

ENVIRONMENTAL IMPACT ASSESSMENT PROCESS
FINAL SCOPING REPORT

PROPOSED WIND ENERGY FACILITY
AND ASSOCIATED INFRASTRUCTURE

WESTERN CAPE PROVINCE
(DEAT Ref No. 12/12/20/913)

September 2007

Prepared for
Eskom Holdings Limited
PO Box 1091
Johannesburg
2000



Prepared by
Savannah

ENVIRONMENTAL (PTY) LTD

216 Weltevreden Road, Northcliff, Gauteng, 2195
PO Box 148, Sunninghill, 2157
Tel: +27 (0)11 234 6621 • Fax: +27 (0)86 684 0547
E-mail: karen@savannahsa.com
www.savannahsa.com



PROJECT DETAILS

- DEAT Reference No.** : 12/12/20/913
- Title** : Environmental Impact Assessment Process
Final Scoping Report: Proposed Wind Energy Facility and Associated Infrastructure, Western Cape Province
- Authors** : Savannah Environmental (Pty) Ltd
Karen Jodas & Jo-Anne Thomas
- Specialists** : Nick Helme Botanical Surveys
Department of Botany & Zoology, Stellenbosch University
Endangered Wildlife Trust (EWT)
Agricultural Research Council (ARC): Institute for Soil, Climate & Water
Dr Peter Illgner
Geological and Environmental Services (GES)
CSIR - Environmentek
Jongens Keet & Associates (JKA)
The Journey
Archaeology Contracts Office (ACO), Department of Archaeology: University of Cape Town
MetroGIS
Arup SA (Pty) Ltd
Tony Barbour
- Client** : Eskom Holdings Limited (Eskom Generation Division)
- Report Status** : Final Scoping Report for submission to National DEAT and Western Cape DEA&DP for review
- Submission date** : 27 September 2007

When used as a reference this report should be cited as: Savannah Environmental (2007) Final Scoping Report: Proposed Wind Energy Facility and Associated Infrastructure, Western Cape Province

COPYRIGHT RESERVED

This technical report has been produced for Eskom Holdings Limited. The intellectual property contained in this report remains vested in Savannah Environmental. No part of the report may be reproduced in any manner without written permission from Savannah Environmental (Pty) Ltd.

PURPOSE OF THE SCOPING REPORT

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

This Final Scoping Report represents the outcome of the Scoping Phase of the EIA process and contains the following sections:

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

Chapter 2 provides the strategic context for energy planning in South Africa

Chapter 3 describes wind energy as a power option and provides insight to technologies for wind turbines

Chapter 4 provides a description of the processes followed in the determination of acceptable sites for the development of a Wind Energy Facility on the West Coast

Chapter 5 outlines the process which was followed during the Scoping Phase of the EIA process, including the consultation program that was undertaken and input received from interested parties

Chapter 6 describes the existing biophysical and socio-economic environment

Chapter 7 describes the activities associated with the project (project scope)

Chapter 8 presents the evaluation of environmental impacts

Chapter 9 presents the conclusions of the scoping evaluation

Chapter 10 describes the Plan of Study for EIA

Chapter 11 provides a list of references and information sources used in undertaking the studies for this Scoping Report.

In accordance with the EIA Regulations, a primary purpose of the Draft Scoping Report was to provide stakeholders with an opportunity to verify that the issues they had raised through the process had been captured and adequately considered within the study, and provide the opportunity to raise any additional key issues for consideration. The Final Scoping Report has incorporated all issues and responses from stakeholders prior to submission to the National Department of Environmental Affairs and Tourism (DEAT), the decision-making authority for the project.

PUBLIC REVIEW OF THE DRAFT SCOPING REPORT

The Draft Scoping Report was made available for public review at the following public places in the project area from 15 August 2007 to 14 September 2007:

- » CapeNature in Van Rhynsdorp
- » Department of Agriculture - Vredendal
- » Vredendal Library
- » Lutzville -Municipal Office
- » Lutzville Farmers Association
- » Ebenhaeser – Post Office
- » Strandfontein - Municipal Office
- » Doringbaai - Municipal Office
- » Matzikama Municipal Office
- » Matzikama Business Chamber
- » West Coast District Municipality in Moorreesburg

The report was also made available on:

- » www.eskom.co.za/eia
- » www.savannahSA.com

Comments were requested to be submitted to Shawn Johnston of Sustainable Futures ZA by 14 September 2007 as written submission via fax, post or e-mail.

PUBLIC MEETING: SCOPING FEEDBACK

In order to facilitate comments on the draft report, a public meeting was held during the review period for the Draft Scoping Report. All interested and affected parties were invited to attend the public meeting held on 22 August 2007 at the Lutzville Hotel (Open House at 17:00-19:00 and Public Meeting at 19:30). The meeting was advertised in the local and regional printed media and registered I&APs were invited to attend. In addition, a meeting for key stakeholders was held in Cape Town on 23 August 2007. Registered key stakeholders were invited to attend (minutes of these meetings are included as Appendix K).

SUMMARY

Background and Project Overview

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

This commercial wind energy facility development is proposed to comprise a cluster of up to **100 wind turbines** (typically described as a wind energy facility or a wind farm) to be constructed over an area of approximately **25 km²** in extent. A broader site of ~37 km², off-set at a distance of 2 km from the coastline, was identified through a regional site identification process. This site falls within the Matzikama Local Municipality and the DMA of Western Cape Municipal Area 1 (WCMA01) on the West Coast, and comprises portions of the farms:

- » Portion 5 of the farm Gravewaterkop 158 (known as Skaapvlei)
- » A portion of Portion 620 of the farm Olifants River Settlement
- » A portion of Portion 617 of the farm Olifants River Settlement

This broader site was proposed for further investigation through an Environmental Impact Assessment (EIA) process. As required in terms of Regulation 16(1) of the NEMA EIA Regulations, the required letter of consent has been obtained from the affected landowners.

The construction of the facility is proposed to be **phased**, with a first phase of the project planned to generate a 100 MW (approximately fifty (50) 2 MW industry standard turbines). The total facility would, however, not exceed one hundred (100) turbines on the proposed site. The infrastructure associated with the total Wind Energy Facility would, therefore, include:

- » Up to 100 **wind turbine units** (approximately 80m high steel tower and nacelle; 90m diameter rotor (consisting of three 45m blades)).
- » A concrete **foundation** (of 15m x 15m) to support each turbine tower.
- » Underground electrical **cabling** between turbines and substation.

- » One or more **substations** (approximately 80m X 80m footprint).
- » Overhead **powerlines** (132 kV distribution lines) from the wind farm substation/s feeding into the electricity distribution network/grid at the Koekenaap Distribution Substation or the Juno Transmission Substation (near Vredendal).
- » An **access/haul road** to the site from the main R363 road at Koekenaap
- » **Internal access road** to each wind turbine (approximately 6m in width)
- » Possibly a small office building and **visitors centre** at the facility entrance.

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

Environmental Impact Assessment

The proposed wind energy facility project is subject to the requirements of the Environmental Impact Assessment Regulations (EIA Regulations) published in Government Notice 28753 of 21 April 2006, in terms of Section 24(5) of the National Environmental Management Act (NEMA, No 107 of 1998). In terms of sections 24 and 24D of NEMA, as read with Government Notices R385

(Regulations 27–36) and R387, a Scoping and EIA are required to be undertaken for this proposed project.

The National Department of Environmental Affairs and Tourism (DEAT) is the competent authority for this project as Eskom is a statutory body. An application for authorisation has been accepted by DEAT (under Application Reference number 12/12/20/913). Through the decision-making process, DEAT will be supported by the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP).

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

A comprehensive public participation process was undertaken in accordance with Regulation 56 of Government Notice No R385 of 2006 during the Scoping phase of this EIA

process. This public participation process comprised the following:

- » **Notification of the EIA Process** in local, regional and national newspapers and on site, as well as through written notification to identified stakeholders and affected landowners
- » **Identification and registration** of interested and affected parties (I&APs) and key stakeholders.
- » Compilation and distribution of a **Background Information Document** (BID) to all identified I&APs and key stakeholders
- » **On-going consultation** with identified I&APs and stakeholders, including:
 - * Focus group meetings
 - * One-on-one and telephonic consultation
 - * Written, faxed or e-mail correspondence
- » Compilation and maintenance of a **register** containing the names and addresses of all identified I&APs and key stakeholders
- » Preparation of an **Issues and Response Report** detailing key issues raised by I&APs as part of the EIA Process.
- » Opportunity for public review and comment of the **Draft Scoping Report** (30-day review period).

Project Alternatives

Through the regional assessment site identification and selection process, Eskom were guided to site/locate their proposed wind energy facility within an area/zone of preference.

No location/site alternatives are, therefore required to be considered further. The following project alternatives, however, will be investigated in the EIA:

- » **The 'do nothing' alternative:** Eskom does not establish a wind energy facility in the Western Cape (maintain status quo). This alternative will not assist Eskom or the South African government in reaching their set targets for renewable energy. In addition, the Western Cape power supply will not benefit from the additional generated power being evacuated directly into the Province's grid. This is, therefore, not a preferred alternative.
- » **Site-specific alternatives:** in terms of turbine positions within the broader 37 km² area. Once sufficient information is available from an environmental and planning perspective for the site, a detailed micro-siting exercise (through the use of specialist software) will be undertaken to effectively 'design' the wind energy facility. This micro-siting information will then be provided, and will inform the specialist impact assessments at the EIA phase. The planning process will also include the positioning of other ancillary infrastructure, including access roads, laydown areas and substation sites. This alternative will, therefore, be considered in extensive detail in the EIA phase.

- » **Alternative technologies:** for use in the establishment of the wind facility. There is a limited range of alternative technologies (turbines) for commercial scale wind energy facilities. In addition, the technology is constantly evolving. There are no significant differences from an environmental perspective between technologies. Eskom will embark on a competitive process (i.e. call for bids from suppliers) to arrive at the most cost-effective solution.
- » **Transportation Route Alternatives:** for transportation of all components associated with the project to the site. The various transportation options (harbour, rail, air, road), as well as the possible routes associated with these options were assessed through the specialist transportation study.
- » **Alternative servitudes for powerline routing:** A 132 kV powerline is proposed to connect the substation/s at the wind energy facility to the electricity distribution network/grid at either the Koekenaap Distribution Substation or the Juno Transmission Substation (outside Vredendal). Network planning and design for the transmission of the power generated is still being finalised. Alternative routes/corridors for the 132 kV powerline will be assessed in the EIA phase. The powerline servitude options available at this time are proposed to follow other existing linear infrastructure

(including roads and or other powerlines) as closely as possible to consolidate linear infrastructure in the area, and to minimise the need for additional points of access.

Issues Identified as being associated with the Construction, Operation and Decommissioning of Wind Energy Facilities

Construction activities for wind energy projects typically include land clearing for site preparation and access routes; excavation and filling; transportation of supply materials and fuels; construction of foundations involving excavations and placement of concrete; operating cranes for unloading and installation of equipment; and commissioning of new equipment. Decommissioning activities may include removal of project infrastructure and site rehabilitation. Environmental issues associated with these construction and decommissioning activities may include, among others, noise and vibration, soil erosion, and threats to biodiversity and ecological processes, including habitat alteration and impacts to wildlife. Due to the typically remote location of wind energy conversion facilities, the transport of equipment and materials during construction and decommissioning may present logistical challenges.

Environmental issues specific to the operation of a wind energy facility include visual impacts; noise produced by the spinning of rotor

blades; avian/bat mortality resulting from collisions with blades; mortality, injury and disturbance to other species; and light and illumination issues.

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

Evaluation of the Proposed Site for Development of a Wind Energy Facility on the West Coast

Issues identified through a scoping evaluation of the proposed wind energy facility on the West Coast include impacts on **biodiversity and ecological processes**, including habitat alteration and impacts to wildlife, **visual** impacts, potential impacts on **heritage** sites, soil **erosion**, **noise** produced by the spinning of rotor blades; **avian/bat mortality** resulting from collisions with blades; and **transportation** of equipment and materials.

The majority of potential impacts identified to be associated with the construction and operation of the proposed wind energy facility are anticipated to be localised and restricted to the proposed site. No environmental fatal flaws were identified to be associated with the site, and no absolute 'no-go' areas were identified within the broader area evaluated. However, a number of potentially sensitive areas have been identified through the scoping

evaluation. These areas should be considered in the micro-siting of the wind turbines, and avoided as far as possible.

Potentially sensitive areas include:

- » The sparse vegetation on clay soils, all rocky areas, and all Sand Fynbos areas were assessed as having a medium to high sensitivity, and should ideally have limited disturbance through the construction of infrastructure in these areas.
- » The three small non-perennial pans that may hold water after rainfall. By definition, a pans is considered a wetland and may be potentially sensitive in terms of vegetation and the provision of habitats to terrestrial fauna and birds. These pans and an associated buffer zones (of approximately 100 m) should be excluded from the development footprint.
- » Unvegetated and largely unvegetated aeolian dunes represent a high erosion risk and should be avoided for the siting of infrastructure wherever possible.
- » The southern corner of the proposed site should not be considered for the placement or development of infrastructure that poses a contamination risk to the groundwater resource unless site-specific groundwater studies indicate otherwise.

As a result of the area being previously disturbed (through grazing and agricultural practises),

the least sensitive area identified is the previously cultivated area located on large parts of Portion 5 of Gravewaterkop 158 (i.e. Skaapvlei).

The findings of the environmental scoping study do not, therefore, identify any portion of the proposed study sites as of high sensitivity prohibiting the development. The proposed design of the wind farm (i.e. wind turbines and other infrastructure) can be based on the full extent of the 37 km² site, and can therefore utilise the most technically optimal positions on the broader site to the fullest extent.

This recommendation does, however, require that due cognisance is taken of the recommendations outlined in scoping report (as well as within individual specialist reports) regarding sites of potential moderate to high sensitivity. Understanding which area of the site would be least impacted by the development of such a facility, Eskom should prepare the detailed infrastructure layouts for consideration within the EIA phase.

Evaluation of the Potential Issues Associated with the Proposed 132 kV Powerline

Potential issues identified to be associated with the proposed overhead powerline include impacts on **flora**, **fauna** and **ecological processes**, impacts on **avifauna** as

a result of collisions and electrocutions, potential impacts on **heritage** sites and **visual** impacts. In order to minimise potential impacts associated with the proposed powerline, it is recommended that the powerline alignment follow **existing linear infrastructure** (i.e. roads, other powerlines, etc.) as far as possible. The alternatives of connecting the powerline into the electricity distribution network/grid at the Koekenaap Distribution Substation or the Juno Transmission Substation will be considered in detail within the EIA phase in order to assess potential impacts associated with the powerline corridor and make recommendations regarding a preferred alternative alignment and appropriate mitigation measures.

Conclusion and the Way Forward

No environmental fatal flaws were identified to be associated with the development of the proposed wind energy facility, and no absolute 'no-go' areas were identified within the broader area evaluated. However, a number of issues requiring further study for both the wind energy development site as well as the associated infrastructure (including the overhead powerline and access road) have been highlighted. These issues will be assessed in detail within the EIA phase of the process.

TABLE OF CONTENTS

| | PAGE |
|--|------------|
| PURPOSE OF THE SCOPING REPORT..... | II |
| SUMMARY | IV |
| TABLE OF CONTENTS..... | X |
| DEFINITIONS AND TERMINOLOGY | XIV |
| ABBREVIATIONS AND ACRONYMS..... | XIX |
| CHAPTER 1: INTRODUCTION | 1 |
| 1.1. THE NEED FOR THE PROPOSED PROJECT..... | 1 |
| 1.2. BACKGROUND TO THE PROJECT | 1 |
| 1.3. PROJECT OVERVIEW..... | 2 |
| 1.4. REQUIREMENT FOR AN ENVIRONMENTAL IMPACT ASSESSMENT PROCESS..... | 5 |
| 1.5. OBJECTIVES OF THE SCOPING PHASE | 7 |
| 1.6. DETAILS OF ENVIRONMENTAL ASSESSMENT PRACTITIONER AND EXPERTISE TO CONDUCT THE SCOPING AND EIA | 8 |
| CHAPTER 2: STRATEGIC CONTEXT FOR ENERGY PLANNING..... | 10 |
| 2.1. STRATEGIC ELECTRICITY PLANNING IN SOUTH AFRICA | 10 |
| 2.1.1. <i>White Paper on the Energy Policy of the Republic of South Africa, 1998</i> | <i>11</i> |
| 2.1.2. <i>Renewable Energy Policy in South Africa</i> | <i>11</i> |
| 2.1.3. <i>Integrated Energy Plan (IEP) – 2003</i> | <i>13</i> |
| 2.1.4. <i>National Integrated Resource Plan (NIRP), 2003/2004.....</i> | <i>13</i> |
| 2.1.5. <i>Integrated Strategic Electricity Planning (ISEP) in Eskom.....</i> | <i>14</i> |
| 2.1.6. <i>Eskom Renewable Energy Strategy.....</i> | <i>15</i> |
| 2.2. STRATEGIC ELECTRICITY PLANNING IN THE WESTERN CAPE | 16 |
| 2.2.1. <i>Draft Western Cape Integrated Energy Strategy.....</i> | <i>16</i> |
| 2.2.2. <i>Regional Methodology for Wind Energy Site Selection: a Guideline Document prepared by DEA&DP.....</i> | <i>17</i> |
| 2.3. PROJECT PLANNING AND THE SITE-SPECIFIC ENVIRONMENTAL IMPACT ASSESSMENT | 22 |
| CHAPTER 3: WIND ENERGY AS A POWER GENERATION OPTION..... | 24 |
| 3.1. INVESTIGATIONS INTO WIND ENERGY FOR SOUTH AFRICA..... | 24 |
| 3.2. THE IMPORTANCE OF THE WIND RESOURCE FOR ENERGY GENERATION..... | 25 |
| 3.3. WHAT IS A WIND TURBINE AND HOW DOES IT WORK..... | 28 |
| 3.3.1. <i>Main Components of a Wind Turbine.....</i> | <i>30</i> |
| 3.3.2. <i>Operating Characteristics of a Wind Turbine.....</i> | <i>32</i> |
| 3.3.3. <i>Understanding the Betz Limit.....</i> | <i>32</i> |
| 3.4. WIND ENERGY AS A POWER OPTION FOR THE WEST COAST | 33 |

CHAPTER 4: DETERMINATION OF ACCEPTABLE SITES FOR THE DEVELOPMENT OF A WIND ENERGY FACILITY ON THE WEST COAST 34

| | | |
|--------|--|-----------|
| 4.1. | IDENTIFICATION OF THE WEST COAST AREA FOR FURTHER INVESTIGATION..... | 34 |
| 4.2. | SELECTION OF POTENTIAL SITES | 35 |
| 4.3. | METHODOLOGY IN DETERMINING AREAS CONSIDERED ACCEPTABLE FOR THE DEVELOPMENT OF A WIND ENERGY FACILITY WITHIN THE IDENTIFIED STUDY AREA | 36 |
| 4.3.1. | <i>STEP 1: Review of the Methodology proposed by DEA&DPs guideline document.....</i> | <i>37</i> |
| 4.3.2. | <i>STEP 2: Consultation with key Stakeholders in the area through meetings</i> | <i>37</i> |
| 4.3.3. | <i>STEP 3: Defining the study area.....</i> | <i>37</i> |
| 4.3.4. | <i>STEP 4: Undertaking the Regional Assessment, based on the Regional Methodology proposed by DEA&DP's guideline document</i> | <i>38</i> |
| 4.3.5. | <i>STEP 5: Consideration of technical criteria</i> | <i>38</i> |
| 4.4. | APPROACH IN DETERMINING AREAS CONSIDERED ACCEPTABLE FOR THE DEVELOPMENT OF A WIND ENERGY FACILITY WITHIN THE IDENTIFIED STUDY AREA (FOLLOWING THE REGIONAL METHODOLOGY PROPOSED BY DEA&DP) | 39 |
| 4.4.1. | <i>Input Data Layers</i> | <i>39</i> |
| 4.4.2. | <i>Mapping the Input Layers.....</i> | <i>40</i> |
| 4.4.3. | <i>Composite Result - Preferred Areas for Development</i> | <i>44</i> |
| 4.5. | DISCUSSION OF TECHNICAL FACTORS AFFECTING THE PLACEMENT OF A WIND ENERGY FACILITY | 52 |
| 4.5.1. | <i>Wind Resource Data and its Relevance to Wind Energy Facilities ..</i> | <i>53</i> |
| 4.5.2. | <i>The Terrain and its Relevance to Wind Energy Facilities</i> | <i>53</i> |
| 4.5.3. | <i>Consideration of Technical Factors.....</i> | <i>57</i> |
| 4.6. | FEASIBLE ALTERNATIVE FOR CONSIDERATION WITHIN THE EIA PROCESS..... | 60 |

CHAPTER 5: APPROACH TO UNDERTAKING THE SCOPING PHASE..... 65

| | | |
|--------|--|-----------|
| 5.1. | OBJECTIVES OF THE SCOPING PHASE | 65 |
| 5.2. | REGULATORY AND LEGAL CONTEXT | 66 |
| 5.2.1. | <i>Regulatory Hierarchy.....</i> | <i>66</i> |
| 5.2.2. | <i>Legislation and Guidelines that have informed the preparation of this Scoping Report.....</i> | <i>68</i> |
| 5.2.3. | <i>Land Use Planning and other legal implications.....</i> | <i>72</i> |
| 5.3. | OVERVIEW OF THE SCOPING PHASE | 73 |
| 5.3.1. | <i>Authority Consultation and Application for Authorisation in terms of GN No R385 of 2006</i> | <i>73</i> |
| 5.3.2. | <i>I&AP Identification, Registration and the Creation of an Electronic Database</i> | <i>74</i> |
| 5.3.3. | <i>Notification of the EIA Process</i> | <i>75</i> |
| 5.3.4. | <i>Public Involvement and Consultation.....</i> | <i>76</i> |
| 5.3.5. | <i>Identification and Recording of Issues and Concerns</i> | <i>78</i> |
| 5.3.6. | <i>Evaluation of Issues Identified through the Scoping Process.....</i> | <i>78</i> |
| 5.3.7. | <i>Public Review of Draft Scoping Report and Feedback Meeting</i> | <i>79</i> |

| | | |
|--|---|------------|
| 5.3.8. | <i>Final Scoping Report</i> | 80 |
| CHAPTER 6: DESCRIPTION OF THE AFFECTED ENVIRONMENT | | 81 |
| 6.1. | LOCATION OF THE STUDY AREA..... | 81 |
| 6.2. | CLIMATIC CONDITIONS | 82 |
| 6.3. | REGIONAL SETTING | 84 |
| 6.4. | SOCIAL CHARACTERISTICS OF THE STUDY AREA AND SURROUNDS..... | 87 |
| 6.4.1. | <i>Demographic Profile</i> | 88 |
| 6.4.2. | <i>Economic Profile</i> | 89 |
| 6.5. | BIOPHYSICAL CHARACTERISTICS OF THE STUDY AREA AND SURROUNDS..... | 90 |
| 6.5.1. | <i>Geographical Profile</i> | 90 |
| 6.5.2. | <i>Ecological Profile</i> | 93 |
| CHAPTER 7: SCOPE OF THE WIND ENERGY FACILITY PROJECT | | 100 |
| 7.1. | PROJECT ALTERNATIVES | 100 |
| 7.2. | PROJECT CONSTRUCTION PHASE..... | 105 |
| 7.1.1. | <i>Conduct Surveys</i> | 107 |
| 7.1.2. | <i>Establishment of Access Roads to the Site</i> | 107 |
| 7.1.3. | <i>Undertake Site Preparation</i> | 108 |
| 7.1.4. | <i>Construct Foundation</i> | 108 |
| 7.1.5. | <i>Transport of Components and Equipment to Site</i> | 109 |
| 7.1.6. | <i>Establishment of Lay Down Areas on Site</i> | 110 |
| 7.1.6. | <i>Construct Turbine</i> | 110 |
| 7.1.7. | <i>Construct Substation/s</i> | 112 |
| 7.1.8. | <i>Establishment of Ancillary Infrastructure</i> | 114 |
| 7.1.9. | <i>Connection of Wind Turbines to the Substation</i> | 114 |
| 7.1.10. | <i>Connect Substation/s to Power Grid</i> | 114 |
| 7.1.11. | <i>Commissioning</i> | 114 |
| 7.1.12. | <i>Undertake Site Remediation</i> | 115 |
| 7.2. | PROJECT OPERATION PHASE | 115 |
| 7.2.1. | <i>Maintenance</i> | 115 |
| 7.3. | DECOMMISSIONING | 115 |
| 7.3.1. | <i>Site Preparation</i> | 116 |
| 7.3.2. | <i>Disassemble and Replace Existing Turbine</i> | 116 |
| CHAPTER 8: SCOPING OF ISSUES ASSOCIATED WITH THE WIND ENERGY FACILITY ON THE WEST COAST | | 117 |
| CHAPTER 9: CONCLUSIONS | | 140 |
| 9.1. | CONCLUSIONS DRAWN FROM THE EVALUATION OF THE PROPOSED SITE FOR DEVELOPMENT OF A WIND ENERGY FACILITY | 141 |
| 9.2. | CONCLUSIONS DRAWN FROM THE EVALUATION OF THE POTENTIAL ISSUES ASSOCIATED WITH THE PROPOSED 132 kV POWERLINE | 144 |
| CHAPTER 10: PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT | | 146 |

| | | |
|-------------------------------------|--|------------|
| 10.1. | AIMS OF THE EIA PHASE | 146 |
| 10.2. | AUTHORITY CONSULTATION | 147 |
| 10.3. | CONSIDERATION OF ALTERNATIVES | 147 |
| 10.4. | ASSESSMENT OF POTENTIAL IMPACTS AND RECOMMENDATIONS REGARDING MITIGATION MEASURES | 148 |
| 10.5. | METHODOLOGY FOR THE ASSESSMENT OF POTENTIAL IMPACTS..... | 155 |
| 10.5.1. | <i>Integration and Preparation of the EIA Report</i> | 156 |
| 10.5.2. | <i>Public Participation Process</i> | 157 |
| 10.5.3. | <i>Key Milestones of the programme for the EIA</i> | 158 |
| CHAPTER 11: REFERENCES | | 159 |

APPENDICES

| | |
|--------------------|--|
| Appendix A: | EIA Project Consulting Team CVs |
| Appendix B: | Regional Assessment – Stakeholder Notes for the Record |
| Appendix C: | Correspondence with DEAT and DEA&DP |
| Appendix D: | Quality Control Sheets |
| Appendix E: | Database |
| Appendix F: | Copies of Newspaper and Site Advertisements and Notifications to I&APs |
| Appendix G: | Background Information Document and Reply Form |
| Appendix H: | Focus Group Meeting Notes and Completed Reply Forms |
| Appendix I: | Consent Forms |
| Appendix J: | Issues and Response Report for Scoping Phase |
| Appendix K: | Public Meeting and Stakeholder Meeting Minutes; Comments received during DSR Review Period; and Issues and Response Report for Comments on DSR |
| Appendix L: | Vegetation Specialist Scoping Study |
| Appendix M: | Fauna Specialist Scoping Study |
| Appendix N: | Avifauna Specialist Scoping Study |
| Appendix O: | Agricultural Potential Specialist Scoping Study |
| Appendix P: | Geomorphological Specialist Scoping Study |
| Appendix Q: | Geological and Erosion Potential Specialist Scoping Study |
| Appendix R: | Groundwater Specialist Scoping Study |
| Appendix S: | Noise Specialist Scoping Study |
| Appendix T: | Tourism Potential Specialist Scoping Study |
| Appendix U: | Heritage Specialist Scoping Study |
| Appendix V: | Visual Specialist Scoping Study |
| Appendix W: | Transportation Specialist Scoping Study |
| Appendix X: | Social Specialist Scoping Study |

DEFINITIONS AND TERMINOLOGY

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

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

Article 3.1 (*sensu* Ramsar Convention on Wetlands): "Contracting Parties "shall formulate and implement their planning so as to promote the conservation of the wetlands included in the List, and as far as possible the wise use of wetlands in their territory"". (Ramsar Convention Secretariat. 2004. Ramsar handbooks for the wise use of wetlands. 2nd Edition. Handbook 1. Ramsar Convention Secretariat, Gland, Switzerland.) (see <http://www.ramsar.org/>).

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

Clean Development Mechanism (CDM): An arrangement under the Kyoto Protocol allowing industrialised countries with a greenhouse gas reduction commitment (called Annex 1 countries) to invest in projects that reduce emissions in developing countries as an alternative to more expensive emission reductions in their own countries. The most important factor of a CDM project is that it establishes that it would not have occurred without the additional incentive provided by emission reductions credits. The CDM allows net global greenhouse gas emissions to be reduced at a much lower global cost by financing emissions reduction projects in developing countries where costs are lower than in industrialised countries. The CDM is supervised by the CDM Executive Board (CDM EB) and is under the guidance of the Conference of the Parties (COP/MOP) of the United Nations Framework Convention on Climate Change (UNFCCC) (refer http://unfccc.int/kyoto_protocol/mechanisms/items/2998.php).

Cumulative impacts: Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and

subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

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

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

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

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

'Do nothing' alternative: The 'do nothing' alternative is the option of not undertaking the proposed activity or any of its alternatives. The 'do nothing' alternative also provides the baseline against which the impacts of other alternatives should be compared.

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

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

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

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

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

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

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

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

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

Indigenous: All biological organisms that occurred naturally within an area prior to 1800.

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

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

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

Natural properties of an ecosystem (*sensu* Convention on Wetlands): Defined in Handbook 1 as the "...physical, biological or chemical components, such as soil, water, plants, animals and nutrients, and the interactions between them". (Ramsar Convention Secretariat. 2004. Ramsar handbooks for the wise use of wetlands. 2nd Edition. Handbook 1. Ramsar Convention Secretariat, Gland, Switzerland.) (see <http://www.ramsar.org/>).

Ramsar Convention on Wetlands: "The Convention on Wetlands (Ramsar, Iran, 1971) is an intergovernmental treaty whose mission is "the conservation and wise use of all wetlands through local, regional and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world". As of March 2004, 138 nations have joined the Convention as Contracting Parties, and more than 1300 wetlands around the world, covering almost 120 million hectares, have been designated for inclusion in the Ramsar List of Wetlands of International Importance." (Ramsar Convention Secretariat, 2004. Ramsar handbooks for the wise use of wetlands. 2nd Edition. Handbook 1. Ramsar Convention Secretariat, Gland, Switzerland.) (refer <http://www.ramsar.org/>). South Africa is a Contracting Party to the Convention.

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

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

Regional Methodology: The Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) have developed a guideline document entitled *Strategic Initiative to Introduce Commercial Land Based Wind Energy Development to the Western Cape - Towards a Regional Methodology for Wind Energy Site Selection* (Western Cape Provincial Government, May 2006). The methodology proposed within this guideline document is intended to be a regional level planning tool to guide planners and decision-makers with regards to appropriate areas for wind energy development (on the basis of planning, environmental, infrastructural and landscape parameters).

Rotor: The portion of the wind turbine that collects energy from the wind is called the rotor. The rotor converts the energy in the wind into rotational energy to turn the generator. The rotor has three blades that rotate at a constant speed of about 15 to 28 revolutions per minute (rpm).

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

Sustainable Utilisation (*sensu* Convention on Wetlands): Defined in Handbook 1 as the "human use of a wetland so that it may yield the greatest continuous benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations". (Ramsar Convention Secretariat. 2004. Ramsar handbooks for the wise use of wetlands. 2nd Edition. Handbook 1. Ramsar Convention Secretariat, Gland, Switzerland.) (refer <http://www.ramsar.org/>).

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

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

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

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

Wise Use (*sensu* Convention on Wetlands): Defined in Handbook 1 (citing the third meeting of the Conference of Contracting Parties (Regina, Canada, 27 May to 5 June 1987) as "the wise use of wetlands is their sustainable utilisation for the benefit of humankind in a way compatible with the maintenance of the natural properties of the ecosystem".(Ramsar Convention Secretariat. 2004. Ramsar handbooks for the wise use of wetlands. 2nd Edition. Handbook 1. Ramsar Convention Secretariat, Gland, Switzerland.) (see <http://www.ramsar.org/>).

ABBREVIATIONS AND ACRONYMS

| | |
|-----------------|--|
| BID | Background Information Document |
| CAPE | Cape Action For People and the Environment |
| CBOs | Community Based Organisations |
| CDM | Clean Development Mechanism |
| CSIR | Council for Scientific and Industrial Research |
| CO ₂ | Carbon dioxide |
| D | Diameter of the rotor blades |
| DEA&DP | Western Cape Department of Environmental Affairs and Development Planning |
| DEAT | National Department of Environmental Affairs and Tourism |
| DME | Department of Minerals and Energy |
| DOT | Department of Transport |
| DWAF | Department of Water Affairs and Forestry |
| EIA | Environmental Impact Assessment |
| EMP | Environmental Management Plan |
| GIS | Geographical Information Systems |
| GG | Government Gazette |
| GN | Government Notice |
| GWh | Gigawatt hour |
| I&AP | Interested and Affected Party |
| IDP | Integrated Development Plan |
| IEP | Integrated Energy Planning |
| km ² | Square kilometres |
| km/hr | Kilometres per hour |
| kV | Kilovolt |
| LUPO | Rezoning and Subdivision in terms of Land Use Planning Ordinance, Ordinance 15 of 1985 |
| m ² | Square meters |
| m/s | Meters per second |
| MW | Megawatt |
| NEMA | National Environmental Management Act (Act No 107 of 1998) |
| NERSA | National Energy Regulator of South Africa |
| NHRA | National Heritage Resources Act (Act No 25 of 1999) |
| NGOs | Non-Governmental Organisations |
| NIRP | National Integrated Resource Planning |
| NWA | National Water Act (Act No 36 of 1998) |
| PGWC | Provincial Government of the Western Cape |
| SAHRA | South African Heritage Resources Agency |
| SANBI | South African National Biodiversity Institute |
| SANRAL | South African National Roads Agency Limited |
| SDF | Spatial Development Framework |
| SIA | Social Impact Assessment |

| | |
|--------|----------------------------------|
| SSW | South South West |
| WCDM | West Coast District Municipality |
| WCMA01 | Western Cape Municipal Area 1 |
| ZVI | Zone of visual influence |