale, retail trade, catering and accommodation (17.2 percent) of which the wholesale and retail trade sub-sector was 86.4 percent; and
- agriculture, forestry and fishing contributed 10.5 percent to the District Municipality's economy.

Agriculture contributed 23.2 percent to the economy of the Laingsburg Local Municipality.

Roggeveld Site and Surrounds

The proposed site is located in an area that is dominated by agricultural activities, primarily stock farming. The area is mountainous and as such large portions of the land are used only for grazing.

4.2.4 Employment, Education and Skills

Approximately 5 percent of the total Namakwa District Municipality's population have no education. The majority of the population (37 percent) has some secondary schooling and 1.5 percent has a tertiary education (1). Illiteracy is high within the Local Municipality with 28 percent of the population having attained no form of schooling and approximately 20 percent having had some primary schooling (2).

Namakwa District Municipality has a lower unemployment rate (12.8 percent) than the Provincial rate (17.4 percent) (3). Approximately 45.7 percent of the population are employed, including both seasonally and permanently employed persons. There is a significant portion (37.3 percent) of the population who are not economically active. Approximately 45 percent of the population in the Karoo Hoogland Local Municipality are employed, while about 18 percent are unemployed (4) and 37 percent are economically inactive (5). The majority of the Local Municipality's population have elementary skills (51 percent), 20 percent are skilled as agricultural workers or for similar occupations (6). People who work as clerks, plant operators and other professionals form between 4 – 5 percent of the skilled labour.

In the Central Karoo District Municipality, 37 percent of people over 14 years of age have attained less than a Grade 7 level education. Illiteracy levels in the Laingsburg Local Municipality are high (42 percent) (7). 44.9 percent of

(1) Namakwa District Municipality IDP, 2006-2011
(2) Karoo Hoogland Local Municipality, 2009-2011
(3) Namakwa District Municipality IDP, 2006 - 2011
(4) Namakwa District Municipality Profile, 2008
(5) Economically inactive refers to those who do not work because they are students, sick, elderly or because they choose not to join the workforce.
(6) Karoo Hoogland Local Municipality IDP, 2010 - 2011
(7) Laingsburg Local Municipality, SDF, July 2007

residents have received no schooling or have only partially completed primary schooling. Approximately 19.5 percent of the population aged 20 years and over have received no schooling. Only 5.7 percent of the population in the Local Municipality have a tertiary level education (1).

In Central Karoo District Municipality 36 percent of the population are employed, 20 percent of the population are unemployed and 44 percent of the population are not economically active. In the Laingsburg Local Municipality approximately 16.3 percent of the population aged between 15-65 years are unemployed. Of the unemployed persons, 96.2 percent are Coloured, two percent are Black African and 1.7 percent are White (2). Skills in the Local Municipality are low and there are high levels of illiteracy (3).

4.2.5 Health

There is a lack of medical facilities in the Namakwa District Municipality; primarily given the scattered settlement pattern in the District (4). The most common illnesses experienced by the population are HIV, TB and substance abuse.

The Central Karoo District Municipality has four provincial Hospitals, 14 mobile clinics, nine built clinics and one Community Health Care Centre. The most prevalent illnesses in the District Municipality are TB and HIV/Aids. The HIV prevalence in the District was predicted to have increased from 1.7 percent to 3.3 percent by 2010 (5). The Laingsburg Local Municipality has the Laingsburg Provincial Government-aided hospital, a built clinic and a mobile clinic (the mobile clinic services the rural communities) (6). TB and HIV/Aids are prevalent in the area, with TB having been recognised by the World Health Organisation as being severe in 2001 with an incidence of 735 per 100,000 people (7). This infection rate is lower than the District TB rate.

4.2.6 Tourism

The main attractions in the Karoo Hoogland Local Municipality close to the site are found in the town of Sutherland. The attractions include the space observation centre (seven telescopes and SALT) and Karoo flowers in the spring. The succulent route is a botanical tourist route which attracts tourists to the Sutherland area from mid July to end October (8).

The historic town of Matjiesfontein is located approximately 30 km south of the site. Matjiesfontein is popular for its historic buildings, museums and as a stop on the luxury Blue Train.

(1) Laingsburg Local Municipality SDF, July 2007
(2) Laingsburg Housing Plan, 2008
(3) Laingsburg Local Municipality IDP, 2007/2008
(4) Namakwa District Municipality Profile, 2008
(5) Central Karoo Vision 2010
(6) Laingsburg Local Municipality IDP 2007/2008
(7) Laingsburg Local Municipality SDF, July 2007
(8) www.sa-venues.com

There are numerous lifestyle farms in the local area surrounding the site. The natural views and environment are the main attraction for most of these farms. These include Anysberg Nature Reserve, Witteberg Private Nature Reserve, Zuurkloof Private Nature Reserve, Rietfontein Private Nature Reserve and other private reserves in the immediate area. Plans are underway for the establishment of an International Space Geodesy Observatory in the Matjiesfontein area and for the restoration of two small settlements near Majtiesfontein which have been declared as heritage sites.

4.2.7 Cultural Heritage

There are a number of areas of cultural interest near the site. The town of Matjiesfontein was declared a National Heritage Site in 1979 and there are at least two other another rural settlements in the area that have been declared as heritage sites in the Matjiesfontein area. The historical railway line from Touwsrivier also stops at Matjiesfontein.

4.2.8 General Infrastructure

Water and Sanitation

Approximately 85.4 percent of the population within the Karoo Hoogland Local Municipality has access to piped water and 13.3 percent access their water from boreholes (1).

Access to sanitation facilities in the Karoo Hoogland Local Municipality is low, with only 57.3 percent of households having access to flush toilets. A further 36.9 percent use dry, chemical and ventilated toilets, 2.3 percent use the bucket system and 3.5 percent have no toilets (2).

In the Laingsburg Local Municipality, a larger percentage of people (93.6 percent) have access to piped water (indoors/outdoors/communal taps) (3) than in the Karoo Hoogland Local Municipality. 6.4 percent of the population in the Laingsburg Local Municipality have no access to piped water; they collect water from rain, boreholes and dams.

The Laingsburg Local Municipality has provided 94.5 percent of the communities with toilets but some households are use the bucket system (2.1 percent) or have no toilets (3.4 percent) (4).

Housing and Energy

Within the Karoo Hoogland Local Municipality 76 percent of the population live in formal houses and approximately 23 percent reside in hostels or in

(1) Community Survey, 2007
(2) Community survey, 2007
(3) Community Survey, 2007
(4) Community Survey, 2007

informal housing [1]. In the Laingsburg Local Municipality 96.9 percent of the population reside in formal housing that meets the IDP standards [2]. The remainder of the population reside in informal housing such as shacks and backyard rooms [3].

Within the Karoo Hoogland Local Municipality 82.3 percent of the population have access to electricity. Candles are still widely used for lighting purposes (by 11.3 percent of the population). Wood is the second preferred energy source for heating (15.1 percent) and for cooking (10.9 percent). In Laingsburg Local Municipality approximately 84.6 percent [4] of the population have access to electricity. Approximately 10.2 percent of the population use candles, 1.6 percent use solar energy and 3.6 percent use other sources of energy such as firewood and coal [5].

Site Infrastructure

Existing infrastructure at the site currently includes:

- a 15 m wind monitoring mast on one of the ridges (G7);
- two 400 kV transmission lines that run through the south of the site;
- numerous 11 kV local power distribution lines which serve farmsteads in the area; and
- an extensive network of farm roads and tacks.

4.2.9 Landscape and Visual Amenity

The landscape of the area is largely agricultural with scattered farms and homesteads. The landscape is mountainous and views of the proposed development area are likely to be seen from a number of visual receptors including the R354 Sutherland – Matjiesfontein and surrounding farms and farmsteads in the area.

(1) Community Survey, 2007
(2) Community Survey, 2007
(3) Community Survey, 2007
(4) Community Survey, 2007
(5) Community Survey, 2007

5.1 INTRODUCTION

A key part of the Scoping Process is a preliminary identification and consideration of the ways in which the project may interact (positively and negatively) with environmental and socio-economic resources or receptors. The issues that are identified as potentially significant during the scoping process provide focus for more detailed specialist studies for the EIA. Each of the potential issues will be briefly described in this Section while the significance of any resulting impacts will be discussed and assessed in more detail in the EIR.

5.2 DESCRIPTION OF POTENTIAL IMPACTS

The potential impacts on environmental and social resources arising from the proposed development include direct and indirect impacts. Potential impacts will also be linked to the different stages of the project which are identified as construction, operation and decommissioning.

Table 5.1 provides an overview of likely aspects arising from each of the key project activities and considers their likely interaction with socio-economic and environmental resources and receptors.

Table 5.1 Interaction between Project Activities and Receiving Environment

Project Activities	Receiving Environment										
	Fauna	Flora	Avifauna	Soils, Geology and Erosion Potential	Hydrology	Traffic and Transport	Air Quality	Landscape and Visual Amenity (homesteads, tourism routes etc)	Cultural Heritage, Archaeology and Palaeontology	Socio-economics	Aerodromes
Construction Activities											
Vegetation Clearing	x	x	x	x	x		x	x	x	x	
Access Road, hard standing and lay-down area construction	x	x	x	x	x	x	x	x	x	x	
Turbine foundation construction	x	x	x	x	x			x	x	x	

Transport of materials and equipment (inc. turbines)	x	x	x	x		x	x	x		x	
Laying of underground Cables	x	x	x	x	x		x		x		
Overhead powerline construction and stringing	x		x					x		x	X
Substation and office building construction	x	x	x	x				x	x	x	
Turbine erection	x		x					x		x	X
Operation Activities											
Turbine Operation			x					x		x	X
Use of Access Tracks	x										
Use of Buildings	x							x			
Operating Powerlines			x					x			X
Site Maintenance	x									x	
Decommissioning Activities											
Removal of Turbines	x	x	x					x		x	X
Removal of Foundations	x	x	x		x			x		x	
Removal of Access Roads	x	x	x		x			x		x	
Removal of Underground Cables	x	x	x					x		x	
Removal of Powerlines	x	x	x					x		x	X
Site Restoration & Rehabilitation	x	x	x	x	x		x	x	x	x	

5.3 POTENTIALLY SIGNIFICANT ISSUES

The following section describes potentially significant issues based on the site visit, discussions with the project team, available information about the environmental affects of renewable energy developments and comments received and issues identified by I&APs that have commented on the proposed project as a result of the initial stakeholder notification activities. It is likely that many of these impacts can be adequately addressed through the implementation of appropriate mitigation and management measures, however, some require further specialist investigation as indicated.

5.3.1 Noise Impacts

Construction traffic comprising large, heavy vehicles and excavation equipment may produce a noticeable increase in noise disturbance during construction of the facility. Construction and turbine transportation traffic will create noise and vibration along access routes.

During operations the noise associated with the facility will be aerodynamic noise generated by the blades of the turbines as they rotate to generate power, and mechanical noise generated by the internal turbine machinery and generators.

The site is located in a rural area where there are few other noise sources and therefore the potential noise impacts associated with the proposed facility will be examined through a noise specialist study.

5.3.2 Loss of Agricultural Land

The proposed site is zoned for agricultural use. The construction activities and the establishment of the facility could render valuable agricultural land unusable. The placement of wind turbines and associated infrastructure will take existing site activities into account to limit disruption to agricultural activities. The potential impact will be assessed in the EIR and mitigation measures included in the draft EMP.

5.3.3 Loss of, or Damage to Archaeological or Cultural Resources during Construction

Section 38 of the National Heritage Resources Act states that any person who intends to undertake a development categorised as

(a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
(c) any development or other activity which will change the character of a site; or
(i) exceeding 5,000 m2 in extent;

must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

Excavations required for the installation of foundations, road construction, laying of cables etc and land clearing for lay-down areas could disturb or destroy features of cultural heritage interest. Furthermore, the presence of turbines given their height, may impact visually on sites of cultural heritage interest located in the vicinity. These potential impacts will be assessed through a heritage specialist study in the EIA phase along with the required submissions to Heritage Western Cape (HWC) and the South African Heritage Resources Agency (SAHRA).

5.3.4 Visual and Aesthetic Landscape Impacts

The proposed wind farm will comprise wind turbines and associated infrastructure and given the size and height of wind turbines the facility will have a visual impact on the landscape. The EIA will consider the effects the facility will have on the landscape character and effects upon potential viewers. The R354 and scattered residential and commercial buildings are in

the vicinity of the site and therefore the visual impact of the facility is regarded as an important consequence of the proposed development.

A specialist visual impact assessment will be undertaken during the EIA phase to assess the visual impacts of the development and the identification of appropriate mitigation and management measures to be included in the draft EMP.

Shadow flicker can be caused by the moving shadows of rotating wind turbine blades. It is generally accepted that shadow flicker effects to not arise at receptors which are located more than ten times the rotor blade diameter (in this case, the blades will be up to 100 m) from the development (1). There are no properties or main roads within 1 km of the proposed development boundary so shadow flicker is not considered to be a potential impact of the proposed wind farm.

5.3.5 Loss or Damage to Flora

The Roggeveld site is located in the Rain Shadow Karoo Bioregion. In this region the Succulent Karoo Biome overlaps in areas with the Fynbos Biome. The vegetation types found on and around the site include Central Mountain Shale Renosterveld and Koedoesberge-Moordenaars Karoo which are both considered to be least threatened (Rouget *et al*. 2004). Despite being considered least threatened on a national basis Cape Nature has indicated that much of the proposed site has been determined to be a Critical Biodiversity Area (CBA) (2).

A botanical specialist study will be undertaken during the EIA phase to assess the impact on terrestrial fauna and flora and the identification of appropriate mitigation and management measures to be included in the draft EMP.

5.3.6 Impact on Avifauna

Potential impacts of the proposed development on bird life in the area include: the possibility of bird collisions with turbines and collisions and electrocutions with overhead power lines resulting in bird injuries and mortalities; habitat loss through the establishment of the facility, disturbance and displacement of birds from their preferred foraging, roosting and breeding areas and flight paths.

An ornithology study will be undertaken during the EIA phase to assess the impacts of the development on avifauna and the identification of appropriate mitigation and management measures to be included in the draft EMP.

(1) Clark (1991)

(2) Bioregional plans are spatial plans published in terms of the Biodiversity Act. These map Critical Biodiversity Areas based on provincial or fine-scale biodiversity plans. These plans are used to inform land-use planning and environmental assessments, among others. According to SANBI CBAs should remain in a natural or near-natural state with no further loss or degradation of natural habitat.

5.3.7 Impact on Fauna

The development of the proposed Roggeveld wind farm may result impacts to fauna due to disturbance, displacement or direct habitat loss. In addition, the proposed wind farm may impact on bats by causing fatalities as a result of collisions with towers or blades or through internal injuries sustained by decompression near moving blades. Migratory bat species may be more susceptible however non-migratory bat species may also be at risk. In South Africa there are at least two migratory species (*Myotis tricolor* and *Miniopterus natalensis*) which are likely to be affected by wind turbines (1). A bat specialist study will be undertaken during the EIA phase to assess the impacts of the development on bats and the identification of appropriate mitigation and management measures to be included in the draft EMP.

5.3.8 Dust

The site has been selected for the proposed development because of the strong wind resource at the site. The arid nature of the site combined with high wind speeds may result in dust generation during vegetation clearance, the transportation of materials for construction, and the construction of the wind energy facility.

Dust will be a temporary impact associated with the construction phase of the project. Sensitive local receptors may need to be protected from dust through the implementation of certain management measures by the contractors responsible for the construction of the facility. Only minimal levels of dust are expected to be generated during the operational phase of the project; limited to dust created by maintenance vehicles along gravel roads, which will be infrequent. Appropriate measures to manage impacts associated with dust generation will be identified in the draft EMP developed during the EIA phase of the project.

5.3.9 Impact on Traffic and Transport during Construction

Traffic will increase during construction in order to bring infrastructure, equipment and construction materials onto site.

Further information in this regard and an assessment of significance will be provided in the EIR.

5.3.10 Impacts Due to Waste Generation

Waste from the construction activities may arise from a range of sources including the following:

- excavated material (e.g. rock and sand); and
- waste from construction workers, equipment, materials and vehicles.

(1) David Jacobs, Bat Specialist Study, 2010

Following the construction phase, there will be limited waste production during the operational phase. Specific requirements for waste management and disposal will be identified in the draft EMP developed during the EIA phase of the project.

5.3.11 Hydrology

It is not anticipated that any major watercourses or waterbodies will be directly impacted by the proposed development. However, removal of vegetation and the development on access roads, laydown areas and non-permeable surfaces such as crane pads may impact surface water flow and run off within the site area and near surrounds during both the construction and operation phases.

A hydrology study will be undertaken during the EIA phase to assess the impacts of the development on watercourses and surface water run-off. This study will identify appropriate mitigation and management measures to be included in the draft EMP.

5.3.12 Surface Water and Groundwater Contamination

The potential for surface water contamination is an important consideration in relation to the construction of the facility since increased sediment load in runoff could impact watercourses in the local area. The potential for groundwater contamination is associated with uncontrolled spills of fuels and lubricants during the construction phase. The extent and impact of potential groundwater or surface water contamination is largely dependent on the nature of the subsurface soil conditions, their transmissivity and susceptibility to erosion.

Basic precautions to prevent groundwater and surface water contamination during construction will be identified in the draft EMP developed during the EIA phase of the project.

5.3.13 Soils, Geology and Erosion Potential

The potential effects on soil and geology from construction and decommissioning include:

- the potential for soil properties at the site to be permanently altered due to site preparation;
- alteration of topography on a local scale through clearing and grading; and
- site preparation activities which could cause instability and erosion.

The potential impacts listed above are common and are reasonably well understood. Further information in this regard and an assessment of significance will be provided in the EIR which will be accompanied by the

identification of appropriate mitigation and management measures in the draft EMP.

5.3.14 Socio-economic Impacts

The employment opportunities arising from the proposed wind energy facility will occur in the construction and operational phase of the development. A small team of up to 15 wind farm maintenance specialists (including trainees) would be employed by the project during the operations phase. Additional staff will be required for ancillary positions during the construction and operation of the site, including site security, access road and vegetation maintenance. In addition to the creation of some jobs, the wind farm will contribute a portion of its yearly income to the funding of an identified and agreed community project in order to contribute more widely to the benefit of the local community. Landowners will also receive payment for the use of their land during the operational phase which would result in an additional, income for the farm.

It is anticipated that the socio-economic impacts associated with the development in the construction and operational phase will be localised, including benefits to the local economy, visual and noise impacts. A specialist study will be undertaken in the EIA phase to assess potential impacts on socio-economic resources and receptors.

5.3.15 Human Health and Safety

As with any construction project, there is potential for impacts on human health and safety to occur as a result of accidents and unplanned events that may occur during the construction of the wind farm.

The risk of injury associated with the construction of the facility will be mainly limited to the subcontractors (as the site will be secured to avoid public incursion into the active development area), but there remains some risk of injury to other site users (ie farm workers). Basic safety precautions and protective measures will be specified in the EMP which, in turn, will be incorporated into subcontractor health and safety plans.

5.3.16 Electromagnetic Interference

Wind turbines have the potential to cause electromagnetic interference (EMI) which effect communication systems including televisions, radio, mobile phone transfers, microwave links, radar and aircraft navigation beacons. As part of the EIA, consultation will be undertaken with the relevant telecommunications operators including the South African Defence Forces, National Air Traffic Services and the Independent Communications Authority of South Africa (ICASA) to determine the possibility of any impacts as a result of the proposed development.

5.4 SCREENING OF IMPACTS

The preceding *Section 5.3* describes a number of potentially significant issues associated with the proposed development. One of the purposes of Scoping is to offer a preliminary, qualitative assessment of potential environmental and social impacts associated with the project, thereby ensuring that those impacts that are potentially significant are assessed in the EIA Phase.

The following impacts have been identified and described above:

- noise impacts;
- loss of agricultural land;
- loss to archaeological and cultural heritage;
- visual and landscape impacts;
- impact on fauna and flora;
- impact on bird life;
- impact on fauna (including bats);
- impacts due to dust;
- impact on traffic;
- impact of waste production;
- impact on hydrology;
- impact on surface water and groundwater;
- impact on soil;
- socio-economic impacts; and
- human health and safety.

The impacts which require further investigation through specialist studies are the following:

- noise impacts associated with the operational phase;
- loss of archaeological and cultural heritage;
- visual and landscape;
- flora and habitats;
- ornithology;
- fauna (including bats);
- hydrology; and
- socio-economic.

Dust, traffic, loss of agricultural land, waste generation, traffic, health and safety, surface and groundwater, soils and health and safety impacts will be addressed in the impact assessment and controlled through the implementation of standard environmental management measures that will be included in the EMP.

5.5 CUMULATIVE EFFECTS

Due to a substantial increase in interest and EIAs for wind farm developments recently, it is important to follow a precautionary approach in accordance with NEMA to ensure that cumulative impacts are addressed or avoided. The following significant cumulative impacts could result due to the development of wind energy facilities in proximity to each other:

- visual intrusion;
- change in sense of place and character of the area;
- an increase in the significance of avifaunal impacts;
- potential impact on bats;
- loss of vegetation; and
- traffic impacts.

The cumulative impacts of the wind energy facility and other known wind energy developments, and the in-combination effects of the wind energy facility and other known developments will be qualitatively assessed during the EIA phase.

6 PLAN OF STUDY FOR EIA

This section describes the Plan of Study for EIA as contemplated in regulation 29(1)(i) of R385 and sets out how the EIA will be conducted.

According to Government Notice R385, section 29(1)(i), a plan of study, must include the following:

(i) a description of the tasks that will be undertaken as part of the environmental impact assessment process, including any specialist reports or specialised processes, and the manner in which such tasks will be undertaken;
(ii) an indication of the stages at which the competent authority will be consulted;
(iii) a description of the proposed method of assessing the environmental issues and alternatives, including the option of not proceeding with the activity; and
(iv) particulars of the public participation process that will be conducted during the environmental impact assessment process.

6.1 EIA TASKS

The remainder of the EIA process will include Specialist Studies and an Integration and Assessment Phase; in parallel with these activities the EIA team will continue to interact with the Authorities and continue the public participation process.

6.1.1 Specialist Study Phase

It is anticipated that all the specialist studies will be completed by end December 2010. However, this timeframe is subject to the approval of this Scoping Report and Plan of Study for EIA by DEA.

6.1.2 Integration and Assessment Phase

The aim of this phase is to synthesise the findings of the specialist studies and relevant available information into a Draft EIR (including a draft EMP). Information will be presented in a clear and understandable format in order to present a document which is easy to comment on and will aid decision-making.

The Draft EIR and EMP will be published for a 40-day I&AP comment period. Registered I&APs will be notified of the release of the draft EIR and copies of the non-technical summary of the report will be distributed with the notification. Copies of the full report will be made available at key locations and on the project website.

Comments received on the Draft EIR and EMP will be collated and the EIA project team will provide an appropriate response to all comments. A

Comments and Response Report will be appended to the Final EIR, which will be submitted to DEA for decision-making.

Registered I&APs will be notified of the outcome of the decision-making process once an Environmental Authorisation (positive or negative) has been issued by DEA. The statutory appeals period will then follow.

The Integration and Assessment phase is anticipated to commence by December 2010. The commencement of this phase is, however, subject to the approval of the Final Scoping Report, including the Plan of Study for EIA.

6.1.3 Interaction with Authorities

DEA was consulted during the project initiation phase of the project to reach agreement on the way forward with the EIA process. DEA will be consulted again once the Scoping Report is submitted for approval, to ensure that all the requirements for Scoping have been met.

Once the Integration and Assessment phase of the EIA is underway, the next key interaction with DEA will be the submission of the Final EIR and EMP for authorisation. However, at the request of DEA, the consultants would be willing to present the findings of the impact assessment, prior to decision-making.

The Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) and The Northern Cape Department of Environment and Nature Conservation (DENC) (the provincial commenting authorites) will be engaged for their comments on the Draft EIR. SAHRA and Heritage Western Cape will be engaged for comments on submissions by the Heritage Specialists and Draft EIR.

6.1.4 Public Participation Activities

Public participation is an essential part of the EIA process. As such, a number of opportunities will exist for public involvement during the Integration and Assessment phase of the EIA. This will include the following:

- The Draft EIR will be released for a 40-day public review period.
- A notification letter will be sent to all registered I&APs on the project database. This letter will invite I&APs to comment on the Draft EIR and non-technical summary.
- News paper adverts will be placed in local newspapers notifying stakeholders of the availability of the Draft EIR report for review and inviting them to public meetings.
- Should sufficient stakeholder interest be should during the Scoping Phase a second round of public open days/public meetings will be convened to feedback to I&APs on the findings of the Draft EIR.

- I&APs will be notified of the Environmental Authorisation and the statutory appeal period.

6.2 SPECIALIST STUDIES

As discussed in *Section 5*, a number of issues have been identified during the Scoping Study. The following specialist studies have, therefore, been identified to address the key issues and data gaps:

- noise impact study;
- archaeological, cultural heritage and palaeontology impact study;
- visual and landscape impact study;
- vegetation and terrestrial ecology impact study;
- bird impact study;
- bat impact study;
- hydrology impact study; and
- socio-economic impact study.

During the Specialist Study phase, the appointed specialists will gather relevant data to provide a description of the affected environment. The understanding of the sensitivity of the affected environment will enable the specialist to identify and assess environmental and social impacts that might occur as a result of the proposed Project. They will assist the project team in assessing potential impacts (both negative impacts and benefits) according to a predefined assessment methodology (see *Section 6.3*). Specialists will also suggest ways in which negative impacts could be mitigated and benefits enhanced.

Specialists who will be responsible for the specialist studies identified are:

- Noise study – Adrian Jongens (Jongens Keet and Associates);
- Archaeological, cultural heritage and palaeontology study – Tim Hart (ACO Associates cc.);
- Visual and landscape study – Bernard Oberholzer and Quinton Lawson (Bernard Oberholzer Landscape Architects in association with Meirelles Lawson Burger Architects);
- Vegetation and terrestrial ecology impact study – Simon Todd (Simon Todd Consulting;
- Bird study – Andrew Jenkins (AVISENSE Ornithological Consulting);
- Bats study – Kate McEwan (Natural Scientific Services cc.);
- Hydrology study – David Swanepoel (ERM); and
- Social study – Kerryn McKune Desai (ERM).

The terms of reference for each of the specialist studies is included in *Table 6.1* below. The results of the specialist studies will be integrated into the EIR during the Integration and Assessment Phase.

Table 6.1 Terms of Reference for Specialist Studies

Specialist Study	Aim of the Study	Terms of Reference for Specialist Study
Noise	Assess the impacts that the proposed development may have on potentially sensitive noise receptors.	• Determine the land use zoning and identify all potential noise sensitive sites that could be impacted upon by activities relating to operation of the proposed wind energy facility. • Identify all noise sources relating to the activities of the facility during construction phase and operation phase that could potentially result in a noise impact at the identified noise sensitive sites. • Determine the sound emission, operating cycle and nature of the sound emission from each of the identified noise sources. • Calculate the combined sound power level due to the sound emissions of the individual noise sources. • Calculate the expected rating level of sound at the identified noise sensitive sites from the combined sound power level emanating from identified noise sources. • Determine the existing ambient levels of noise at identified noise sensitive sites by conducting representative sound measurements. • Determine the typical rating level for noise at the identified noise sensitive sites. • Calculate the noise impact at identified noise sensitive sites. • Assess the noise impact at identified noise sensitive sites in terms of SANS 10103; the Noise Control Regulations; the World Health Organisation. • Investigate alternative noise mitigation procedures, if required, in collaboration with the design engineers of the facility and estimate the impact of noise upon implementation of such procedures. • Prepare and submit an environmental noise impact report of the investigation containing detailed procedures and findings of the investigation. • Prepare and submit recommended noise mitigation procedures as part of a separate environmental noise management plan, if relevant.

Specialist Study	Aim of the Study	Terms of Reference for Specialist Study
Archaeology and Cultural Heritage	Determine the cultural heritage impacts associated with the construction and installation phase of the wind energy project.	• Collect secondary data on the occurrence and distribution of heritage, archaeological and paleontological sites in the project area. • Survey the project affected area, identify and describe sites of interest. • Explain how the different elements of the project may affect any archaeological, heritage and paleontological sites within the project area. • Evaluate the potential impacts on sites of interest. • Describe mitigation/management measures that may be implemented to avoid or reduce any negative impacts on these sites and enhance benefits of the development. • Provide recommendations for any ongoing monitoring that may be necessary. • Outline any further studies that may be required during or after the EIA process. • Liaise, submit and follow-up on all relevant permits, project applications and associated documents to the South African Heritage Resources Agency (SAHRA) and Heritage Western Cape (HWC), as required.
Visual	Assess the visual impact associated with the proposed development	• Collate all available spatial data for at least a 10 km radius around the study area. Data to include the following vector layers: farms, road, rivers, wetlands, informal settlements, towns, land use data and elevation and the following raster data: topographic maps and aerial photos. • Develop a 3D model of the study area using available aerial photos and 5 m contour data. • Use visual assessment tools to create a view shed analysis of the proposed development. The increase in view area will be calculated and shown. • Identify farms/neighbouring properties affected by the new viewsheds and provision of outputs in Excel spreadsheets. • Identify sensitive receptors in the viewsheds including towns, lodges, tourist routes etc. • Determine of the visual absorption capacity by means of graphic representation (photomontages) of the proposed development on 2D photographs taken from key locations. • Describe relevant and implementable mitigation measures to reduce, avoid, or minimise negative impacts and enhance positive impacts and recommendations. • Identify all relevant legislation, permits and standards that would apply to the development.

Specialist Study	Aim of the Study	Terms of Reference for Specialist Study

Vegetation and Terrestrial Ecology	Determine the impacts on vegetation and terrestrial ecology associated with the construction and installation phase of the wind energy project.	• Develop a description of the broad ecological characteristics of the site and its surrounds in terms of patchiness, patch size, relative isolation, connectivity, corridors, disturbance regimes, ecotones, buffering, viability, etc.
		• In terms of biodiversity pattern, the following will be identified and described where appropriate:
		  • Community and ecosystem level
		  • Species level
		  • Other pattern issues
		• In terms of biodiversity process, the following will be identified or described:
		  • The key ecological 'drivers' of ecosystems on the site and in the vicinity, such as fire and grazing.
		  • Environmental gradients (e.g. upland-lowland), biome boundaries, soil interfaces or sand movement corridors on the site or in its vicinity.
		  • Any possible changes in key processes, e.g. increased fire frequency or drainage/artificial recharge of aquatic systems.
		  • The condition and functioning of rivers and wetlands (if present) in terms of: possible changes to the channel, flow regime and naturally-occurring riparian vegetation.
		• Undertake an assessment of impacts on flora, habitats and fauna, identifying appropriate mitigation measures and enhancement techniques where appropriate.

Birds	Determine the impact the proposed development may have on birds.	• Compile an up to date but brief review of the latest international literature on bird-wind farm interactions, the latter to inform the EIA and associated recommendations on suitability, siting and mitigation of impacts. • Undertake a site visit to directly assess the habitats present within the inclusive impact zone, and to determine the *in situ* avifauna and identify any known or potential bird flight corridors present in the area. • The on-site information will be integrated with bird atlas (SABAP 1 & 2) and any other relevant bird data available for the general area to develop an inclusive, annotated list of the avifauna expected to occur on the site (expanding on an initial list compiled at the scoping phase). • Particular attention will be paid to Red-listed, endemic, restricted-range and known, collision, displacement or disturbance-prone species on each list and they would be highlighted for particular attention in evaluating the risks posed by a wind farm development. • The EIA report will also address the need to conduct before-and-after monitoring of bird populations at the selected site, so that we can learn as much as possible about wind farm impacts on local avifauna.

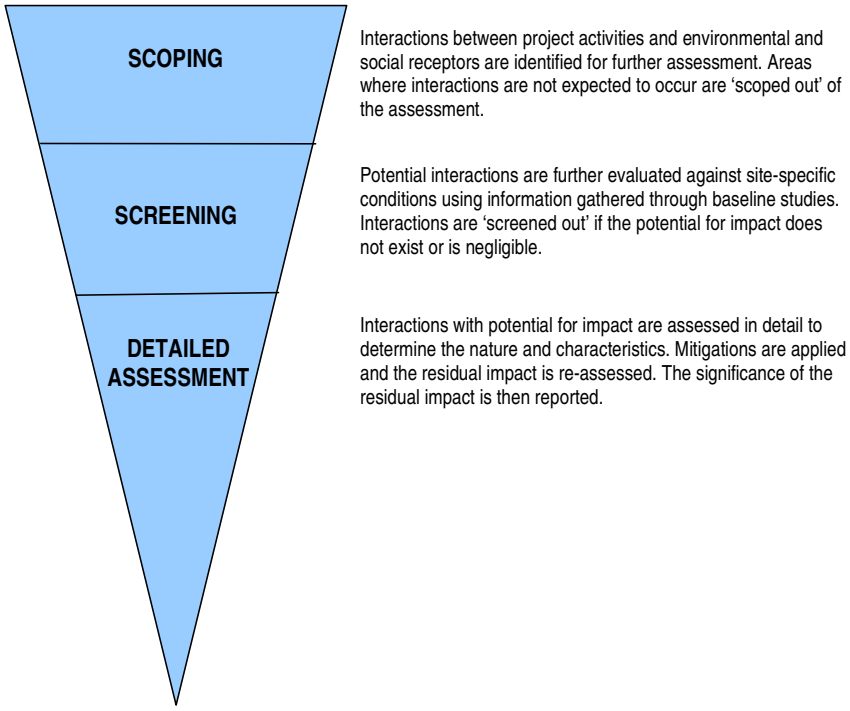
Specialist Study	Aim of the Study	Terms of Reference for Specialist Study
Bats	Determine the impact the proposed development may have on bats.	• Identify through echolocation calls the level of bat activity as well as bat species at the site. • Supplement acoustic data with searches for bat roosts (caves, buildings, road culverts, bridges, etc). • Identify and describe potential sensitive areas or habitats for bats that may be impacted by the construction and operational activities. • Assess potential impacts on bats from the construction and operation activities. • Describe mitigation/management measures that may be implemented to avoid or reduce any negative impacts and enhance benefits of the development that can be incorporated into the project design. • Provide recommendations for any ongoing monitoring that may be necessary. • Outline any further studies that may be required during or after the EIA process. • Identify all relevant legislation, permits and standards that would apply to the development.
Hydrology	Determine the impacts on hydrology associated with the proposed development.	Using secondary data sources such as maps, site visit reports, photographs, satellite images, atlases, reports ad GIS data: • Provide a baseline description of the hydrological, geological and physical characteristics of the site area that may be affected by the proposed project activities. • Identify areas that are potentially sensitive to erosion. • Identify impacts on surface water and run-off associated with the proposed project. • Describe the groundwater resource of the area and assess any potential impacts on this resource. • Describe relevant and implementable mitigation measures to reduce, avoid, or minimise negative impacts and enhance positive impacts and recommendations. • Identify all relevant legislation, permits and standards that would apply to the development.
Socio-economic	Assess the socio-economic impact associated with the proposed development	• Provide a baseline description of the socio-economic environment that may be affected by the proposed project activities. • The baseline description will be derived from secondary data (range of sources, including but not limited to, census data, existing reports, and IDP and other strategic planning documents) and primary data collection (using a combination of telephonic, face-to-face and focus group interviews). • Identify and assess socio-economic impacts (direct, indirect and cumulative) that may result from the construction and operation phases of the project. • Recommend mitigation measures that addresses the local context and needs. • Identify all relevant legislation, permits and standards that would apply to the development.

6.3 IMPACT ASSESSMENT METHODOLOGY

6.3.1 Impact Assessment Process

The following diagram (*Figure 6.1*) describes the impact identification and assessment process through scoping, screening and detailed impact assessment. The methodology for detailed impact assessment is outlined in *Section 6.3.2* below.

Figure 6.1 Impact Assessment Process



6.3.2 Detailed Assessment Methodology

The purpose of impact assessment and mitigation is to identify and evaluate the significance of potential impacts on identified receptors and resources according to defined assessment criteria; to develop and describe measures that will be taken to avoid or minimise any potential adverse effects and enhance potential benefits; and to report the significance of the residual impacts that remain following mitigation.

Impact Types and Definitions

An impact is any change to a resource or receptor brought about by the presence of a Project component or by the execution of a Project related activity. The evaluation of baseline data provides crucial information for the process of evaluating and describing how the Project could affect the biophysical and socio-economic environment.

Impacts are described as a number of types as summarised in *Table 6.2*. Impacts are also described as *associated*, those that will occur, and *potential,* those that may occur.

Table 6.2 Impact Nature and Type

Nature or Type	Definition
Positive	An impact that is considered to represent an improvement on the baseline or introduces a positive change.
Negative	An impact that is considered to represent an adverse change from the baseline, or introduces a new undesirable factor.
Direct	Impacts that result from a direct interaction between a planned project activity and the receiving environment/receptors (e.g. between occupation of a site and the pre-existing habitats or between an effluent discharge and receiving water quality).
Indirect	Impacts that result from other activities that are encouraged to happen as a consequence of the Project (e.g. in-migration for employment placing a demand on resources).
Cumulative	Impacts that act together with other impacts (including those from concurrent or planned future third party activities) to affect the same resources and/or receptors as the Project.

Significance

Impacts are described in terms of '*significance*'. Significance is a function of the **magnitude** of the impact and the **likelihood** of the impact occurring. Impact magnitude (sometimes termed *severity*) is a function of the **extent, duration and intensity** of the impact. The criteria used to determine significance are summarised in *Table 6.3.* Once an assessment is made of the magnitude and likelihood, the impact significance is rated through a matrix process as shown in *Table 6.4*. For ease of review, the significance is colour-coded in the text according to *Table 6.5*. *Table 6.6* outlines the various definitions for significance of an impact.

Significance of an impact is qualified through a statement of the **degree of confidence**. Confidence in the prediction is a function of uncertainties, for example, where information is insufficient to assess the impact. Degree of confidence is expressed as low, medium or high.

Table 6.3 Significance Criteria

Magnitude – the degree of change brought about in the environment	
Extent	**On-site** – impacts that are limited to the Site Area only. **Local** – impacts that affect an area in a radius of 20 km around the development area. **Regional** – impacts that affect regionally important environmental resources or are experienced at a regional scale as determined by administrative boundaries, habitat type/ecosystems. **National** – impacts that affect nationally important environmental resources or affect an area that is nationally important/ or have macro-economic consequences. **Transboundary/International** – impacts that affect internationally important resources such as areas protected by international conventions.

Duration	**Temporary** – impacts are predicted to be of short duration and intermittent/occasional. **Short-term** – impacts that are predicted to last only for the duration of the construction period. **Long-term** – impacts that will continue for the life of the Project, but ceases when the Project stops operating. **Permanent** – impacts that cause a permanent change in the affected receptor or resource (e.g. removal or destruction of ecological habitat) that endures substantially beyond the Project lifetime.
Intensity (1)	BIOPHYSICAL ENVIRONMENT: *Intensity can be considered in terms of the sensitivity of the biodiversity receptor (ie habitats, species or communities).* **Negligible** – the impact on the environment is not detectable. **Low** – the impact affects the environment in such a way that natural functions and processes are not affected. **Medium** – where the affected environment is altered but natural functions and processes continue, albeit in a modified way. **High** – where natural functions or processes are altered to the extent that it will temporarily or permanently cease.
	SOCIO-ECONOMIC ENVIRONMENT: *Intensity can be considered in terms of the ability of project affected people/communities to adapt to changes brought about by the Project.* **Negligible** – there is no perceptible change to people's way of life. **Low** - People/communities are able to adapt with relative ease and maintain pre-impact livelihoods. **Medium** - Able to adapt with some difficulty and maintain pre-impact livelihoods but only with a degree of support. **High** - Those affected will not be able to adapt to changes and continue to maintain-pre impact livelihoods.

Likelihood - the likelihood that an impact will occur	
Unlikely	The impact is unlikely to occur.
Likely	The impact is likely to occur under most conditions.
Definite	The impact will occur.

(1) The frequency of the activity causing the impact also has a bearing on the intensity of the impact, ie the more frequent the activity, the higher the intensity.

Table 6.4 Significance Rating Matrix

SIGNIFICANCE				
		LIKELIHOOD		
		Unlikely	**Likely**	**Definite**
MAGNITUDE	**Negligible**	Negligible	Negligible	Minor
	Low	Negligible	Minor	Minor
	Medium	Minor	Moderate	Moderate
	High	Moderate	Major	Major

Table 6.5 Significance Colour Scale

Negative ratings	Positive ratings
Negligible	Negligible
Minor	Minor
Moderate	Moderate
Major	Major

Table 6.6 Significance Definitions

Significance definitions	
Negligible significance	An impact of negligible significance is where a resource or receptor will not be affected in any way by a particular activity, or the predicted effect is deemed to be imperceptible or is indistinguishable from natural background levels.
Minor significance	An impact of minor significance is one where an effect will be experienced, but the impact magnitude is sufficiently small and well within accepted standards, and/or the receptor is of low sensitivity/value.
Moderate significance	An impact of moderate significance is one within accepted limits and standards. The emphasis for moderate impacts is on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that "moderate" impacts have to be reduced to "minor" impacts, but that medium impacts are being managed effectively and efficiently.
Major significance	An impact of major significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. A goal of the EIA process is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied). An example might be the visual impact of a development. It is then the function of regulators and stakeholders to weigh such negative factors against the positive factors, such as employment, in coming to a decision on the Project.

For activities with significant impacts, the Project would be required to identify suitable and practical mitigation measures and fully implement them. The implementation of the mitigations is ensured through the EMP.

Once the mitigation is applied, each impact is re-evaluated, assuming that the mitigation measure is effectively applied, and any remaining impact is rated once again using the process outlined above. The result is a significance rating for the residual impact.

6.4 PROJECT TIMING

Table 6.7 outlines the current timeline of the assessment process going forward.

Table 6.7 Planned Schedule for Future Activities

Task	Date
Stakeholder Comment on Scoping Report and Plan of Study for EIA	Oct/Nov 2010
Finalise Scoping Report and Plan of Study for EIA and submit to DEA	Nov 2010
Specialist studies	Sept – Dec 2010
Prepare Draft EIR and EMP	Dec 2010 - Jan 2011
Stakeholder Comment on Draft EIR and EMP	Feb/Mar 2011
Finalise and submit EIR and EMP to DEA	Apr 2011

All additional comments received during the review of this Scoping Report and associated public participation activities will be assimilated and incorporated into a Comments and Responses Report which will be appended to the Final Scoping Report. The Final Scoping Report will be submitted to DEA for approval. On acceptance of the Final Scoping Report by DEA, the EIA will proceed to the next phase, the Specialist Studies and Impact Assessment Integration Phase.

I&APs will be notified of the availability of the Draft EIR for comment.

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