ENVIRONMENTAL IMPACT ASSESSMENT PROCESS
SCOPING REPORT

PROPOSED GUNSTFONTEIN WIND ENERGY FACILITY, NORTHERN CAPE PROVINCE
(DEA Ref: 14/12/16/3/3/2/826)

FINAL FOR SUBMISSION TO THE DEA
October 2015

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PROJECT DETAILS

Title	**:**	Environmental Impact Assessment Process Scoping Report for the Proposed Gunstfontein Wind Energy Facility, Northern Cape
DEA Reference No.	**:**	14/12/16/3/3/2/826
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Applicant	**:**	Gunstfontein Wind Farm (Pty) Ltd
Report Status	**:**	Final Scoping Report for submission to the DEA

When used as a reference this report should be cited as: Savannah Environmental (2015) Scoping Report for the Proposed Gunstfontein Wind Energy Facility, Northern Cape.

PURPOSE OF THE FINAL SCOPING REPORT

Gunstfontein Wind Farm (Pty) Ltd is proposing to develop a commercial wind energy facility and associated infrastructure on a site located approximately 20km south of Sutherland in the Northern Cape Province. The project site falls within the Karoo Hoogland Local Municipality, under the jurisdiction of the Namakwa District Municipality. The proposed project is to be known as the Gunstfontein Wind Energy Facility.

This Scoping Report documents the evaluation of the potential environmental impacts of each proposed solar energy facility and forms part of the EIA process. The Scoping Phase was conducted in accordance with the requirements of the EIA Regulations in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998).

This Scoping Phase aims to:

» Identify and evaluate potential environmental (biophysical and social) impacts and benefits of all phases of the proposed development (including design, construction, operation and decommissioning) within the broader study area through a desk-top review of existing baseline data and specialist studies.
» Identify potentially sensitive environmental features and areas on the site to inform the preliminary design process of the three facilities.
» Define the scope of studies to be undertaken within the EIA process.
» Provide the authorities with sufficient information in order to make a decision regarding the scope of issues to be addressed in the EIA process, as well as regarding the scope and extent of specialist studies that will be required to be undertaken as part of the EIA Phase of the process.

Within this context, the objectives of this Scoping Phase are to, through a consultative process:

» identify the relevant policies and legislation relevant to the project;
» motivate the need and desirability of the proposed project, including the need and desirability of the activity in the context of the preferred location;
» identify and confirm the preferred project and technology alternative through an impact and risk assessment and ranking process;
» identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;
» identify the key issues to be addressed in the EIA phase;

» agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the project will impose on the preferred site through the life of the project, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored

This Scoping Report consists of 9 sections:

» **Chapter 1** provided background to the proposed project and the environmental impact assessment.
» **Chapter 2** describes the activities associated with the project (project scope) and provides insight of the available technologies.
» **Chapter 3** provides the Regulatory and Planning Context.
» **Chapter 4** outlines the process which was followed during the Scoping Phase of the EIA process, including the consultation programme that was undertaken and input received from interested and affected parties.
» **Chapter 5** describes the existing biophysical and socio-economic environment.
» **Chapter 6** provides an identification and evaluation of the potential issues associated with the proposed Wind Energy Facility.
» **Chapter 7** presents the conclusions of the scoping evaluation for the proposed Wind Energy Facility.
» **Chapter 8** describes the Plan of Study for EIA.
» **Chapter 9** provides references used to compile the Scoping Report.

LEGAL REQUIREMENTS IN TERMS OF THE EIA REGULATIONS

Table 1 below details how the legal requirements of Appendix 2 and Regulation 21(1) of the 2014 EIA Regulations have been addressed within this report.

Table 1: Legal requirements in terms of the EIA regulations

EIA REGULATIONS 2014 GNR 982: Appendix 2 CONTENT OF THE SCOPING REPORT	Cross-reference in this scoping report
A scoping report must contain all the information that is necessary for a proper understanding of the nature of issues identified during scoping, and includes -	
(a) details of— (i) the EAP who prepared the report; and (ii) the expertise of the EAP to carry out scoping procedures; including a curriculum vitae	Chapter 1 Section 1.3
(b) the location of the activity, including— (i) the 21 digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; (iii) where the required information in items (i) and (iv) is not available, the coordinates of the boundary of the property or properties;	Chapter 1 Section 1.2
(c) a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is— (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	Chapter 1 Section 1.1 and 1.2
(d) a description of the scope of the proposed activity, including— (i) all listed and specified activities triggered; (ii) a description of the activities to be undertaken, including associated structures and infrastructure;	Chapter 2 Section 2.1 & 2.2 Chapter 4 Section 4.1
(e) a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process;	Chapter 3
(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	Chapter 2 Section 2.3
(g) Missing as per the EIA Regulations 2014 GNR 982: Appendix 2; pg 58	
(h) a full description of the process followed to reach the proposed preferred activity, site and location within the site, including—	

(i) details of all the alternatives considered;	Chapter 2 Section 2.5
(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Chapter 4 Appendix C
(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	Chapter 4 To be included in the final scoping report
(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Chapter 5
(v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts—	
(aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	Chapter 6
(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	Chapter 4
(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Chapter 6
(viii) the possible mitigation measures that could be applied and level of residual risk;	Chapter 6
(ix) the outcome of the site selection matrix;	Chapter 2 Section 2.3.1
(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and	Chapter 2 Section 2.5
(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity	Chapter 2 Section 2.5
(i) a plan of study for undertaking the environmental impact assessment process to be undertaken	Chapter 8
(j) an undertaking under oath or affirmation by the EAP in relation to— (i) the correctness of the information provided in the report; (ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and (iii) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	Appendix A

(k) an undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the plan of study for undertaking the environmental impact assessment;	Appendix A
(l) where applicable, any specific information required by the competent authority; and	To be included in the final scoping report

INVITATION TO COMMENT ON THE SCOPING REPORT

Members of the public, local communities and stakeholders were invited to comment on the Scoping Report which was made available for public review and comment at the following locations from **August 2015 – 21 July 2015:**

- » Sutherland Public Library
- » Laingsburg Public Library
- » www.savannahSA.com

Comments were received through written submission via fax, post or e-mail. I&APs were also informed in writing that this Final Scoping Report has been prepared and submitted to DEA and is available from the website: www.savannahSA.com. Changes made to this Final Report are underlined for ease of reference. Comments on this final report should be submitted to DEA with a copy to Savannah Environmental. Relevant contact details are as follows:

National DEA **Mmamohale Kabasa** **Tel:** 012 399 9420 **Fax**: 012 320 7539 **Email:** MKabasa@environment.gov.za **Post:** Private Bag X 447, Pretoria, 0001	**Savannah Environmental(EAP):** **Gabriele Wood** **Tel:** 011 656 3237 **Fax:** 086 699 5796 **Email:** gabriele@savannahsa.com **Post:** P O Box 148 Sunninghill 2157

EXECUTIVE SUMMARY

Background and Project Overview

Gunstfontein Wind Farm (Pty) Ltd, an Independent Power Producer (IPP), is proposing to establish a commercial wind energy facility and associated infrastructure over four farm portions located approximately 20km south of Sutherland in the Northern Cape Province (refer to **Figure 1**).

The study area is approximately 12 000 ha in extent comprising of privately owned land. The wind energy facility is proposed to have an installed capacity of up to 200MW and all associated infrastructure on a site located on the following farms approximately 20km south of Sutherland:

- Portion 1 of the farm Gunstfontein 131;
- Remainder of the farm Gunstfontein 131;
- Farm Boschmans Hoek 177, and
- Remainder of the farm Wolven Hoek 182.

The proposed wind energy facility is proposed to include the following infrastructure:

- 100 wind turbines, each up to 4MW in capacity;
- Permanent concrete foundations to support the turbines, and crane pad/laydown area;
- Cabling between the turbines, to be laid underground where practical and generally alongside the internal access roads, to connect to an on-site substation;
- An on-site substation to facilitate the connection between the wind energy facility and the electricity grid;
- Internal access roads to each turbine linking the wind turbines and other infrastructure on the site;
- Buildings and dedicated areas for workshops, control systems, maintenance and storage with parking areas where required; and
- Temporary construction compound and temporary site offices.

The proposed capacity at 200MW is in excess of the current cap of 140MW per project as imposed by the Department of Energy under their Renewable Energy Independent Power Producer Procurement (REIPPP) Programme. The reason for this is so as to anticipate an increase in the cap on megawatts per project under the REIPPP Programme.

This Scoping Report is aimed at detailing the nature and extent of this facility, identifying potential issues associated with the proposed project, and defining the extent of studies required within the EIA. This was achieved through an evaluation of the proposed project, involving the

project proponent, specialist consultants, and a consultation process with key stakeholders that included both relevant government authorities and interested and affected parties (I&APs). In accordance with the requirements of the EIA Regulations, feasible project-specific alternatives (including the "do nothing" option) have been identified for consideration within the EIA process.

Evaluation of the Proposed Project

The main issues identified through this scoping study associated with the proposed wind energy facility are summarised in **Table 1 and 2 below.**

As is evident from the Table below, the majority of potential impacts identified to be associated with the construction of Gunstfontein Wind Energy Facility are anticipated to be localised and restricted to the proposed site itself while operation phase impacts range from local to regional. No environmental fatal flaws were identified to be associated with the site. Features within the larger site have, however, been identified as 'no-go' areas or areas of high ecological, avifaunal and bat sensitivities should be avoided by the development footprint.

The **potentially sensitive areas** which have been identified through the environmental scoping study are shown in **Figure 2**. The scoping phase sensitivity map provides an informed estimate of sensitivity on the larger site. The detail is based on the desktop review of the available baseline information for the study area. During the ecological site survey, the site was well covered and the affected area was investigated in detail in order to provide definitive insight into the potential for constraining factors for the site. The sensitivity map is intended to inform the location/layout of the facility proposed for the site, and must be used as a tool by the developer to avoid those areas flagged to be of potential high sensitivity.

Table 1: Summary of potential impacts associated with the construction of the proposed Gunstfontein Wind Energy Facility.

Construction Impacts	Extent
Potential Impacts on Soil, Land Use and Agriculture	
Physical soil disturbance, erosion and disruption to current agricultural or grazing practices due to construction activities	L
Potential impacts on ecology	
Impacts on vegetation and listed plant species	L
Degradation of ecosystems	L
Direct impacts on fauna, their habitat and movement	L
Impacts on Critical Biodiversity Areas (CBA) and Loss of Landscape Connectivity	L- R
Potential impacts on avifauna	
Destruction of bird habitat & disturbance of birds	L
Displacement of birds from the site and barrier effects	L- R
Potential Impacts on Bats	
The destruction of habitats resulting in a reduced prey-base and/or the destruction of roost sites	L
Potential heritage and paleontological impacts	
Potential impacts on heritage resources (graves, ruins, kraals and Stone Age sites)	L
Impacts on paleontological resources (Abrahamskraal Formations are fossiliferous)	L
Potential Visual Impacts	
Visual impacts associated with the construction of the facility and associated infrastructure	L- R
Potential SALT Impacts	
Impacts associated with construction stage facility lights	L-R
Potential impacts on Falcon Oil and Gas Ltd	
Impacts on proposed seismic exploration	L-R
Potential Impacts on the Social Environment	
Impact on rural sense of place	L- R
Impact on farming activities	L- R
Impact on existing infrastructure (e.g. traffic)	L- R
Influx of job seekers and associated social issues	L- R
Creation of employment and business opportunities	L- R
Creation of potential training and skills development opportunities for local communities and	L- R

businesses	
Potential up and down-stream economic opportunities for the local, regional and national economy	L- R- N

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

Table 2: Summary of potential impacts associated with the operation of the proposed Gunstfontein Wind Energy Facility.

Operation Impacts	Extent
Potential Impacts on Soil, Land Use and Agriculture	
Potential social impacts	L-R
Cumulative impacts	R
Potential impacts on avifauna	
Collision of birds and increased mortality due to collision with turbine blades	L-R
Potential Impact on Bats	
Increased mortality of bats as a result of collision with turbine blades and barotrauma	L-R
Potential heritage and paleontological impacts	
Potential impact on sense of place	L-R
Potential Visual Impacts	
Visual impact of wind turbines (due to scale) and associated infrastructure on observers from roads, built-up areas, homesteads and farmsteads	L
Visual impact on affecting perception of sensitive topographic features and sense of place	L
Potential SALT Impact	
Impacts associated with operation stage facility lights	L-R
Potential impacts on Falcon Oil and Gas Ltd	
Shard infrastructure, thereby reducing the environmental impact of fracking	L-R
Potential compromises required to accommodate both wind farming and fracking	L-R
Potential Noise Impact	
Wind turbine noise: aerodynamic sources	L
Wind turbine noise: mechanical sources	L
Potential Impacts on the Social Environment	
Potential localised negative impacts on farming activities and land use	L-R

Visual and sense of place impacts on existing receptors, including nearby rural and urban residences	L-R

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

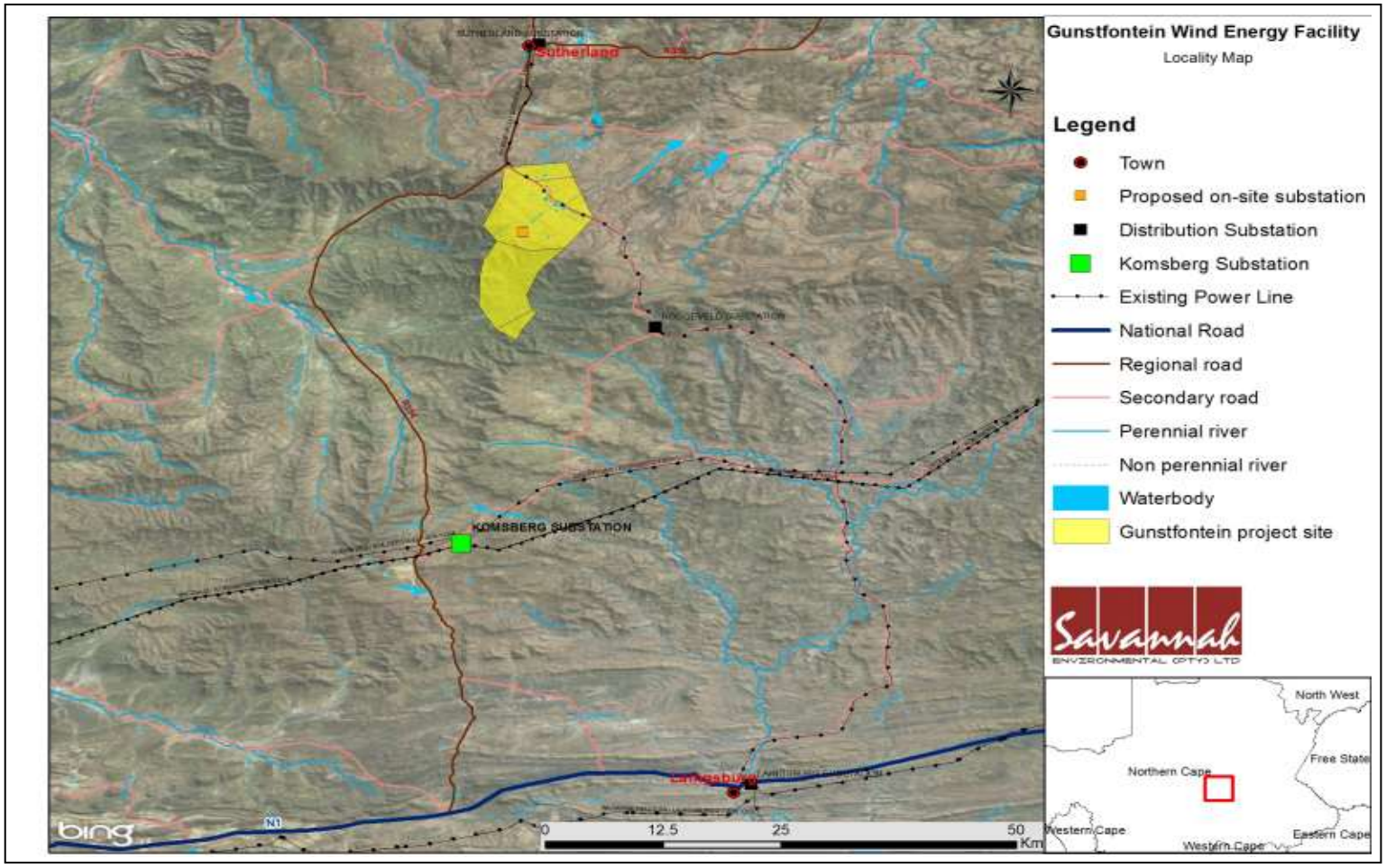

Figure 1: Locality Map of the proposed Gunstfontein Wind Energy Facility

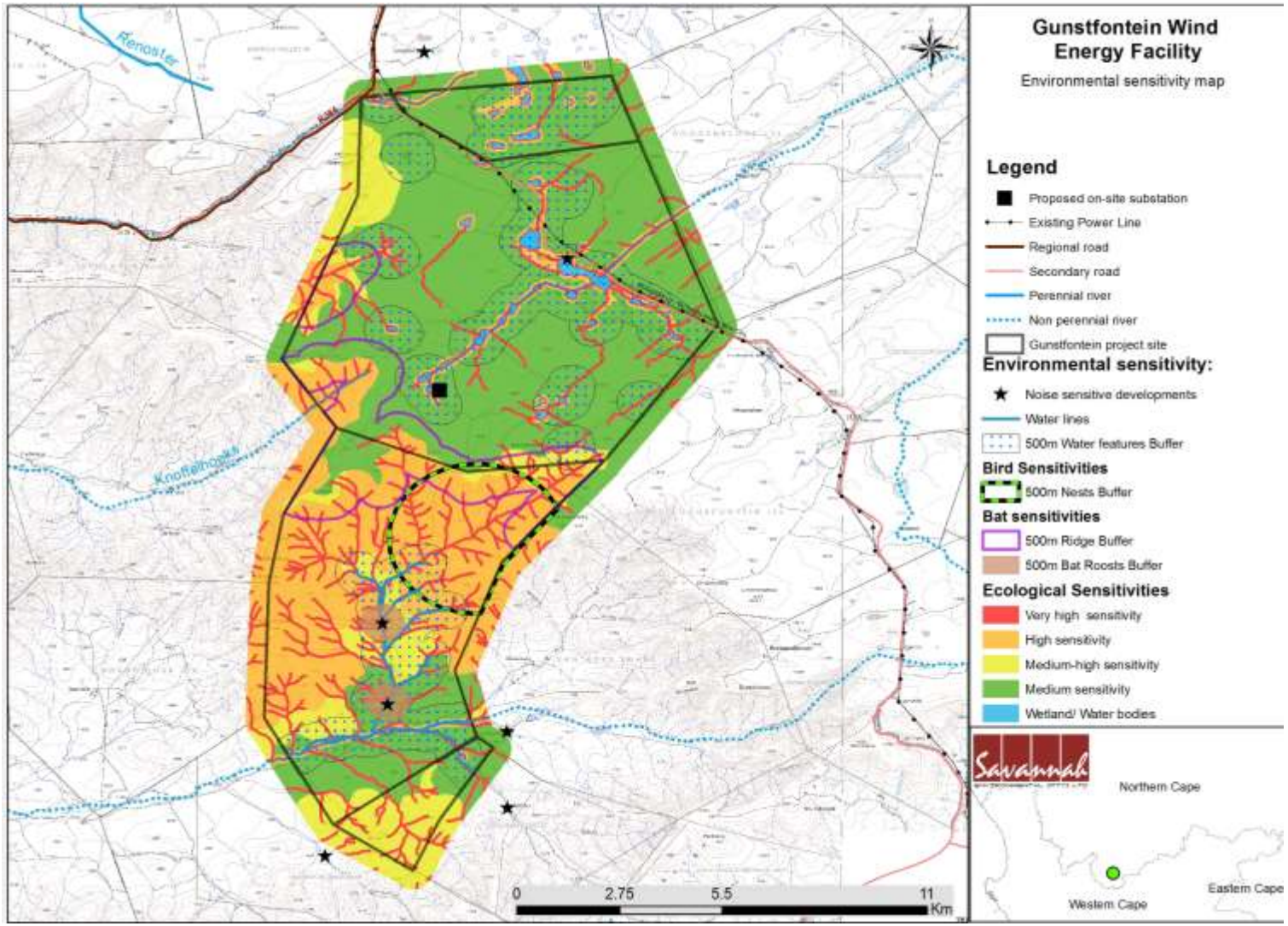

Figure 2: Environmental Sensitivity Map for the proposed Gunstfontein Wind Energy Facility

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DEFINITIONS AND TERMINOLOGY

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Perennial and non-perennial: Perennial systems contain flow or standing water for all or a large proportion of any given year, while non-perennial systems are episodic or ephemeral and thus contains flows for short periods, such as a few hours or days in the case of drainage lines.

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

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

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

Riparian: the area of land adjacent to a stream or river that is influenced by stream-induced or related processes. Riparian areas which are saturated or flooded for prolonged periods would be considered wetlands and could be described as riparian wetlands. However, some riparian areas are not wetlands (e.g. an area where alluvium is periodically deposited by a stream during floods but which is well drained).

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

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

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

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

Wetland: land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which under normal circumstances supports or would support vegetation typically adapted to life in saturated soil (Water Act 36 of 1998); land where an excess of water is the dominant factor determining the nature of the soil development and the types of plants and animals living at the soil surface (Cowardin et al., 1979).

Water course: as per the National Water Act means -
(a) a river or spring;
(b) a natural channel in which water flows regularly or intermittently;
(c) a wetland, lake or dam into which, or from which, water flows; and
(d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

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

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

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

ABBREVIATIONS AND ACRONYMS

BID	Background Information Document
CBOs	Community Based Organisations
CDM	Clean Development Mechanism
CSIR	Council for Scientific and Industrial Research
CO_2	Carbon dioxide
D	Diameter of the rotor blades
DAFF	Department of Forestry and Fishery
DEA	National Department of Environmental Affairs
DME	Department of Minerals and Energy
DOT	Department of Transport
DWS	Department of Water and Sanitation
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
GIS	Geographical Information Systems
GG	Government Gazette
GN	Government Notice
GWh	Giga Watt Hour
Ha	Hectare
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IEP	Integrated Energy Planning
km^2	Square kilometres
km/hr	Kilometres per hour
kV	Kilovolt
m^2	Square meters
m/s	Meters per second
MW	Mega Watt
NEMA	National Environmental Management Act (Act No 107 of 1998)
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act (Act No 25 of 1999)
NGOs	Non-Governmental Organisations
NIRP	National Integrated Resource Planning
NWA	National Water Act (Act No 36 of 1998)
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
SDF	Spatial Development Framework
NC DENC	Northern Cape Department of Environmental and Nature Conservation

INTRODUCTION CHAPTER 1

Gunstfontein Wind Farm (Pty) Ltd is proposing to develop a commercial wind energy facility and associated infrastructure on a site located approximately 20km south of Sutherland in the Northern Cape Province. The project site falls within the Karoo Hoogland Local Municipality, under the jurisdiction of the Namakwa District Municipality. The proposed project is to be known as the **Gunstfontein Wind Energy Facility**.

The nature and extent of the proposed facility, as well as potential environmental impacts associated with the construction, operation and decommissioning phases of a facility of this nature is described in this Scoping Report.

This Scoping Report consists of the following sections:

» **Chapter 1** provided background to the proposed project and the environmental impact assessment.
» **Chapter 2** describes the activities associated with the project (project scope) and provides insight of the available technologies.
» **Chapter 3** provides the Regulatory and Planning Context.
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» **Chapter 9** provides references used to compile the Scoping Report.

1.1. Project Overview

Gunstfontein Wind Farm (Pty) Ltd is proposing a wind energy facility with an installed capacity of up to 200MW and all associated infrastructure on a site located on the following farms approximately 20km south of Sutherland:

» Portion 1 of the farm Gunstfontein 131;
» Remainder of the farm Gunstfontein 131;
» Farm Boschmans Hoek 177, and
» Remainder of the farm Wolven Hoek 182.

A previous application by Networx Eolos Renewables (Pty) Ltd for establishment of the Gunsfontein Wind Energy Facility (with a total generating capacity of 280MW) was submitted

in August 2013 (and allocated the following reference number: DEA Ref No.:14/12/16/3/3/2/395). A Scoping Report for the Gunstfontein Wind Energy Facility was submitted and subsequently accepted by the DEA in October 2014. Due to a change in the Applicant as well as the project scope, the application was withdrawn on 17 August 2015. A new application has now been lodged with the DEA under the NEMA EIA Regulations, 2014 for the proposed Gunstfontein Wind Energy facility (with a contacted capacity of up to 200MW which is some 30% reduced from the previous 280MW).

The Gunstfontein Wind Energy Facility will comprise of up to 100 turbines. The optimum turbine for use at the site is yet to be determined, and it is considered that each turbine could have a generating capacity of up to 4MW, with a hub height of up to 120m and a rotor diameter of up to 140m. The wind energy facility will be developed in a single phase and will have a generating capacity of up to 200MW, with the number of wind turbines depending on the final turbine selected.

The proposed capacity at 200MW is in excess of the current cap of 140MW per project as imposed by the Department of Energy under their Renewable Energy Independent Power Producer Procurement (REIPPP) Programme. The reason for this is so as to anticipate an increase in the cap on megawatts per project under the REIPPP Programme.

The proposed wind energy facility is proposed to include the following infrastructure:

» 100 wind turbines, each up to 4MW in capacity;
» Permanent concrete foundations to support the turbines, and crane pad/laydown area;
» Cabling between the turbines, to be laid underground where practical and generally alongside the internal access roads, to connect to an on-site substation;
» An on-site substation to facilitate the connection between the wind energy facility and the electricity grid;
» Internal access roads to each turbine linking the wind turbines and other infrastructure on the site;
» Buildings and dedicated areas for workshops, control systems, maintenance and storage with parking areas where required; and
» Temporary construction compound and temporary site offices.

The wind energy facility is to be constructed within an area of approximately 12 000ha, and together with the associated infrastructure listed above will constitute a development footprint of less than 5% of the total site. The optimal position for each turbine will be determined using specialist software and the turbines will be appropriately spaced to optimise the energy generating potential of the wind resource, taking into consideration any environmental sensitivity which might be identified through the EIA process. A more accurate understanding of the final development footprint will be determined during the EIA Phase with the availability of a facility layout plan.

A detailed description of the components listed above and the potential impacts identified is provided in Chapter 2 of this report.

This EIA application pertains to the Gunstfontein Wind Farm. A separate Basic Assessment application will be lodged with the Department of Environmental Affairs for the grid connection infrastructure required to connect the proposed Gunstfontein Wind Energy Facility to the Eskom grid, assumed to be at Komsberg Substation.

1.2. Locality and access

The proposed site is located near Sutherland within the Karoo Hoogland Local Municipality, which falls under the jurisdiction of the Namakwa District Municipality. The development envelope for the wind energy facility comprises the following privately owned farm portions (refer to Table 1.1):

» Portion 1 of the farm Gunstfontein 131;
» Remainder of the farm Gunstfontein 131;
» Farm Boschmans Hoek 177, and
» Remainder of the farm Wolven Hoek 182.

The site extends for approximately 21.5km from north to south and for approximately 9.5km from east to west at the broadest section (tip to tip). The approximate coordinates of the site are as follows:

» Northern-most extent: 32◦31'39'' S 20◦ 41' 34'' E
» Eastern-most extent: 32◦35'09'' S 20◦ 43' 11'' E
» Southern-most extent: 32◦42'54'' S 20◦ 38' 46'' E
» Western-most extent: 32◦35'24'' S 20◦ 37' 03'' E
» Centre point: 32◦38'02'' S 20◦ 38' 30'' E

The northern section of the study area (above the escarpment) can be accessed via a gravel road which branches off of the R354. Similarly, the southern section of the study area (below the escarpment) can also be accessed via a gravel road branching off of the R354. A further access option to the study area is provided via the road to Spitskop which also branches off of the R354. This gravel road also passes the Komsberg Substation to which grid connection is assumed.

Table 1.1: Location of the study area

Province	**Northern Cape Province**
District Municipality	Namakwa District Municipality
Local Municipality	Karoo Hoogland Local Municipality
Ward number(s)	4
Nearest town(s)	Sutherland (20km south)f
Farm name(s) and number(s)	Gunstfontein 131 Boschmans Hoek 177, and

	Wolven Hoek 182
Portion number(s)	Portion 1 of the farm Gunstfontein 131; Remainder of the farm Gunstfontein 131; and Remainder of the farm Wolven Hoek 182.
SG 21 Digit Code (s)	C07200000000013100000 C07200000000013100001 C07200000000017700000 C07200000000013100000

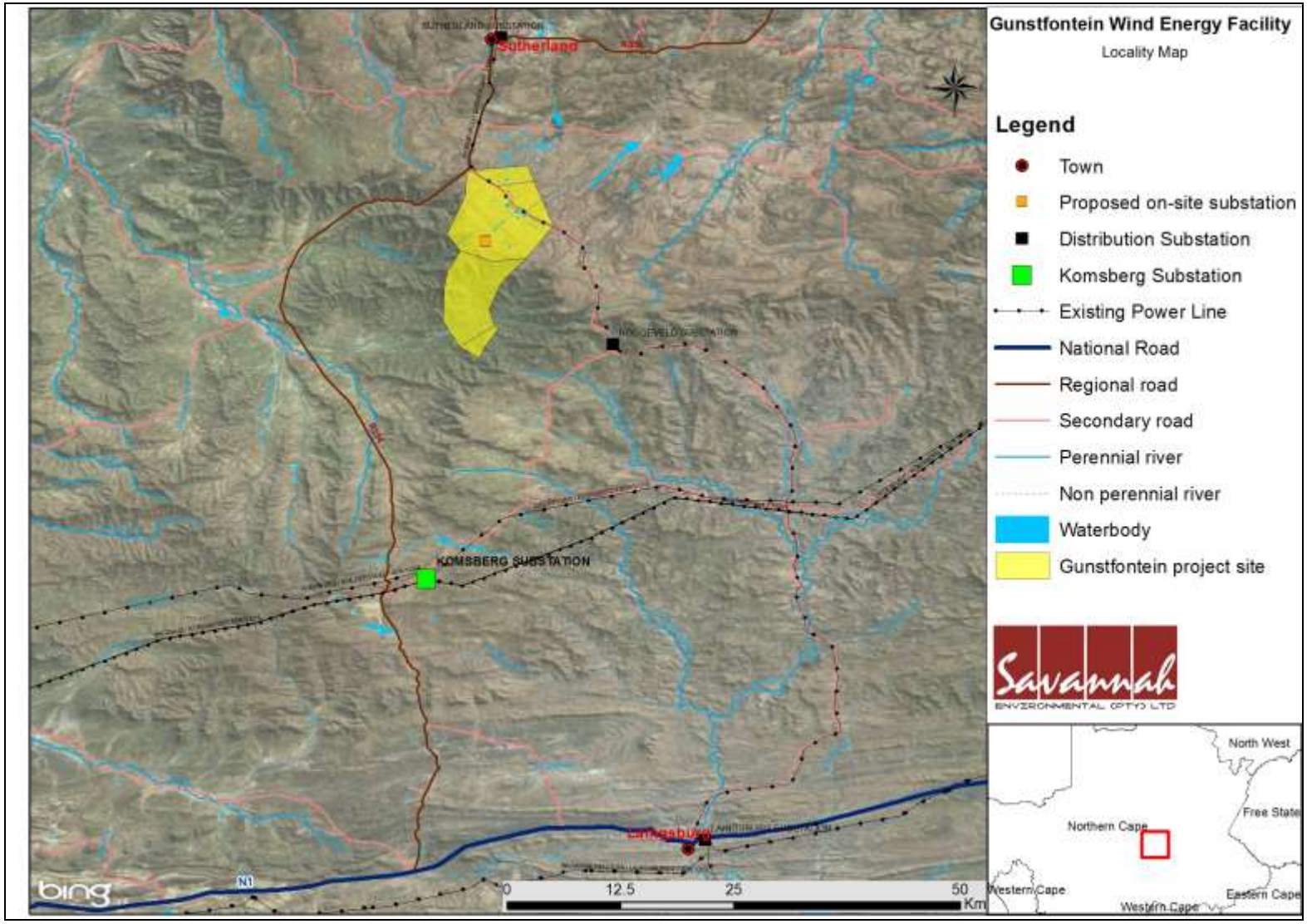

Figure 1.1: Locality map showing the location and study area of the proposed Gunstfontein Wind Energy Facility

1.3. Requirement for an Environmental Impact Assessment Process

The construction and operation of the proposed Gunstfontein Wind Energy Facility is subject to the requirements of the EIA Regulations published in terms of Section 24(5) of the National Environmental Management Act (NEMA) 107 of 1998. This section provides a brief overview of the EIA Regulations, 2014 and their application to this project.

NEMA is the national legislation that provides for the authorisation of 'listed activities'. In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these activities must be considered, investigated, assessed and reported on to the competent authority that has been charged by NEMA with the responsibility of granting environmental authorisations. As this is a proposed electricity generation project and thereby considered to be of national importance, the National Department of Environmental Affairs (DEA) is the competent authority[8] and the Northern Cape Department of Environmental and Nature Conservation (DENC) will act as a commenting authority. An application for Environmental Authorisation was lodged with the DEA in September 2015 and the following reference number has been allocated: 14/12/16/3/3/2/826.

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

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

The EIA process comprises two phases – i.e. Scoping and Impact Assessment - and involves the identification and assessment of environmental impacts though specialist studies, as well as public participation. The process followed in these two phases is as follows:

» The **Scoping Phase** includes the identification of potential issues associated with the proposed project through a desktop study and consultation with affected parties and key stakeholders. Areas of sensitivity within the broader site are identified and delineated in order to identify any environmental fatal flaws, and sensitive or no go areas. Following a

[8] In terms of the Energy Response Plan, the DEA is the competent authority for all energy related applications.

public review period of the scoping report, this phase culminates in the submission of a final Scoping Report and Plan of Study for EIA to the competent authority for acceptance.

» The **EIA Phase** involves a detailed assessment of potentially significant positive and negative impacts (direct, indirect, and cumulative) identified in the Scoping Phase. This phase includes detailed specialist investigations and public consultation. Following a public review period of the EIA report, this phase culminates in the submission of a final EIA Report and an Environmental Management Programme (EMPr), including recommendations of practical and achievable mitigation and management measures, to the competent authority for final review and decision-making.

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

Savannah Environmental was contracted by the applicant as an independent consultant and environmental assessment practitioner to undertake an Environmental Impact Assessment (EIA) for the proposed project, as required in terms of Regulation 17 of the NEMA EIA Regulations. Neither Savannah Environmental, nor any of the specialist sub-consultants on this project are subsidiaries of or affiliated with the applicant. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed project.

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

The Savannah Environmental team have considerable experience in environmental impact assessments and environmental management, and have been actively involved in undertaking environmental studies, for a wide variety of projects throughout South Africa, including those associated with electricity generation.

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

» *Tebogo Mapinga* – is a Senior Environmental Consultant, holds a BSc degree with 8 years of experience in the environmental field in both public and private sectors. Her competencies lie in environmental impact assessments, compliance monitoring and public participation for small and large scale projects.

» *Karen Jodas* - the principle Environmental Assessment Practitioner (EAP) for this project, is a registered Professional Natural Scientist and holds a Master of Science degree. She has 17 years of experience consulting in the environmental field. Her key focus is on strategic environmental assessment and advice; management and co-ordination of environmental projects, which includes integration of environmental studies and

environmental processes into larger engineering-based projects and ensuring compliance to legislation and guidelines; compliance reporting; the identification of environmental management solutions and mitigation/risk minimising measures; and strategy and guideline development. She is currently responsible for the project management of EIAs for several renewable energy projects across the country.

» *Gabriele Wood* - holds an Honours Degree in Anthropology, obtained from the University of Johannesburg. She has 6 years consulting experience in public participation and social research. Her experience includes the design and implementation of public participation programmes and stakeholder management strategies for numerous integrated development planning and infrastructure projects. Her work focuses on managing the public participation component of Environmental Impact Assessments and Basic Assessments undertaken by Savannah Environmental.

In order to adequately identify and assess potential environmental impacts associated with the proposed project, Savannah Environmental has appointed several specialist consultants to conduct the specialist scoping studies, as required. In order to adequately identify and assess potential environmental impacts associated with the proposed project, Savannah Environmental has included the following specialist consultants to conduct specialist assessments:

Specialist	Area of Expertise	Refer Appendix
Simon Todd Consulting	Ecology, flora and fauna	Appendix D
Bioinsight South Africa	Avifauna	Appendix E
Bioinsight South Africa	Bats	Appendix F
Jaco Jansen and Jasper Dreyer (Peer reviewer)	Soil, Land Use, Land Capability & Agricultural potential	Appendix G
Jon Marshall	Visual Impact	Appendix H
Jaco van der Walt of Heritage Contracts	Heritage	Appendix I
Dr. B.D Millsteed	Palaeontology	Appendix J
Morne de Jager of EAR- Enviro Acoustic Research	Noise	Appendix K
Tony Barbour (Environmental Consultant and Researcher)	Social Impact	Appendix L

Appendix A includes the curricula vitae for the environmental assessment practitioners from Savannah Environmental and the specialist consultants.

Gustfontein Wind Farm (Pty) Ltd is proposing to establish a commercial wind energy facility and associated infrastructure on a site located approximately 20km south of Sutherland in the Northern Cape Province. The project development site falls within the Karoo Hoogland Local Municipality. The facility would have a maximum installed capacity of 200MW[9] and would include up to 100 turbines. The final turbine capacity and model will be dependent on what is deemed suitable for the site in relation to, among other things, further studies of the wind regime, terrain, and potential environmental constraints.

The overarching objective for the wind farm planning process is to maximise electricity production through exposure to the wind resource, while minimising infrastructure, operational and maintenance costs, as well as minimising detrimental social and environmental impacts. The development should also accord with national legislation.

Once environmentally constraining factors have been determined through the EIA process, and long-term site-specific wind data is available from the wind monitoring conducted on site, the layout of the wind turbines and associated infrastructure can be appropriately determined. Specialist software is available to assist developers in selecting the optimum position of each turbine before the project is constructed. This layout will then inform the positioning of other infrastructure such as the internal substation and access roads.

2.1. Components of the Proposed Project

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

- 100 wind turbines, each up to 4MW in capacity;
- Permanent concrete foundations to support the turbines, and crane pad/laydown area;
- Cabling between the turbines, to be laid underground where practical and generally alongside the internal access roads, to connect to an on-site substation;
- An on-site substation to facilitate the connection between the wind energy facility and the electricity grid;
- Internal access roads to each turbine linking the wind turbines and other infrastructure on the site;
- Buildings and dedicated areas for workshops, control systems, maintenance and storage with parking areas where required; and
- Temporary construction compound and temporary site offices.

[9] The proposed capacity at 200MW is in excess of the current cap of 140MW per project as imposed by the Department of Energy under their Renewable Energy Independent Power Producer (REIPPP) Programme. The reason for this is so as to anticipate an increase in the cap on MW per project under REIPPP Programme.

It should be noted that the power lines that will connect the on-site substation to the Eskom distribution network will be the subject of a separate study and Basic Assessment Report.

2.2. Location of the Proposed Project

The proposed site is located ~20km south of Sutherland within the Karoo Hoogland Local Municipality, which falls under the jurisdiction of the Namakwa District Municipality. The development envelope for the wind energy facility comprises the following privately owned farm portions:

- » Portion 1 of the farm Gunstfontein 131;
- » Remainder of the farm Gunstfontein 131;
- » Farm Boschmans Hoek 177, and
- » Remainder of the farm Wolven Hoek 182.

Figure 2.1 Farm portions comprising the Gunstfontein Wind energy Facility

2.3. Need and Desirability of the Development at the preferred site location

The overarching objective for the wind energy facility is to maximise electricity production through exposure to the wind resource, while minimising infrastructure, operational and maintenance costs, as well as minimising detrimental social and environmental impacts. The Gunstfontein Wind Energy Facility is proposed to be constructed outside of the urban edge. The affected farm portions have not been considered for an alternative land use such as urban development. The site is also located within an area which has become a node for renewable energy projects, with the following preferred bidder projects located in close proximity to, the project development site: Roggeveld Wind Farm, Karusa Wind Farm, and Soetwater Wind Farm. Given the competitive nature of the Renewable Energy Independent Power Producer Procurement (REIPPP) Programme, a high wind resource and grid connectivity suitability are some of the most important factors for success. The selection of the above-mentioned projects as Preferred Bidders and the location of Gunstfontein Wind Energy Facility being located directly north of the Soetwater Wind Farm and the Karusa Wind Farm is a confirmed indicator that the Gunstfontein Wind Energy Facility site possesses the required wind resources and grid connectivity characteristics to be highly competitive and suitable for the selection process by the Department of Energy for future bidding rounds of the REIPPP Programme. This is further confirmed by the Gunstfontein Wind Energy Facility falling within one of the Renewable Energy Development Zones (REDZs) for wind as identified by the Council for Scientific and Industrial Research (CSIR).

2.3.1 Site Selection and Pre-Feasibility Analysis

Due to the nature of the development (i.e. a renewable energy facility), the location of the project is largely dependent on technical factors such as the availability of wind (i.e. the fuel source), extent and topography of the site and available grid connection. The proposed site was identified by the project developer as being technically feasible and given its attributes is also thought to be commercially feasible i.e. able to offer electricity to the citizens of South Africa at a highly competitive tariff.

As part of the feasibility investigations that were undertaken during the early-stages of project development, a high-level environmental screening study was initiated in April 2012 for the broader area surrounding the Gunstfontein site for the construction of a renewable energy facility.

The broader study area was identified as having potential for the installation of wind turbines on the basis of various technical criteria, including the wind resource, accessibility of the site, accessibility to the Eskom grid, and local site topography. The intention of the high-level site assessment was to inform the developer of the environmental suitability of the identified site for the development of a renewable energy facility (i.e. wind farm), and highlight or red-flag potential issues of concern prior to initiation of the Environmental Impact Assessment.

In summary the screening study utilised the following methodology:

a) Desk-top GIS mapping as a tool in line with the methodology developed by the Western Cape Provincial Government and outlined in the *Strategic Initiative to Introduce Commercial Land Based Wind Energy Development to the Western Cape - Towards a Regional Methodology for Wind Energy Site Selection* (May 2006), as well as the update (finalised in 2011, but not yet published). The purpose of following this developed methodology was to test the suitability of the identified site for development from an environmental perspective.
b) Desk-top level evaluation of those issues considered to be most pertinent or of most concern when considering the placement of a renewable energy facility. The studies were reliant on available literature, as well as reporting from other EIAs for neighbouring sites. No field surveys were undertaken at that time. These studies included: Desk-top level evaluation ecology, avifauna, noise.
c) Compilation of a preliminary sensitivity map (based on the desktop data) to be considered in the pre-feasibility assessment.

From the screening study it was concluded that the area now considered as the Gunstfontein site had the least negative environmental constraints.

The broader area surrounding the site (north-west, north, north east, east, south-east and south) consists of land that either falls within the National Protected Areas Expansion Strategy, rivers and water body, wetland and/or pans or numerous river buffers. The area to the west of the site is mountainous and therefore considered less suitable for development.

The location of the Southern African Large Telescope (SALT) and the Square Kilometre Array (SKA) were also taken into consideration in the early site selection process.

2.3.2 Receptiveness of the site to development of the wind energy facility

The use of wind power for electricity generation is essentially a non-consumptive use of a natural resource. The site displays characteristics which, in the opinion of the Gunstfontein Wind Farm (Pty) Ltd experienced wind development team, make this development and project site desirable:

Site extent: The wind turbines are to be constructed in one phase within an area of approximately 12 000ha, and together with the associated infrastructure will constitute a development footprint of less than 5% of the total site.

Land availability and site access: The proposed development site is available for lease by the developer from the landowners. The northern section of the study area (Gunstfontein Portion 1/131 and RE/131 - above the escarpment) can be accessed from an existing gravel road which branches off of the R354. Similarly the southern section of the study area

(Boschmanshoek 177 and Wolven hoek RE/182 - below the escarpment) can also be accessed from an existing gravel road branching off of the R354. A further access option to the study area is provided via the road to Spitzkop which also branches off of the R354. This gravel road also passes the Komsberg Substation to which grid connection is proposed.

Environmental Considerations: Through the screening study undertaken, the proposed development area was identified as being an area which is potentially suitable for a development of this nature from an environmental perspective. The site is currently being utilised for sheep grazing and hence much of the land is already transformed. Furthermore, the turbine bases and associated infrastructure will use up less than 5% of the land area once construction is complete.

SALT Considerations: Through interactions with the South African Astronomical Observatory (SAAO) to date, and it must be noted that these are still ongoing, the potential impacts of vibration and increased atmospheric turbulence appear to have been satisfactorily demonstrated as minimal, and furthermore solutions arrived at in consultation with the Civil Aviation Authority (CAA) would appear to be able to address concerns relating to the potential impact of wind turbine aviation lighting on the dark skies above SALT.

Wind Resource: The proposed site was originally selected for the development of a wind energy facility based on its predicted wind climate (high wind speeds). Two 80m met masts have been installed on site, one since late 2012 and the other from June 2014. The data received from these masts is highly confidential, but it has confirmed the wind resource to be excellent and better than that available in most other parts of South Africa. The mean wind speed at potential wind turbine hub heights have been confirmed which translate into the project being very competitive in the current market. Extensive wind flow modelling using linear and non-linear mathematical models has been performed for the site. This gives Gunstfontein Wind Farm (Pty) Ltd additional confidence in the wind speed predictions and the competitiveness of the site.

Grid Connection: The electricity generated at the proposed facility is to be evacuated to the Eskom Komsberg Substation via a new 132kV overhead power line. This is considered to be the most technically feasible connection option, as confirmed by Eskom. Export capacity at Komsberg Substation is favourable due to two 400kV lines running past the Komsberg Substation (over 1000MW or power can be evacuated per 400kV line).

Agricultural considerations: The land comprising the site is of low agricultural merit and has limited carrying capacity for livestock. It is presently considered only suitable for sheep farming and the development of the WEF will have minimal impact on this.

Local labour and poverty alleviation: The site is located close to the town of Sutherland, which will act as a source of local labour during construction and operation of the proposed facility which will lead to social upliftment in an area with high rates of unemployment and

poverty (estimated 48% of families in the Karoo live below the poverty breadline of R800 pm (NCPGDS, Jul 2011). Other areas that will similarly benefit are Laingsburg.

Socio-economic and enterprise development:
All areas within a 50km radius of the proposed WEF will benefit from the socio-economic and enterprise development initiatives committed to by the Gunstfontein WEF as prescribed by the Department of Energy in their Renewable Energy Independent Power Producer Procurement Program (REIPPPP). These commitments will the local community owning a share in the Gunstfontein Wind Energy Facility, thus benefitting from dividends, and will also see a % of turnover being deployed back into the local community.

2.3.3 Renewable Energy Development Zones (REDZ)

The Department of Environmental Affairs (DEA) has committed to contribute to the implementation of the National Development Plan and National Infrastructure Plan by investigating the undertaking of Strategic Environmental Assessments (SEAs) to identify adaptive processes that streamline the regulatory environmental requirements for Strategic Integrated Projects (SIPs) while safeguarding the environment.

The wind and solar photovoltaic (PV) SEA was accordingly commissioned by DEA in support of SIP 8, which aims to facilitate the implementation of sustainable green energy initiatives. This SEA identifies areas where large scale wind and solar PV energy facilities can be developed in terms of SIP 8 and in a manner that limits significant negative impacts on the environment, while yielding the highest possible socio-economic benefits to the country. These areas are referred to as Renewable Energy Development Zones (REDZs).

The REDZs also provide priority areas for investment into the electricity grid. Currently one of the greatest challenges to renewable energy development in South Africa is the saturation of existing grid infrastructure and the difficulties in expanding the grid. Proactive investment in grid infrastructure is therefore likely to an important factor determining the success of REDZs.

As shown in Figure 2.2 below, the proposed Gunstfontein Wind Energy Facility falls within REDZ 2 which was selected by the Council for Scientific and Industrial Research (CSIR) (acting under a DEA appointment) as an area highly suitable for wind farms given a range of factors considered. This provides further motivation for the selection of the specific site chosen for this project.

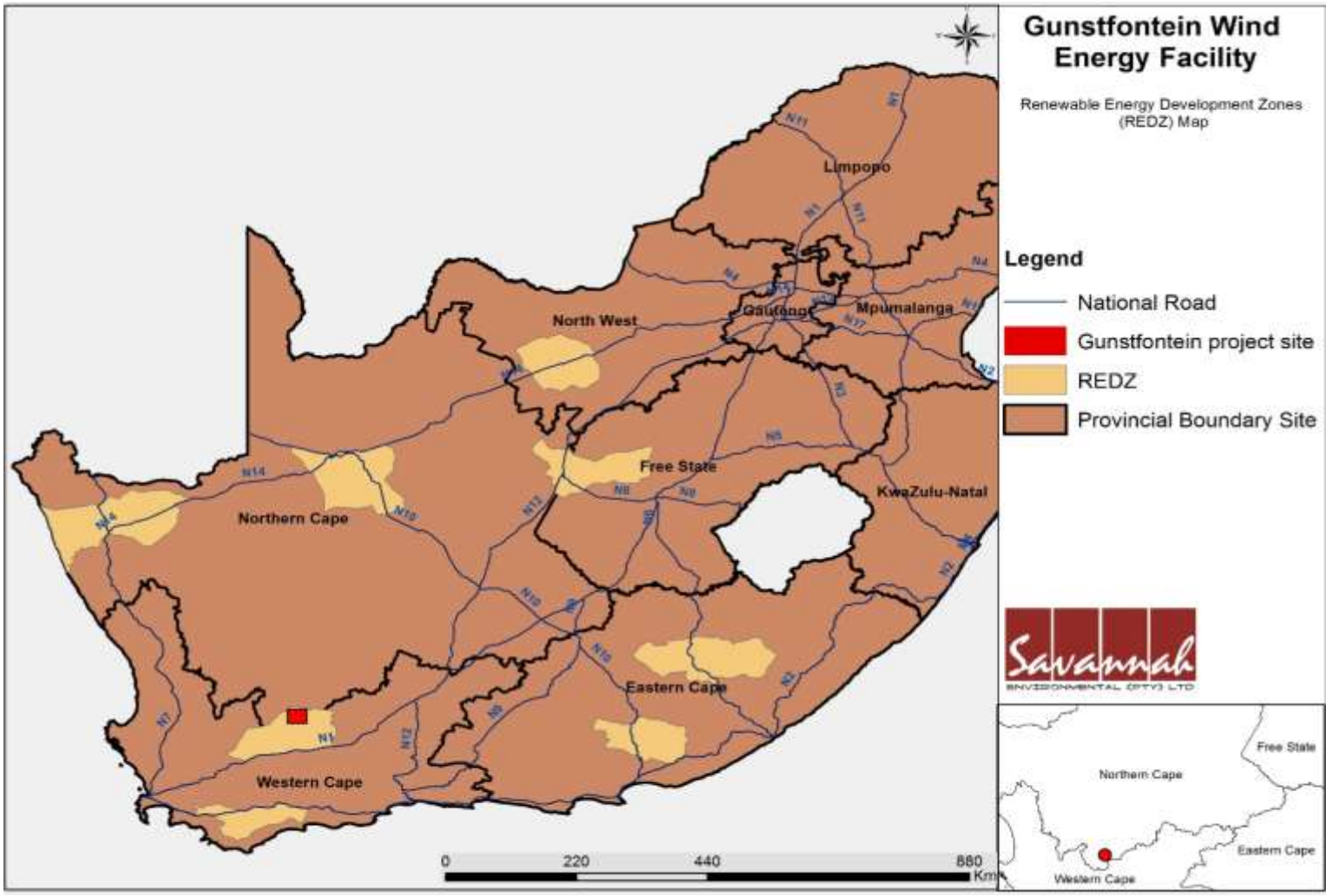

Figure 2.2: Renewable Energy Development Zones (REDZ) (CSIR, 2014) illustrating that the Gunstfontein Wind Energy Facility falls within REDZ 2

2.3.4 Benefits of Renewable Energy

The generation of electricity from renewable energy resources offers a range of potential socio-economic and environmental benefits for South Africa. These benefits include:

Increased energy security: The current electricity crisis in South Africa highlights the significant role that renewable energy can play in terms of power supplementation. In addition, given that renewables can often be deployed in a short timeframe and in a decentralised manner close to consumers, they offer the opportunity for improving grid strength and supply quality in the short-term, while reducing expensive distribution losses. These real benefits have already been enjoyed by citizens with renewable energy generation since early 2012 making an increasingly important contribution to supply security.

Resource saving: It is estimated that the achievement of the targets in the Renewable Energy White Paper will result in water savings of approximately 16.5 million kilolitres per annum. This also translates into revenue savings of R26.6 million per annum, as fuel for renewable energy facilities is free while compared to the continual purchase of fuel for conventional power stations. As an already water-stressed nation, it is critical that South Africa engages in a variety of water conservation measures, particularly due to the detrimental effects of climate change on water availability.

Exploitation of our significant renewable energy resource: At present, valuable renewable resources including biomass by-products, solar radiation and wind power remain largely unexploited. The use of these energy flows will strengthen energy security through the development of a diverse energy portfolio in South Africa.

Economics: As a result of the excellent resource and competitive procurement processes, both wind power and solar PV power are now proven in South Africa as cheaper forms of energy generation than coal power. They offer excellent value for money to the economy and citizens of South Africa.

Pollution reduction: The releases of by-products through the burning of fossil fuels for electricity generation have a particularly hazardous impact on human health and contribute to ecosystem degradation. The use of solar radiation or wind for power generation is a non-consumptive use of a natural resource which produces zero emissions during its operation.

Climate friendly development: The uptake of renewable energy offers the opportunity to address energy needs in an environmentally responsible manner and thereby allows South Africa to contribute towards mitigating climate change through the reduction of greenhouse gas (GHG) emissions. South Africa is estimated to be currently responsible for approximately 1% of global GHG emissions (and circa half of those for

which Africa is responsible) and is currently ranked 9th worldwide in terms of per capita carbon dioxide emissions.

Support for international agreements: The effective deployment of renewable energy provides a tangible means for South Africa to demonstrate its commitment to its international agreements under the Kyoto Protocol, and for cementing its status as a leading player within the international community.

Employment creation: The development, procurement, installation, maintenance and management of renewable energy facilities have significant potential for job creation and skills development in South Africa.

Acceptability to society: Renewable energy offers a number of tangible benefits to society including reduced pollution concerns, improved human and ecosystem health and climate friendly development.

Support to a new industry sector: The development of renewable energy offers the opportunity to establish a new industry within the South African economy, which will create jobs and skill local communities which have potential for further renewable energy projects.

Protecting the natural foundations of life for future generations: Actions to reduce our disproportionate carbon footprint can play an important part in ensuring our role in preventing dangerous anthropogenic climate change; thereby securing the natural foundations of life for generations to come. This is the basis of sustainable development.

2.5. Alternatives Considered in the Scoping Phase

In accordance with the requirements outlined in Appendix 2 of the EIA Regulations 2014, the consideration of alternatives including site, activity, technology and site access alternatives, as well as the "do-nothing" alternative should be undertaken. The follow sections address this requirement.

2.5.1 Site-specific or Layout Design Alternatives

As mentioned above, a Screening Assessment was undertaken to assist in determining overall project feasibility and to assist in the conceptual and broad scale siting of the renewable energy facility. The scope of the assessment included a desktop ecological scan, a noise impact scan and an avifaunal scan. The screening exercise served to assist the applicant in mapping and identifying desktop sensitivities in order to delineate preliminary areas of exclusion within the broader development area.

The site under consideration is approximately 12 000ha in extent. Less than 5% of this area will be permanently transformed as a result of the proposed wind energy facility. The placement of the wind turbines and associated infrastructure within the study area can be undertaken taking cognisance of the identified environmental sensitivities. The final layout will consider and aim to achieve a balance between energy production and environmental protection, with the micro-siting of the turbines and associated infrastructure to be provided for assessment in the EIA Phase.

The applicant has not selected the final turbine model, or models, that will be installed on the site at this stage in the process. The capacity of the actual turbines to be used for the project is therefore not certain at this point, but the units are each expected to be up to 4 MW in capacity, with the Wind Farm limited to 200MW. The turbines will have a hub height of up to 120 m and a rotor diameter of up to 140m.

During the EIA Phase a number of layout alternatives will be considered in order to maximise the production of electricity on the site whilst minimising the environmental impact. Options that will be considered and evaluated will range from smaller turbines (e.g. 100No 2.0MW turbines) through to fewer larger turbines (e.g. 50 No 4.0MW turbines). The technology provider and turbine model will only be selected after conclusion of this exercise, as informed by the findings of the EAP and Specialists.

2.5.2 Activity Alternatives

Gunstfontein Wind Farm (Pty) Ltd is a renewable energy project developer and as such will only consider renewable energy technologies. CSP is not a viable technology due to water shortages in the area. Solar PV also requires the use of water for cleaning (although small amounts). Solar PV is however not considered a viable alternative due to the available resource and the long grid connection required for the site. If a solar PV project were developed on the site it would need to compete with other PV projects in the REIPPP Programme. Many other PV projects have better resource and also have on-site grid access and would therefore have a much lower grid connection cost. These factors would make a solar PV project on this site uncompetitive. On the other hand, there are only a few sites in South Africa with a wind resource as good as this site, and therefore this site can afford a fairly long grid connection and still be very competitive. The capacity at the Eskom Komsberg Substation enables the export of energy into the national transmission grid, thereby enhancing the competitiveness of this site.

2.5.3 Technology Alternatives

As stated previously, various wind turbine options will be evaluated during the project development process in order to maximise the production of electricity on the site while minimising the environmental impact. Options that will be considered and evaluated will range from more smaller turbines (e.g. 100 turbines with each turbine generating

2.0MW) through to fewer larger turbines (e.g. 50 turbines with each turbine generating 4.0MW).

2.5.4 Site Access Alternatives

Site access will be from the R534. Due to the topography of the area there are no other site access alternatives.

2.5.5 The 'do-nothing' Alternative

The 'do-nothing' alternative is the option of the Applicant not constructing the Gunstfontein Wind Energy Facility. This would result in no environment or social impacts as a result of a wind energy facility in this area, i.e. no detrimental impacts but also no positive impacts. As it is suggested that the positive impacts outweigh the detrimental impacts (especially after mitigation), the 'do-nothing' alternative is not seen as a desirable alternative.

The electricity demand in South Africa is placing increasing pressure on the country's existing power generation capacity and the resultant restrictions are severely damaging the economy. There is, therefore, a need for additional electricity generation options to be developed throughout the country. The 'do nothing' option in terms of implementing renewable energy projects results in a scenario where a fossil fuel or nuclear facility must rather be developed as the need for power does not go away. Environmental considerations aside, these have long lead times (considerably longer than the time required to implement renewable energy projects) and hence the South African economy and its citizens will suffer. Furthermore, the development of a renewable energy source, as promoted by the South African Government would also not be realised, and the reliance on fossil fuel energy sources would not be reduced, as has been committed to.

The purpose of the proposed wind energy facility is to add new capacity for generation of renewable energy to the national electricity mix and to aid in achieving the goal of a 43% share of all new power generation being derived from independent power producers (IPPs), as targeted by the Department of Energy (DoE). It is fully aligned with government policy – aligns with policy at all three levels of government (see Chapter 2 of this Scoping Report) and for it not to be implemented is at odds with said policies.

The 'do-nothing' alternative would result in the additional power from this highly efficient and competitive renewable energy facility not being added to the electricity grid and for the associated socio-economic benefits not being available to enhance the lives of South Africans.

At this time the EAP and Specialists believe that there is no reason for the Gunstfontein Wind Energy Facility project not to be evaluated further and that its envisaged

associated environmental and social impacts should be able to be satisfactorily mitigated against.

The "do nothing" option will be further assessed within the EIA phase of the process.

2.6. Wind Energy as a Power Generation Technology

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

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

Environmental pollution and the emission of CO_2 from the combustion of fossil fuels constitute a threat to the environment. The use of fossil fuels is reportedly responsible for ~70% of greenhouse gas emissions worldwide. The climate change challenge needs to include a shift in the way that energy is generated and consumed. Worldwide, many solutions and approaches are being developed to reduce emissions. However, it is important to acknowledge that the more cost effective solution in the short-term is not necessarily the least expensive long-term solution. This holds true not only for direct project cost, but also indirect project cost such as impacts on the environment. Renewable energy is considered a 'clean source of energy' with the potential to contribute greatly to a more ecologically, socially and economically sustainable future. The challenge now is ensuring wind energy projects are able to meet all economic, social, and environmental sustainability criteria.

Wind energy has the attractive attribute that the fuel is free. The economics of a wind energy project crucially depend on the wind resource at the site. Detailed and reliable information about the speed, strength, direction, and frequency of the wind resource is vital when considering the installation of a wind farm, as the wind resource is a critical factor to the success of the installation.

Wind speed is the rate at which air flows past a point above the earth's surface. Average annual wind speed is a critical siting criterion, since this determines the cost of generating electricity. As energy is proportional to the cube of wind speed, even small changes in wind speed can produce large changes in the economic performance of a wind farm (for example, an increase of average wind speed from 6 m/s to 10 m/s potentially increases the amount of energy produced by over 400%). Wind turbines can

start generating at wind speeds of 3 - 4 m/s. Wind speed can be highly variable and is affected by a number of factors, including surface roughness of the terrain.

Wind direction at a site is important to understand as it influences the turbulence over the site, and therefore the potential energy output. However, wind turbines can extract energy from any wind direction as the nacelle automatically turns to face the blades into the predominant wind direction at any point in time.

South Africa in general can be considered as having a moderate wind resource as compared to Northern Europe (Scandinavia), northern parts of Great Britain and Ireland, New Zealand and Tasmania. However, wind regimes are highly site specific and given the size of South Africa this means that South Africa does have numerous locations that are suitable for commercial wind farms. Many sites along the South African coastline and select inland locations have average wind speeds above 7 m/s which starts to become meaningful, especially as modern wind turbines are designed to provide models that cover a wide range of wind speeds.

The wind speed measurements taken at a particular site are affected by the local climate, local topography (extending to a few tens of kilometres from the mast) and surface roughness. This is why local on-site monitored wind speed data is so important for detailed wind farm design. The effect of height variation/relief in the terrain can impose a speeding-up/slowing-down of the wind due to the topography. Elevation in the topography exerts a profound influence on the flow of air, and may result in turbulence within the air stream, and this has to be taken into account in the placement of turbines.

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

Wind turbines typically need to be spaced approximately 2 to 3xD apart perpendicular to the predominant wind direction, and 5 to 7xD in the plane of the predominant wind direction (D = the diameter of the rotor blades). This is required to minimise the induced wake effect that the turbines might have on each other. The micro-sitting of the turbines will be optimised using industry software systems once a viable footprint for the establishment of the wind farm has been determined through the consideration of both technical and environmental criteria.

2.6.1. How do wind turbines function

Wind turbines, like windmills, are mounted on a tower to capture the most energy. The kinetic energy of wind is used to turn a wind turbine to generate electricity. At increased

height above ground, they can take advantage of the faster and less turbulent wind. Turbines catch the wind's energy with their propeller-like blades. Three blades are mounted on a shaft to form a *rotor.* A wind turbine consists of three rotor blades and a nacelle mounted at the top of a tapered supporting tower. The mechanical power generated by the rotation of the blades is transmitted to the generator within the nacelle via a gearbox and drive train.

Turbines are able to operate at varying speeds. The amount of energy a turbine can harness depends on both the wind velocity and the length of the rotor blades. It is anticipated that the turbines utilised for the proposed Gunstfontein Wind Energy Facility will have a hub height of up to 120m, and a rotor diameter of up to up to 140 m.

2.6.2. Main Components of a Wind Turbine

The turbine consists of the following major components (as shown in **Figure 2.2)**:

» The rotor
» The nacelle
» The tower
» The foundation unit

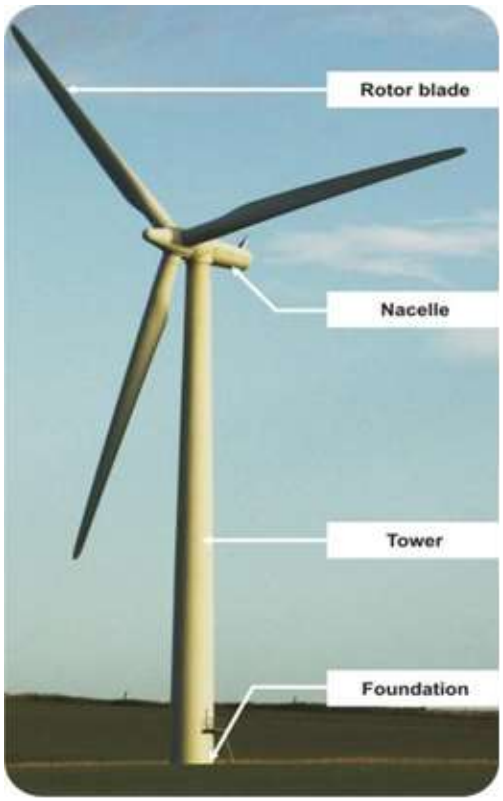

Figure 2.3: Illustration of the main components of a wind turbine

The Rotor

The portion of the wind turbine that collects energy from the wind is called the rotor. The rotor comprises of three rotor blades, the diameter of which (up to 140m in this

instance) is an important specification. The rotor blades use the latest advances in aeronautical engineering materials science to maximise efficiency. The greater the number of turns of the rotor the more electricity is produced. The rotor converts the energy in the wind into rotational energy to turn the generator. The rotor has three blades that rotate at about 15 to 28 revolutions per minute (rpm). The speed of rotation of the blades is controlled by turning the blades to face into the wind ('yaw control'), and changing the angle of the blades ('pitch control') to make the most use of the available wind.

The rotor blades function in a similar way to the wing of an aircraft, utilising the principles of **lift** (Bernoulli). When air flows past the blade, a wind speed and pressure differential is created between the upper and lower blade surfaces. The pressure at the lower surface is greater and thus acts to "lift" the blade. When blades are attached to a central axis, like a wind turbine rotor, the lift is translated into rotational motion. Lift-powered wind turbines are well suited for electricity generation.

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

The nacelle

The nacelle contains the generator, control equipment, gearbox, and anemometer for monitoring the wind speed and direction (as shown in **Figure 2.4**).

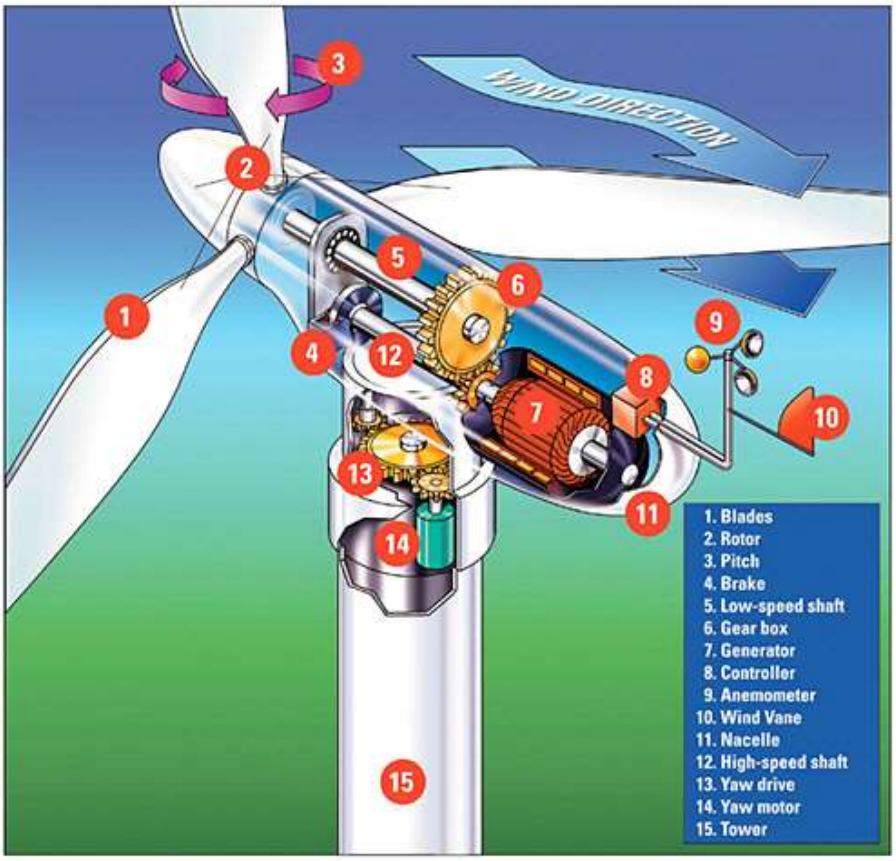

Figure 2.4: Detailed structure of a typical nacelle of a wind turbine (refer to windenergypros.org)

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

The tower

The tower is a hollow structure allowing access to the nacelle (up to 120m in height in this case) (refer to **Figure 2.5)**. The height of the tower is a key factor in determining the amount of electricity a turbine can generate as the wind speed varies with height. Towers are typically delivered to site in sections and then erected and joined together on site. Most towers are made of steel however some are made of reinforced post-stressed concrete.

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

Figure 2.5: Example of a tower on which the rotor is mounted

Small transformers may be placed outside each turbine tower, depending on what make and model of turbine is deemed most suitable for the site. Such a transformer would have its own foundation and housing around it. Alternatively, the transformer could be housed within the tower. The transformers convert the electricity to the correct voltage for internal reticulation to the on-site substation where it is transformed once more to the correct voltage for transmission into the grid.

2.6.3. Operating Characteristics of a Wind Turbine

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

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

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

It is the flow of air over the blades and through the rotor area that makes a wind turbine function. The wind turbine extracts energy by slowing the wind down. The theoretical maximum amount of energy in the wind that can be collected by a wind turbine's rotor is approximately 59%. This value is known as the Betz Limit. In practice, the collection efficiency of a rotor is not 100%. A more typical efficiency is 35% to 45%. A complete wind energy system incurs losses through friction, wake effects, electrical losses etc. and modern systems end up converting between 20-25% of the energy in the air into electricity which equates to 34 - 42% of the maximum (due to Betz Law).

However, because the energy in the air is free, describing how efficiently the energy is converted is only useful for system improvement and monitoring purposes. A more useful measurement is the Capacity Factor which is also represented as a percentage. The 'Capacity Factor %' is calculated from the actual MWh output of electricity from the entire wind farm over 1 year divided by the nameplate maximum theoretical output for the same period. It therefore also takes wind resource, wind variability and system availability (downtime, maintenance and breakdowns) into account. Gunstfontein Wind Farm (Pty) Ltd has initial predictions for Capacity Factors of between 35-40% which compares favourably with other best resource site in South Africa. This figure will be predicted more accurately when more on-site wind data has been recorded and the most suitable turbine has been chosen.

Wind turbines can be used as stand-alone applications, or they can be connected to a utility power grid. For utility-scale sources of wind energy, a large number of wind turbines are usually built close together (suitably spaced so as to minimise wake losses and wake induced turbulence) and then connected via a series of "strings" to an on-site substation where all power is transformed to the correct voltage and then exported via a linkage to the utility power grid. This is what is meant by a **wind energy facility.**

2.7. Project Construction Phase

The construction phase of the wind farm is dependent on the number of turbines to be erected, but can be estimated at around 24 months. The project will create direct construction employment opportunities over this period.

The most suitable accommodation for construction workers will be identified prior to construction. No on-site labour camps are envisaged. It is expected that construction workers will be accommodated in the nearby towns and transported to and from site on a daily basis. Overnight on-site worker presence would be aimed to be limited to security staff.

Construction is envisaged to begin in 2017 should the project be approved by the DEA, the DoE, a generating license issued by NERSA, and a Power Purchase Agreement

secured with Eskom. In order to construct the proposed wind energy facility and associated infrastructure, a series of activities will need to be undertaken. The construction process is discussed in more detail below.

2.7.1. Conduct Surveys

Prior to initiating construction, a number of surveys will be required including, but not limited to, geotechnical survey, site survey and confirmation of the turbine micro-siting footprint, survey of the on-site substation site and survey of power line servitude (if applicable) to determine tower locations and all other associated infrastructure.

2.7.2. Establishment of Access Roads to the Site

Access/haul roads to the site as well as internal access roads within the site are required to be established.

The northern section of the study area (above the escarpment) can be accessed from a gravel road which branches off of the R354. Similarly the southern section of the study area (below the escarpment) can also be accessed from a gravel road branching off of the R354. A further access option to the study area is provided via the road to Spitzkop which also branches off of the R354. This gravel road also passes the Komsberg Substation to which grid connection is proposed. The need to upgrade these existing roads to enable the transportation of components to site during construction would need to be verified prior to construction.

As far as possible, existing access roads would be utilised and upgraded where required. Within the site itself, access will be required between the turbines for construction purposes (and later limited access for maintenance). Special haul roads may need to be constructed to and within the site to accommodate abnormally loaded vehicle access and circulation. The internal service road alignment will be informed by the final micro-siting/positioning of the wind turbines.

Figure 2.6: Turn off the R354 onto the

Figure 2.7: View of the gravel road in the

gravel road.	direction of the entrance to the Gunstfontein farm.

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

2.7.3. Undertake Site Preparation

Site preparation activities will include clearance of vegetation at the footprint of each turbine, establishment of laydown areas (refer to 2.7.4 below), the establishment of internal access roads and excavations for foundations. These activities will require the stripping of topsoil, which will need to be stockpiled, backfilled and/or spread on site.

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

2.7.4. Establishment of Laydown Areas on Site

Laydown areas will need to be established at a central point for the storage of wind turbine components. Laydown and storage areas will also be required to be established for the normal civil engineering construction equipment which will be required on site.

A large laydown area will be required at each turbine position where the main lifting crane will be required for turbine erection and for disassembly at the end of life. Each turbine needs an associated flat and hardened lay-down area of approximately 40 m x 25 m (depending on the turbine selected), though this can be less in difficult access terrain.

2.7.5. Construct Foundation

Concrete foundations will be constructed at each turbine location. Foundation holes will be mechanically excavated to a depth of approximately 4-5 m, depending on the local geology. Concrete may to be brought to site as ready-mix or batched on site if no suitable concrete suppliers are available in the vicinity. The reinforced concrete foundation of approximately 22m x 22m x 4m (depending on the turbine selected) will be poured and will support a mounting ring (refer to Figure 2.8). The foundation will be backfilled and will be left for a suitable period to cure, where-after it may receive the turbine.

Figure 2.8: Reinforced concrete foundation supporting the mounting ring

2.7.6. Transport of Components and Equipment to Site

The wind turbine, including tower, will be brought on site by the supplier in sections on flatbed trucks. The equipment will be transported to the site using appropriate National and Provincial routes, and the dedicated access/haul road to the site itself.

Turbine units which must be transported to site consist of a tower comprised of segments, a nacelle weighing approximately 100 tons, and three rotor blades (each of up to 70 m in length in this instance). The individual components are defined as abnormal loads in terms of Road Traffic Act (Act No 29 of 1989)[3] by virtue of the dimensional limitations (abnormal length of the ~70 m blades) and load limitations (i.e. the nacelle). In addition, components of various specialised construction, lifting equipment and counter weights etc. are required on site (e.g. 200 ton mobile assembly crane and a 750 ton main lift crane to erect the wind turbines) and need to be transported to site.

In addition to the specialised lifting equipment, the normal civil engineering construction equipment will need to be brought to the site for the civil works (e.g. excavators, trucks, graders, compaction equipment, cement mixers, batching plant etc.).

[3] A permit may be required for the transportation of these loads on public roads.

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

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

2.7.7. Construct Turbine

A large lifting crane will be brought on site. It will lift the tower sections into place. The nacelle, which contains the gearbox, generator and yawing mechanism, will then be placed onto the top of the assembled tower. The next step will be to assemble or partially assemble the rotor (i.e. the blades of the turbine) on the ground. It will then be lifted to the nacelle and bolted in place. A small crane will likely be needed for the assembly of the rotor while a large crane will be needed to put it in place. Alternatively the hub may be fixed first to the nacelle and the blades thereafter individually fixed to the hub.

2.7.8. Construct Substation

A suitable substation will be constructed within the site footprint. The turbines will be connected to the substation via underground cabling wherever possible and practical). The layout of the turbines will determine the optimum position for the construction of a substation. The substation will be constructed within a maximum footprint of 120m x 120m.

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

2.7.9. Connection of Wind Turbines to the Substation

Each wind turbine will be connected to an optimally positioned substation on site by underground (where practical) medium voltage electrical cables (normally 33 kV). The installation of these cables will require the excavation of trenches, approximately 1 m in depth within which these cables can then be laid. The underground cables will be planned to follow the internal access roads, as far as possible. Some sections of overhead cabling may be required.

2.7.10. Establishment of Ancillary Infrastructure

A workshop as well as a control and administration / service buildings (number, size and location to be confirmed later in process) are also required. The establishment of these facilities/buildings will require the clearing of vegetation and levelling of the development site and the excavation of foundations prior to construction. A laydown area for building materials and equipment associated with these buildings will also be required. To the extent practical this ancillary infrastructure will be located within the footprint previously advised with respect to the substation.

2.7.11. Temporary Infrastructure

A contractor's camp is likely to be required to be constructed to accommodate offices, stores, workshops, fuel storage etc (sizes and numbers to be confirmed later in process). The establishment of these facilities will require the clearing of vegetation and levelling of the site and the preparation of hardened areas suitable for the placing of porta-cabins and containers and the construction of stores and workshops. A laydown area for building materials and equipment associated with the construction of the wind farm will also be required.

2.7.12 Undertake Site Rehabilitation

As construction is completed in an area, and as all construction equipment is removed from the site, the site will be rehabilitated as specified in the approved Environmental Management Programme (EMPr). On full commissioning of the facility, any access points to the site which are not required during the operation phase will be closed and prepared for rehabilitation.

2.8. Project Operation Phase

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

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

2.9. Project Decommissioning Phase

The turbine infrastructure which will be utilised for the proposed Wind Farm is expected to have a lifespan of approximately 20 - 25 years (with maintenance). Equipment associated with this facility would only be decommissioned once it has reached the end of its economic life. The following decommissioning activities have been considered to form part of the project scope.

2.9.1. Site Preparation

Site preparation activities will include confirming the integrity of the access to the site to accommodate required equipment and lifting cranes, preparation of the site (e.g. lay down areas, construction platform) and the mobilisation of construction equipment.

2.9.2. Disassemble and Remove Turbines

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

Any decommissioning activities will be required to comply with the legislation relevant at the time.

REGULATORY AND PLANNING CONTEXT CHAPTER 3

3.1. Strategic Electricity Planning in South Africa

The need to expand electricity generation capacity in South Africa is based on national policy and is informed by on-going strategic planning undertaken principally by the Department of Energy (DoE), who in turn are supported by many other organs of government. The hierarchy of policy and planning documentation that support the development of renewable energy projects such as the Gunsfontein Wind Energy Facility is illustrated in **Figure 3.1**.

Figure 3.1: Hierarchy of electricity policy and planning documents

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

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

» *Department of Energy (DoE)*: This Department is responsible for policy relating to all energy forms, including renewable energy, and is responsible for forming and approving the IRP (Integrated Resource Plan for Electricity).
» *National Energy Regulator of South Africa (NERSA):* This body is responsible for regulating all aspects of the electricity sector, and will ultimately issue licenses for wind energy developments to generate electricity.

» *Department of Environmental Affairs (DEA):* This Department is responsible for environmental policy and is the controlling authority in terms of NEMA and the EIA Regulations. The DEA is the competent authority for this project, and charged with granting the relevant environmental authorisation.
» *The South African Heritage Resources Agency (SAHRA):* SAHRA is a statutory organisation established under the National Heritage Resources Act, No 25 of 1999, as the national administrative body responsible for the protection of South Africa's cultural heritage.
» *Department of Transport – South African Civil Aviation Authority (SACAA):* This department is responsible for aircraft movements and radar, which are aspects that influence wind energy development location and planning.
» *South African National Roads Agency Limited (SANRAL):* This Agency is responsible for the regulation and maintenance of all national routes.
» *Department of Water and Sanitation:* This Department is responsible for water resource protection, water use licensing and permits.
» *The Department of Agriculture, Forestry and Fisheries (DAFF):* This Department is the custodian of South Africa's agriculture, fisheries and forestry resources and is primarily responsible for the formulation and implementation of policies governing the Agriculture, Forestry and Fisheries Sector. This Department has published a guideline for the development of wind farms on agricultural land.
» *The Department of Science and Technology:* This department is the administrating authority for the Astronomy Geographical Advantage Act (Act 21 of 2007).

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

» *Provincial Government of the Northern Cape – Department of Environment and Nature Conservation (Northern Cape DENC).* This department is the commenting authority for this project as well as being responsible for issuing of other biodiversity and conservation-related permits.
» *Department of Transport and Public Works - Northern Cape.* This department is responsible for roads and the granting of exemption permits for the conveyance of abnormal loads on public roads.
» *Northern Cape Department of Agriculture and Rural Development:* This is the provincial authority responsible for matters affecting agricultural land.
» *Ngwao Boswa ya Kapa Bokone (Northern Cape Heritage Authority):* This body is responsible for commenting on heritage related issues in the Northern Cape Province.

At **Local Level** the local and municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. In the Northern Cape, the Karoo Hoogland Local Municipality and the Namakwa District Municipality play a role.

» In terms of the Municipal Systems Act (Act No 32 of 2000) it is compulsory for all municipalities to go through an Integrated Development Planning (IDP) process to prepare a five-year strategic development plan for the area under their control.
» *Namakwa District Biodiversity Sector Plan* (Desment & Marsh 2008) Bioregional planning involves the identification of priority areas for conservation and their placement within a planning framework of core, buffer and transition areas. These could include reference to visual and scenic resources and the identification of areas of special significance, together with visual guidelines for the area covered by these plans.

3.2. National Policy

3.2.1 The Kyoto Protocol, 1997

South Africa's electricity is mainly generated from coal-based technologies. South Africa accounts for ~38 % of Africa's CO2 (a greenhouse gas contributing to climate change) from burning of fossil fuels and industrial processes. The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change. South Africa ratified the Kyoto Protocol in 2002. The Kyoto Protocol requires developing countries to reduce its greenhouse gas emissions through actively cutting down on using fossil fuels, or by utilising more renewable resources. Therefore certain guidelines and policies (discussed further in the sections below) were put in place for the Government's plans to reduce greenhouse gas emissions. The development of renewable energy projects (such as the proposed wind energy facility) is therefore in line with South Africa's international obligations in terms of the Kyoto Protocol. A second commitment period commenced from 1 January 2013, and extends to 31 December 2020.

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

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

» increasing access to affordable energy services;
» improving energy sector governance;
» stimulating economic development;
» managing energy-related environmental impacts; and
» securing supply through diversity.

Furthermore, the National Energy Policy identifies the need to undertake an Integrated Energy Planning (IEP) process and the adoption of a National Integrated Resource Planning (NIRP) approach. Through these processes, the most likely future electricity

demand based on long-term Southern African economic scenarios can be forecasted, and provide the framework for South Africa to investigate a whole range of supply and demand side options.

3.2.3. The National Energy Act (2008)

The National Energy Act was promulgated in 2008 (Act No 34 of 2008). One of the objectives of the Act was to promote diversity of supply of energy and its sources. In this regard, the preamble makes direct reference to renewable resources, including wind:

"*To ensure that diverse energy resources are available, in sustainable quantities, and at affordable prices, to the South African economy, in support of economic growth and poverty alleviation, taking into account environmental management requirements (…); to provide for (…) increased generation and consumption of renewable energies*…(Preamble)."

The National Energy Act aims to ensure that diverse energy resources are available, in sustainable quantities and at affordable prices, to the South African economy in support of economic growth and poverty alleviation, taking into account environmental management requirements and interactions amongst economic sectors, as well as matters relating to renewable energy. The Act provides the legal framework which supports the development of renewable energy facilities for the greater environmental and social good.

3.2.4. Renewable Energy Policy in South Africa

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

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

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

The support for the Renewable Energy Policy is guided by a rationale that South Africa has a very attractive range of renewable resources, particularly solar and wind, and that renewable applications are, in fact, the least cost energy service in many cases from a fuel resource perspective (i.e. the cost of fuel in generating electricity from such technology); more so when social and environmental costs are taken into account. In spite of this range of resources, the National Energy Policy acknowledges that the development and implementation of renewable energy applications has been neglected in South Africa.

Government policy on renewable energy is therefore concerned with meeting the following challenges:

» Ensuring that economically feasible technologies and applications are implemented;
» Ensuring that an equitable level of national resources is invested in renewable technologies, given their potential and compared to investments in other energy supply options; and
» Addressing constraints on the development of the renewable industry.

In order to meet the long-term goal of a sustainable renewable energy industry, the South African Government has set the following 10-year target for renewable energy: "*10 000 GWh (0.8 Mtoe) renewable energy contribution to final energy consumption by 2013 to be produced mainly from biomass, wind, solar and small-scale hydro. The renewable energy is to be utilised for power generation and non-electric technologies such as solar water heating and bio-fuels. This is approximately 4% (1 667 MW) of the estimated electricity demand (41 539 MW) by 2013"* (DME, 2003).

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

3.2.5 National Development Plan

The National Development Plan (NDP) contains a plan aimed at eliminating poverty and reducing inequality by 2030. The NDP identifies 9 key challenges and associated remedial plans. Managing the transition towards a low carbon national economy is

identified as one of the 9 key national challenges. Expansion and acceleration of commercial renewable energy is identified as a key intervention strategy.

The proposed project will support many of the objectives of the National Development Plan (NDP). Some of these objectives are listed below:

- » Create 11 million jobs by 2030; and
- » Procuring about 20 000MW of renewable electricity by 2030.

3.2.6 Strategic Integrated Projects

In 2010, a National Development Plan was drafted to address socio economic issues affecting development in South Africa. These issues were identified and placed under 18 different Strategic Integrated Projects (SIPs) to address the spatial imbalances of the past by addressing the needs of the poorer provinces and enabling socio-economic development. Amongst these is the green energy in support of South African Economy i.e. SIP 8 (*Green energy in support of the South African economy).* The SIP aims at supporting sustainable green energy initiatives on national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP, 2010).

The proposed Gunstfontein Wind Energy Facility is a potential Strategic Infrastructure Project[4]

SIP 8: Green energy in support of the South African Economy
The proposed Gunstfontein Wind Energy Facility is a potential SIP 8 Project and would only become a SIP project if selected as a preferred bidder project by the Department of Energy. SIP 8 supports sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP 2010).

SIP 9: Electricity generation to support socioeconomic development
The proposed Gunstfontein Wind Energy Facility is a potential SIP 9 Project and would only become a SIP 9 project if selected as a preferred bidder project by the Department of Energy. SIP 9 supports the acceleration the construction of new electricity generation capacity in accordance with the IRP2010 to meet the needs of the economy and address historical imbalances.

3.2.7. Integrated Resource Plan 2010 - 2030

The Energy Act of 2008 obligates the Minister of Energy to develop and publish an integrated resource plan for energy. Therefore, the Department of Energy (DoE),

[4] The South African Government adopted a National Infrastructure Plan in 2012 with the objective that government aims to transform South Africa's economic landscape whilst simultaneously creating significant numbers of new jobs, and strengthening the delivery of basic services. The plan also supports the integration of African economies. The SIPs cover social and economic infrastructure across all nine provinces (with an emphasis on lagging regions). The SIPs include catalytic projects that can fast-track development and growth.

together with the National Energy Regulator of South Africa (NERSA) has compiled the Integrated Resource Plan (IRP) for the period 2010 to 2030. The objective of the IRP is to develop a sustainable electricity investment strategy for generation capacity and transmission infrastructure for South Africa over the next twenty years. The IRP is intended to:

» Improve the long term reliability of electricity supply through meeting adequacy criteria over and above keeping pace with economic growth and development;
» Ascertain South Africa's capacity investment needs for the medium term business planning environment;
» Consider environmental and other externality impacts and the effect of renewable energy technologies; and
» Provide the framework for Ministerial determination of new generation capacity (inclusive of the required feasibility studies).

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

The current iteration of the IRP for South Africa outlines the proposed generation new-build fleet for South Africa for the period 2010 to 2030. This scenario was derived based on the cost-optimal solution for new-build options (considering the direct costs of new build power plants), which was then "balanced" in accordance with qualitative measures such as local job creation.

The Policy-Adjusted IRP includes the same amount of coal and nuclear new builds as the Revised Balanced Scenario (RBS), while reflecting recent developments with respect to prices for renewables. In addition to all existing and committed power plants (including 10 GW committed coal), the plan includes 9,6 GW of nuclear; 6,3 GW of coal; 17,8 GW of renewables; and 8,9 GW of other generation sources. The Policy-Adjusted IRP has therefore resulted in an increase in the contribution from renewables from 11.4 GW to 17.8 GW.

3.2.8. Department of Energy process for Independent Power Producers (IPP)

Globally there is increasing pressure on countries to increase their share of renewable energy generation due to concerns such as exploitation of non-renewable resources. In order to meet the long-term goal of a sustainable renewable energy industry and to diversify the energy-generation mix in South Africa, a goal of 17.8GW of renewables by 2030 has been set by the Department of Energy (DoE) within the Integrated Resource Plan (IRP) 2010. This energy will be produced mainly from wind, solar, biomass, and small-scale hydro (with wind and solar comprising the bulk of the power generation

capacity). This amounts to ~42% of all new power generation being derived from renewable energy forms by 2030.

In responding to the growing electricity demand within South Africa, as well as the country's targets for renewable energy, Gunstfontein Wind Farm (Pty) Ltd, an Independent Power Producer (IPP), proposes the establishment of a wind energy facility and associated infrastructure on a site near Sutherland in the Northern Cape Province to add new capacity to the national electricity grid. Gunstfontein Wind Farm (Pty) Ltd will be required to apply for a generation license from the National Energy Regulator of South Africa (NERSA), as well as a power purchase agreement from Eskom or other relevant parties (i.e. typically for a period of 20 - 25 years) in order to build and operate the proposed wind energy facility. As part of the agreement, Gunstfontein Wind Farm would be remunerated per kWh by Eskom or a subsequent authority/market operator. Depending on the economic conditions following the lapse of this period, the facility can either be decommissioned, or the power purchase agreement renegotiated and extended.

The IPP will participate in a bidding process called the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP), in which the Department of Energy (DoE) will determine preferred bidders. A Preferred Bidder will be held to compliance with the price and economic development proposals in its bid, with regular reporting to demonstrate compliance during the life of the project.

The DoE REIPPP Programme commenced in 2011. Gunstfontein Wind Farm (Pty) Ltd intends bidding the proposed project to the DoE in Round 5 of REIPPPP and/or subsequent rounds.

3.3. Provincial and Local Level Developmental Policy

3.3.1 Northern Cape Province Provincial Growth and Development Strategy

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

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

» Tourism.

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

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

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

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

The NCPGDS make reference to the need to ensure the availability of inexpensive energy. The section notes that in order to promote economic growth in the Northern Cape the availability of electricity to key industrial users at critical localities at rates that enhance the competitiveness of their industries must be ensured. At the same time, the development of new sources of energy through the promotion of the adoption of energy applications that display a synergy with the province's natural resource endowments must be encouraged. In this regard the NCPGDS notes "the development of energy sources such as wind and solar energy, the natural gas fields, bio-fuels, etc., could be some of the means by which new economic opportunity and activity is generated in the Northern Cape". The NCPGDS also highlights the importance of close co-operation between the public and private sectors in order for the economic development potential of the Northern Cape to be realised.

The NCPGDS also highlights the importance of enterprise development, and notes that the current level of private sector development and investment in the Northern Cape are low. In addition, the province also lags in the key policy priority areas of SMME Development and Black Economic Empowerment. The proposed wind energy facility therefore has the potential to create opportunities to promote private sector investment and the development of SMMEs in the Northern Cape Province.

In this regard care will need to be taken to ensure that the proposed WEF and other renewable energy facilities do not negatively impact on the regions natural environment. In this regard the NCPGDS notes that the sustainable utilisation of the natural resource base on which agriculture depends is critical in the Northern Cape with its fragile eco-systems and vulnerability to climatic variation. The document also indicates that due to

the provinces exceptional natural and cultural attributes, it has the potential to become the preferred adventure and ecotourism destination in South Africa. Care therefore needs to be taken to ensure that the development of large renewable energy projects, such as the proposed wind energy facility, do not restrict this ambition.

The proposed Gunstfontein Wind Energy Facility meets all these requirements and is strongly supportive of the NCPGDS.

3.3.2. Northern Cape Province Spatial Development Framework (NCPSDF)

As part of the development planning process that underlies the formulation of the NCPGDS lies the Northern Cape Province Spatial Development Framework (NCPSDF). The NCPSDF not only gives effect to national spatial development priorities but it also sets out a series of provincial, district and local development priorities for the economy of the Northern Cape. Of specific relevance to the proposed Gunstfontein Wind Energy Facility, the NCPSDF notes that:

"Renewable energy sources such as wind, solar thermal, biomass and domestic hydroelectricity are to constitute 25% of the province's energy generation capacity by 2020. In order to promote the development of renewable energy supply schemes, large-scale renewable energy supply schemes are strategically important for increasing the diversity of domestic energy supplies and avoiding energy imports while minimising detrimental environmental impacts."

The Northern Cape PSDF, is premised upon and gives effect to the following five strategic objectives of the National Strategic for Sustainable Development (NSSD 2011-2014):

» Enhancing systems for integrated planning and implementation;
» Sustaining our ecosystems and using natural resources efficiently;
» Towards green economy;
» Building sustainable communities; and
» Responding effectively to climate change.

The NCPSDF makes reference to the need to ensure the availability of energy. Under the economic development profile of the NCPSDF, the White Paper on Renewable Energy (2003) target of 10GWh of energy to be produced from renewable energy sources was discussed. The NC PSDF also discusses economic development and that it typically responds to the availability of environmental capital (e.g. water, suitable agricultural soil, mining resources); and infrastructural capital (e.g. roads, electricity, bulk engineering services etc.) and that over time this has resulted in the distinct development regions and corridors.

The proposed Gunstfontein Wind Energy Facility falls within a Renewable Energy Development Zone (REDZs) as identified by government planning and is strongly supportive of the NCPSDF.

3.4. Local Authority Level Developmental Policy

3.4.1 Namakwa District Municipality Integrated Development Plan

The vision for the Namakwa DM as set out in the Namakwa District Municipality (NDM) Integrated Development Plan (IDP) 2006 – 2011 (Fourth revision 2011/2012) is for the "The establishment of a development-orientated and economically viable district through sustainable growth".

In order to comply with the vision, the mission statement concentrates on certain key focus areas, namely: Promotion of the quality of life of the Namakwa community through purposeful and quality service, and the effective and optimal utilisation of resources, focussing especially on:

» Economic development;
» Development, upgrading and maintenance of basic infrastructure;
» Development of human resources;
» Sustainable management and optimal utilisation of operational and natural resources;
» Creating of a safe, healthy and investment-friendly environment;
» Development of opportunities for local entrepreneurs; and
» Ensuring friendly, credible and transparent services and client satisfaction.

The NDM IDP also identifies a number of key performance areas (KPA). The KPA that is relevant to the proposed project is KPA 3: Local Economic Development. A number of projects are listed under the Local Economic Development KPA of these the following are of specific relevance to the project:

» Project No. LE02: Renewable Energy Cluster: The Development of a synergy between the energy resources within Namakwa Region.
» Project No. LE05: SMME Development Cluster: The development of a Management support system for SMME'S.

The objective of Project No: LEO2 is to ensure the participation of the NDM in the development of a synergy between wind energy, natural gas, solar, bio-fuel and wave energy so that the energy sector can enhance competitive and comparative advantage of the Namakwa region. The performance indicators listed in the IDP include the facilitation of quarterly Local Economic Development Forum (LED) Forum meetings with stakeholders/future partners in wind (TPE), solar, wave and natural gas (Forest

International) in order to exchange information before June 2012. The key outputs of the project listed in the IDP include:

» Establishment of renewable energy resources like natural gas, wind, bio-fuel, waves, solar, hydro and waste recycling in the key municipalities and the NDM as whole.

The proposed Gunstonftein Wind Energy Facility is therefore supported by and supports the energy related objectives set out in the NDM IDP.

3.4.2 Karoo Hoogland Integrated Development Plan

The 2014/2015 Revision of the Karoo Hoogland Integrated Development Plan (IDP) was approved in May 2014.

The key socio-economic development intervention areas identified in the IDP for the Karoo Hoogland Local Municipality are: (a) Basic service delivery, (b) Economic development by focusing on space research (SKA and SALT) and historical value of settlements, and (c) the conservation of the natural vegetation that is unique to the arid environment.

The IDP notes that the focus on economic development, primarily based on the tourism potential of the area, is considered a more viable approach towards improving capital flows into the LM's towns than to try and build the supply from within. The LM should therefore direct attention to the key roads within its boundaries for these to be developed in the interest of the local economic development opportunities available to its population. The LM's towns are identified as priority investment areas, as this is where the population is concentrated. Three key investment priorities are identified:

» Investment in infrastructure to provide a basic level of infrastructure services;
» Investment in human capital to promote economic growth; and
» Investment in human capital to promote general welfare and stimulate the local economy.

With regard to key performance areas (KPAs), KPA 3 Local Economic Development (LED) is of relevance. Priority issues identified under LED include:

» The development of a tourism industry;
» Addressing social challenges that hinder economic development;
» Education, illiteracy and skills development, and
» Creating a safe and affordable haven for visitors and residents.

Key strategies to address KPA3 priority issues include:

» Establish, in consultation with stakeholders, a strategy for the management of alcohol abuse and related welfare challenges;
» Develop youth empowerment programmes;
» Develop and source skills related to social development;
» Establish, with relevant stakeholders, general training and skills development; programmes accessible by the community;
» Engage with relevant stakeholders regarding the enhancement of education in the LM; and
» Enhance skills and SMME development with a view to marketing services outside the region.

The socio-economic obligations that are placed on IPPs under the REIPPP Programme with respect to the 50km zone surrounding a project, will ensure that the Gunstfontein Wind Energy Facility contributes meaningfully towards the achievement of the above objectives.

The IDP also includes a discussion on climate change and renewable energy. In this regard, the vulnerability of the local municipality is noted, as is national and provincial government's commitment to commercial-scale renewable energy generation.

The proposed Gunstfontein Wind Energy Facility is aligned with and supportive of the Karoo Hoogland IDP.

3.5. Legislation and Guidelines

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

» National Environmental Management Act (Act No. 107 of 1998)
» EIA Regulations, published under Chapter 5 of NEMA (GNR R982 in Government Gazette No 38282 of December 2014)
» Guidelines published in terms of the NEMA EIA Regulations, in particular:
  * Public Participation in the EIA Process (DEA, 2010)
  * Integrated Environmental Management Information Series (published by DEA);
» Namwaka District Municipality Integrated Development Plan (IDP) (2006-2012);
» Karoo Hoogland Local Municipality Integrated Development Plan (2014-2015);
» International guidelines – the Equator Principles and the International Finance Corporation and World Bank Guidelines; and
» Astronomy Geographic Advantage Act (Act No. 21 of 2007).

Several other Acts, standards or guidelines have also informed the project process and the scope of issues evaluated in the scoping report, and to be addressed in the EIA. A

listing of relevant legislation identified at this stage of the process is provided in Table 3.1. A more detailed review of legislative requirements applicable to the proposed project will be included in the EIA phase.

Table 3.1: Relevant legislative permitting requirements applicable to the proposed Gunstfontein Wind Energy Facility

Legislation	Applicable Requirements
National Environmental Management Act (Act No 107 of 1998)	The EIA Regulations have been promulgated in terms of Chapter 5 of the Act. Listed activities which may not commence without an environmental authorisation are identified within these Regulations. In terms of S24(1) of NEMA, the potential impact on the environment associated with these listed activities must be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation. In terms of GN R982, R983, R984 and R985 of December 2014, a Scoping and EIA Process is required to be undertaken for the proposed project.
National Environmental Management Act (Act No 107 of 1998)	In terms of the Duty of Care Provision in S28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with this project is avoided, stopped or minimised. In terms of NEMA, it has become the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.
Environment Conservation Act (Act No 73 of 1989)	National Noise Control Regulations (GN R154 dated 10 January 1992)
National Water Act (Act No 36 of 1998)	Water uses under S21 of the Act must be licensed, unless such water use falls into one of the categories listed in S22 of the Act or falls under the general authorisation (and then registration of the water use is required). Consumptive water uses may include the taking of water from a water resource and storage - Sections 21a and b. Non-consumptive water uses may include impeding or diverting of flow in a water

	course - Section 21c; and altering of bed, banks or characteristics of a watercourse - Section 21i.
Minerals and Petroleum Resources Development Act (Act No 28 of 2002)	A mining permit or mining right may be required where a mineral in question is to be mined (e.g. materials from a borrow pit) in accordance with the provisions of the Act. Requirements for Environmental Management Programmes and Environmental Management Plans are set out in S39 of the Act. S53 Department of Mineral Resources: Approval from the Department of Mineral Resources (DMR) may be required to use land surface contrary to the objects of the Act in terms of section 53 of the Mineral and Petroleum Resources Development Act, (Act No 28 of 2002): In terms of the Act approval from the Minister of Mineral Resources is required to ensure that proposed activities do not sterilise a mineral resource that might occur on site.
National Environmental Management: Air Quality Act (Act No 39 of 2004)	Measures in respect of dust control (S32) and National Dust Control Regulations of March 2014. Measures to control noise (S34) - no regulations promulgated yet.
National Heritage Resources Act (Act No 25 of 1999)	Stipulates assessment criteria and categories of heritage resources according to their significance (S7). Provides for the protection of all archaeological and palaeontological sites, and meteorites (S35). Provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority (S36). Lists activities which require developers any person who intends to undertake to notify the responsible heritage resources authority and furnish it with details regarding the location, nature, and extent of the proposed development (S38). » Requires the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction (S44).
National Environmental Management: Biodiversity Act (Act No 10 of 2004)	» Provides for the MEC/Minister to identify any process or activity in such a listed ecosystem as a threatening process (S53)

	» A list of threatened and protected species has been published in terms of S 56(1) - Government Gazette 29657. » Three government notices have been published, i.e. GN R 150 (Commencement of Threatened and Protected Species Regulations, 2007), GN R 151 (Lists of critically endangered, vulnerable and protected species) and GN R 152 (Threatened or Protected Species Regulations). » Provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (G 34809, GN 1002), 9 December 2011). » This Act also regulates alien and invader species.
Conservation of Agricultural Resources Act (Act No 43 of 1983)	» Prohibition of the spreading of weeds (S5) » Classification of categories of weeds and invader plants (Regulation 15 of GN R1048) and restrictions in terms of where these species may occur. » Requirement and methods to implement control measures for alien and invasive plant species (Regulation 15E of GN R1048).
National Forests Act (Act No. 84 of 1998)	According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that 'no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister'.
National Veld and Forest Fire Act (Act 101 of 1998)	In terms of S12 the applicant must ensure that the firebreak is wide and long enough to have a reasonable chance of preventing the fire from spreading, not causing erosion, and is reasonably free of inflammable material.

	In terms of S17, the applicant must have such equipment, protective clothing, and trained personnel for extinguishing fires.
Hazardous Substances Act (Act No 15 of 1973)	This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products. Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance • Group IV: any electronic product; and • Group V: any radioactive material. The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.
Development Facilitation Act (Act No 67 of 1995)	Provides for the overall framework and administrative structures for planning throughout the Republic. S (2-4) provide general principles for land development and conflict resolution.
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)	The Minister may by notice in the Gazette publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. The Minister may amend the list by –

	» Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. In terms of the Regulations published in terms of this Act (GN 921), a Basic Assessment or Environmental Impact Assessment is required to be undertaken for identified listed activities. Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that: » The containers in which any waste is stored, are intact and not corroded or in any other way rendered unlit for the safe storage of waste. » Adequate measures are taken to prevent accidental spillage or leaking. » The waste cannot be blown away. » Nuisances such as odour, visual impacts and breeding of vectors do not arise; and » Pollution of the environment and harm to health are prevented.
Subdivision of Agricultural Land Act (Act No 70 of 1970)	Details land subdivision requirements and procedures. Applies for subdivision of all agricultural land in the Province
National Road Traffic Act (Act No 93 of 1996)	» The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. » Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts. » The general conditions, limitations, and escort requirements for abnormally

	dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.
Northern Cape Nature Conservation Act, Act No. 9 of 2009	This Act provides for the sustainable utilisation of wild animals, aquatic biota and plants; provides for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; provides for offences and penalties for contravention of the Act; provides for the appointment of nature conservators to implement the provisions of the Act; and provides for the issuing of permits and other authorisations. Amongst other regulations, the following may apply to the current project: » Boundary fences may not be altered in such a way as to prevent wild animals from freely moving onto or off of a property; » Aquatic habitats may not be destroyed or damaged; » The owner of land upon which an invasive species is found (plant or animal) must take the necessary steps to eradicate or destroy such species. » The Act provides lists of protected species for the Province.
Astronomy Geographic Advantage Act (Act No. 21 of 2007)	» The Astronomy Geographic Advantage Act (No. 21 of 2007) provides for the preservation and protection of areas within South Africa that are uniquely suited for optical and radio astronomy; for intergovernmental co-operation and public consultation on matters concerning nationally significant astronomy advantage areas and for matters connected thereto. » Chapter 2 of the act allows for the declaration of astronomy advantage areas while Chapter 3 pertains to the management and control of astronomy advantage areas. Management and control of astronomy advantage areas include, amongst others, the following: * Restrictions on use of radio frequency spectrum in astronomy advantage areas;

	* Declared activities in core or central astronomy advantage area; * Identified activities in coordinated astronomy advantage area; and * Authorisation to undertake identified activities.

APPROACH TO UNDERTAKING THE SCOPING PHASE

CHAPTER 4

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

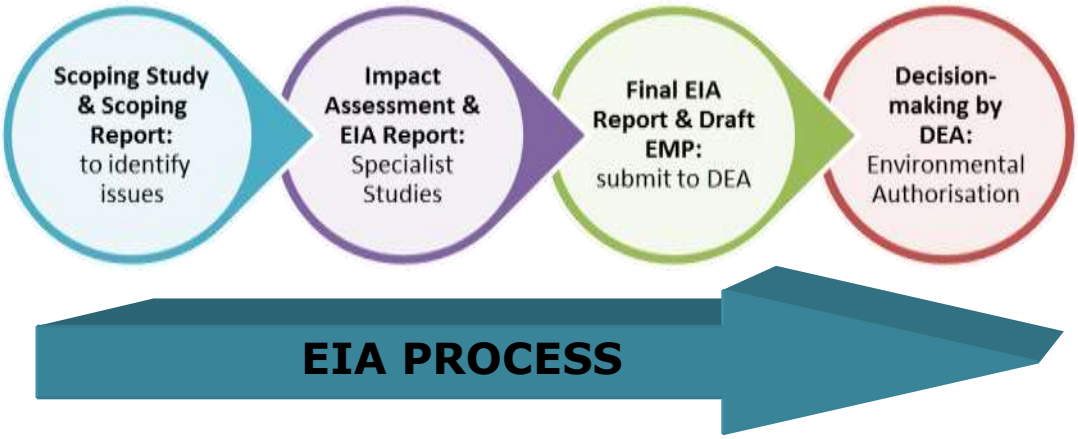

Figure 4.1: The Phases of an EIA Process

The Scoping Phase for the proposed Gunstfontein Wind Energy Facility has been undertaken in accordance with the sections 24(5) of the National Environmental Management Act (No 107 of 1998). In terms of the EIA Regulations (2014) of GN R982 as well as GN R983, GN R984 and GN R985, a Scoping and EIA Study are required to be undertaken for this proposed project. In accordance with these Regulations, this scoping process aimed at identifying potential issues associated with the proposed project, and defining the extent of studies required within the EIA. This was achieved through an evaluation of the proposed project involving desk-top specialist studies, limited field surveys, as well as a consultation process with key stakeholders (including relevant government authorities) and interested and affected parties (I&APs). This chapter serves to outline the process which was followed during the Scoping Phase of the EIA process.

4.1. Relevant Listed Activities

In terms of the EIA Regulations, 2014 of GN R983, GN R984 and GN R985; the following 'listed activities' are triggered by the proposed facility as shown in **Table 4.1** below.

Table 4.1: Listed activities triggered by the proposed Gunstfontein Wind Energy Facility

Number and date of the relevant notice:	Activity No(s) (in terms of the relevant notice):	Description of each listed activity as per project description
GN 983, 08 December 2014	11 (i)	The development of facilities or infrastructure for the transmission and distribution of electricity- (i). outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts ***The project will include construction of an on-site substation with a capacity of <275kV (outside an urban area).***
GN 983, 08 December 2014	12 (xii)(a)(c)	The development of – (xii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.; ***The wind energy facility will include the construction of infrastructure or structures (including culverts) within a watercourse and/or within 32m of a watercourse.***
GN 983, 08 December 2014	19 (i)	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from- (i) a watercourse. ***The upgrade or construction of access roads will require material being deposited into or removed from watercourses.***
GN 983, 08 December 2014	24 (ii)	The development of- (ii) a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres ***The wind energy facility will require access roads with parts wider than 8m in width (up to 12m in width), to be constructed outside urban areas.***
GN 983, 08 December 2014	28 (ii)	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare

		The development footprint for the proposed wind energy facility (infrastructure and associated areas) will cover an area greater than 1 hectare on land currently used for agriculture.
GN 984, 08 December 2014	1	The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more; ***The wind energy facility will generate an electricity output of more than 20MW. Gunstfontein Wind Farm will have an installed capacity of up to 200 MW.***
GN 984, 08 December 2014	15	The clearance of an area of 20 hectares or more of indigenous vegetation ***The development footprint for the proposed wind energy facility (infrastructure and associated areas) will require clearance of vegetation of an area greater than 20 hectares.***
GN 985, 08 December 2014	4(a) (ii) (bb), (ee)	The development of a road wider than 4 metres with a reserve less than 13,5 metres. (a) In Northern Cape province: (ii) Outside urban areas, in: (bb) National Protected Area Expansion Strategy Focus areas; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; ***A road wider than 4 m will be constructed. The site is located :*** • ***Outside urban areas*** » ***In a National Protected Area Expansion Strategy Focus area*** » ***In Critical Biodiversity Areas in terms of the Namakwa District Biodiversity Sector Plan (Desment & Marsh 2008).***
GN 985, 08 December 2014	10(a)(ii) (bb) (ee)	The development of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres; (a) In Northern Cape province: (ii) Outside urban areas, in (bb) National Protected Area Expansion Strategy Focus areas; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; ***The construction of the facility will require facilities or infrastructure for the storage, or storage and handling of a dangerous good (fuel, lubricants, etc), where such storage occurs in containers with a combined capacity of 30 but not***

		exceeding 80 cubic metres. The site is located : • ***Outside urban areas*** » ***In a National Protected Area Expansion Strategy Focus area*** » ***In Critical Biodiversity Areas in terms of the Namakwa District Biodiversity Sector Plan (Desment & Marsh 2008).***
GN 985, 08 December 2014	12 (d)(ii)	The clearance of an area of 300 square metres or more of indigenous vegetation; (d) In Northern Cape: (ii) Within critical biodiversity areas identified in bioregional plans. **An area of 300 square metres or more of indigenous vegetation cover will be cleared for infrastructure and associated areas. The site is located within a Critical Biodiversity Area in terms of the Namakwa District Biodiversity Sector Plan (Desment & Marsh 2008).**
GN 985, 08 December 2014	14 (xii)(a)(c)(a)(ii)(bb)(ff)	The development of- (xii) infrastructure or structures with a physical footprint of 10 square metres or more; (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; (a) In Northern Cape: (ii) Outside urban areas, in: (bb) National Protected Area Expansion Strategy Focus areas; (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans ***Infrastructure or structures, including culverts, with a physical footprint of 10 square metres or more within a watercourse or within 32m of a watercourse will be required to be constructed. The site is located:*** • ***Outside urban areas*** • ***In a National Protected Area Expansion Strategy Focus area*** • ***In Critical Biodiversity Areas in terms of the Namakwa District Biodiversity Sector Plan (Desment & Marsh 2008).***
GN 985, 08 December 2014	18(a) (ii) (bb) (ee) (ii)	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. (a) In Northern Cape provinces: (ii) Outside urban areas, in: (bb) National Protected Area Expansion Strategy Focus areas;

		(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ii) Areas on the watercourse side of the development setback line or within 100 metres from the edge of a watercourse where no such setback line has been determined. ***The wind energy facility and power line route will require access roads to be upgraded, which will include the widening of the roads as well and lengthening of roads in some areas. The site is located :*** » ***Outside urban areas*** » ***In a National Protected Area Expansion Strategy Focus area*** » ***In Critical Biodiversity Areas in terms of the Namakwa District Biodiversity Sector Plan (Desment & Marsh 2008).***
GN 985, 08 December 2014	23 (xii) (a) (c) 23(a) (ii) (ee)	The expansion of – (xii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more; where such development occurs – (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse measured from the edge of a watercourse; (a) In Northern Cape: (ii) Outside urban areas, in: (bb) National Protected Area Expansion Strategy Focus areas; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; ***The project will require the expansion of infrastructure or structures, including culverts, within 32m of a watercourse. The site is located :*** • ***Outside urban areas*** » ***In a National Protected Area Expansion Strategy Focus area*** » ***In Critical Biodiversity Areas in terms of the Namakwa District Biodiversity Sector Plan (Desment & Marsh 2008).***

On the basis of the above listed activities, a Scoping and an EIA Phase is required to be undertaken for the proposed project. This process is to be undertaken in two phases as follows:

» The Scoping Phase includes the identification of potential issues associated with the proposed project through a desktop study and consultation with affected parties and key stakeholders. Areas of sensitivity within the broader site are identified and delineated in order to identify any environmental fatal flaws, and sensitive or no go

areas. Following a public review period of the draft report, this phase culminates in the submission of a final Scoping Report and Plan of Study for EIA to the DEA.

» The EIA Phase involves a detailed assessment of potentially significant positive and negative impacts (direct, indirect, and cumulative) identified in the Scoping Phase. This phase includes detailed specialist investigations and public consultation. Following a public review period of the draft report, this phase culminates in the submission of a Final EIA Report and an Environmental Management Programme (EMPr), including recommendations of practical and achievable mitigation and management measures, to DEA for review and decision-making.

4.2. Objectives of the Scoping Phase

This draft Scoping Report documents the evaluation of the potential environmental impacts of the wind energy facility and the associated infrastructure and forms part of the EIA process. The Scoping Phase was conducted in accordance with the requirements of the EIA Regulations in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998).

This Scoping Phase aims to:

» Identify and evaluate potential environmental (biophysical and social) impacts and benefits of the proposed development (including design, construction, operation and decommissioning) within the broader study area through a desk-top review of existing baseline data and specialist studies.
» Identify potentially sensitive environmental features and areas on the site to inform the preliminary design process of the wind energy facility.
» Define the scope of studies to be undertaken within the EIA process.
» Provide the authorities with sufficient information in order to make a decision regarding the scope of issues to be addressed in the EIA process, as well as regarding the scope and extent of specialist studies that will be required to be undertaken as part of the EIA Phase of the process.

Within this context, the objectives of this Scoping Phase are to, through a consultative process:

» identify the relevant policies and legislation relevant to the project;
» motivate the need and desirability of the proposed project, including the need and desirability of the activity in the context of the preferred location;
» identify and confirm the preferred project and technology alternative through an impact and risk assessment and ranking process;
» identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified alternatives focusing on the

geographical, physical, biological, social, economic, and cultural aspects of the environment;
» identify the key issues to be addressed in the EIA phase;
» agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the project will impose on the preferred site through the life of the project, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and
» identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

4.3. Overview of the Scoping Phase

The Scoping Phase has been undertaken in accordance with the EIA Regulations published in Government Gazette No 38282 in December 2014, in terms of NEMA. Key tasks undertaken within the scoping phase included:

» Consultation with relevant decision-making and regulating authorities (at National, Provincial and Local levels).
» Submission of the completed application form for authorisation to the competent authority (DEA) in terms of Regulations 5 and 16 of Government Notice R982 of 2014.
» Undertaking a public involvement process throughout the Scoping process in accordance with Chapter 6 of Government Notice R982 of 2014 in order to identify issues and concerns associated with the proposed project.
» Undertaking of independent specialist studies in accordance with Appendix 6 of Government Notice R982 of 2014.
» Preparation of a Scoping Report and Plan of Study for EIA in accordance with the requirements of Appendix 2 of Government Notice No R982 of 2014.
» Preparation of a Comments and Response Report detailing key issues raised by I&APs as part of the EIA Process.

The tasks are discussed in detail below.

4.3.1. Authority Consultation and Application for Authorisation in terms of GNR982 of 2014

In terms of the Energy Response Plan, the DEA is the competent authority for all energy related projects. As the project falls within the Northern Cape, the Department of Environment and Nature Conservation (DENC) is the commenting authority for the project. Consultation with these authorities will be undertaken throughout the Scoping process. This consultation will include the following:

» Submission of the application for authorisation to DEA;
» Submission of the draft Scoping Report for review by I&APs, the Organs of State and the competent authority.

A record of all authority correspondence i.e. National, Provincial and Local authorities undertaken within the Scoping Phase is included in **Appendix C**.

4.3.2. Public Participation

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

» All relevant stakeholders and I&APs are identified and consulted with.
» Information containing all relevant facts in respect of the application is made available to stakeholders and I&APs.
» Participation by stakeholders and I&APs is facilitated in such a manner that they are all provided with a reasonable opportunity to comment on the application.
» Comments received from stakeholders and I&APs are recorded and considered in the EIA process, where appropriate.

The following sections detail the tasks which were undertaken as part of the public participation process.

i. Stakeholder identification

The first step in the public involvement process was to initiate the identification of relevant stakeholders and interested and affected parties (I&APs). This process was undertaken through existing contacts and databases, as well as through the process of networking. Stakeholders identified are listed in **Table 4.2** below:

Table 4.2: List of Stakeholders identified during the Scoping Phase

Organs of State
National Government Departments
Department of Agriculture, Forestry and Fisheries (DAFF)
Department of Communications
Department of Energy (DoE)
Department of Mineral Resources (DMR)
Department of Public Works (DPW)
Department of Rural Development and Land Reform (DRDLR)
Department of Water and Sanitation (DWS)
Department of Science and Technology (DST)
Government Bodies and State Owned Companies
Eskom SOC Limited
National Energy Regulator of South Africa (NERSA)

Sentech
South African Civil Aviation Authority (SACAA)
South African Heritage Resources Agency (SAHRA)
South African National Roads Agency Limited (SANRAL)
Square Kilometre Array: Southern Africa
Telkom SA Ltd
Provincial Government Departments
Ngwao-Boswa Ya Kapa Bokone (Northern Cape Provincial Heritage Resources Authority)
Northern Cape Department of Agriculture, Land Reform and Rural Development
Northern Cape Department of Environment and Nature Conservation (DENC)
Northern Cape Department of Roads and Public Works
Local Government Departments
Karoo Hoogland Local Municipality (KHLM)
Namakwa District Municipality (NDM)
Conservation Authorities
BirdLife South Africa
Wildlife and Environment Society of South Africa (WESSA)
Endangered Wildlife Trust (EWT)
Landowners
Affected landowners and tenants
Neighbouring landowners and tenants

ii. Stakeholder Database

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

iii. Adverts and Notifications

In order to notify and inform the public of the proposed project and invite members of the public to register as I&APs for the project and EIA process, an advert have been placed in the Noordwester Uitgewers and Die Burger newspapers which are read in the study area. The advertisements have been placed in both English and Afrikaans in order to inform the wider community. The advert provides information on the following (in terms of Regulation 41):

» the details of the project; and
» the availability of the draft Scoping Report

Site notices (in English and Afrikaans) will be placed at visible points on the main access roads and at the entrance to the farms portion 1 and remainder of Gunstfontein 131, Boschmans Hoek 177, and the remainder of the farm Wolven Hoek 182, in accordance with the requirements of the EIA Regulations. Further notices were placed at the Karoo Hoogland Local Municipality in Sutherland, Sutherland Public Library and the Laingsburg Public Library. In addition to the advertisements and site notices, key stakeholders and registered I&APs were notified in writing of the commencement of the EIA process and the availability of the draft Scoping Report. Copies of all the advertisements, site notices and written notifications are included within **Appendix C**.

iv. Public Involvement and Consultation

In order to provide information regarding the proposed project and the EIA process, a background information document (BID) for the project was compiled at the outset of the process (refer to **Appendix C**). The BID will be distributed to identified stakeholders and I&APs, additional copies will be made available at public venues within the broader study area, and it will be posted electronically on the Savannah Environmental website.

Through consultation with key stakeholders and I&APs, issues for inclusion within the issues-based scoping study will be identified and confirmed prior to the final submission of the report. In order to accommodate the varying needs of stakeholders and I&APs within the study area, as well as capture their views, issues and concerns regarding the project, various opportunities will be provided in order for I&APs to have their issues noted. I&APs will be consulted through one-on-one consultation meetings during the EIA Phase (for example with directly affected or surrounding landowners), telephonic consultation sessions, and written, faxed or e-mail correspondence.

v. Identification and Recording of Issues and Concerns

All comments received from stakeholders and I&APs on the proposed project will be included in the final Scoping Report. A Comments and Responses Report will be compiled to include all comments received during the scoping phase of the process, including those received during the review period of the draft Scoping Report.

4.3.3. Public Review of Scoping Report

The Scoping Report was made available for review from **03 September 2015 – 05 October 2015** at the following locations:

» Sutherland Public Library;
» Laingsburg Public Library; and
» www.savannahSA.com

All registered I&APs have been notified of the availability of the draft Scoping Report via email and registered post at the commencement of the review period (refer to **Appendix C**).

4.3.4. Authority comments on the draft Scoping Report

Organs of State/Authorities who have jurisdiction over matters relating to the environment, as identified in Table 4.2, were invited to comment on the draft Scoping Report refer to **Appendix C**. Issues/comments raised by some of the organs of state are included within the Comments and Responses Report **Appendix C.**

4.3.5. Evaluation of Issues Identified through the Scoping Process

Issues (both direct and indirect environmental impacts) associated with the proposed project identified within the scoping process have been evaluated through desk-top studies. In evaluating potential impacts, Savannah Environmental has been assisted by the following specialist consultants:

Specialist	Area of Expertise	Refer Appendix
Simon Todd Consulting	Ecology, flora and fauna	Appendix D
Bioinsight South Africa	Avifauna	Appendix E
Bioinsight South Africa	Bats	Appendix F
Jaco Jansen and Jasper Dreyer (Peer reviewer)	Agricultural potential & Soils	Appendix G
Jon Marshall	Visual Impact	Appendix H
Jaco van der Walt of Heritage Contracts	Heritage	Appendix I
Dr. B.D Millsteed	Palaeontology	Appendix J
Morne de Jager of EAR- Enviro Acoustic Research	Noise	Appendix K
Tony Barbour (Environmental Consultant and Researcher)	Social Impact	Appendix L

In order to evaluate issues and assign an order of priority, the following methodology was used to identify the characteristics of each potential issue/impact for each of the proposed project components:

» Identify the **nature** of the potential impact, which includes a description of what causes the effect, what will be affected and how it will be affected
» Identify the **extent** of the potential impact, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development) or regional

» Identify **sensitive receptors** that may be impacted on by the proposed facility and the **types of impacts** that are most likely to occur.
» Evaluate the **significance** of potential impacts in terms of the requirements of the EIA Regulations.
» Identify the potential impacts that will be **considered further** in the EIA Phase.

Specialist Scoping Reports are contained within Appendices D – L.

4.3.6. Final Scoping Report

The final stage in the Scoping Phase includes the capturing of responses from stakeholders and I&APs on the Draft Scoping Report in order to refine the report. It is the final scoping report upon which the decision-making environmental Authorities provide comment, recommendations and acceptance to undertake the EIA Phase of the process.

DESCRIPTION OF THE AFFECTED ENVIRONMENT CHAPTER 5

This section of the Scoping Report provides a description of the environment that may be affected by the proposed Gunstfontein Wind Energy Facility. This information is provided in order to assist the reader in understanding the possible effects of the proposed project on the environment. Aspects of the biophysical, social and economic environment that could be directly or indirectly affected by, or could affect, the proposed development have been described. This information has been sourced from both existing information available for the area as well as collected field data, and aims to provide the context within which this EIA is being conducted. A more detailed description of each aspect of the affected environment is included within the specialist scoping reports contained within **Appendices D - L**.

5.1. Regional Setting

The study area is located in an area that has a distinct rural and natural character and spans across (from south to north) the Komsberge (*Koms* Mountains) escarpment. The northern farm portions are located on the Roggeveld Plateau, while the southern farm portions are located within the Tankwa River catchment basin, below the escarpment. The Komsberge Mountains form part of the southern Drakensberg Mountains and the Great Escarpment that divides the Central Interior Plains from the Moordernaars (Murderer's) Karoo. Other mountains or tall hills, that delineate the rim of the Tankwa River basin, include the Klein (Little) Roggeveldberge to the south and east of the site.

This broader area spanning the escarpment ranges in elevation from approximately 700m above sea level in the west (in the Tankwa River valley), to 1700m above sea level on top of the escarpment located south of Sutherland.

The most prominent hydrological features within the study area, mainly located on top of the plateau, are a number of non-perennial pans and farm dams. Other smaller pans and farm dams occur throughout the study area. There are no major perennial rivers in close proximity to the proposed development site, but a number of non-perennial rivers and streams traverse the study area. The most notable of these is the Tankwa River and its tributaries that have their origin within this region.

Existing power line and substation infrastructure traversing (or in close proximity to) the site is limited to the Roggeveld to Sutherland No.1 66kV power line. The existing Eskom Komsberg Substation is located approximately 25km south of the site. There are other power lines within the broader region that connect to the existing Eskom Komsberg Substation. Besides these structures, the larger part of the region remains mostly undeveloped. The SALT observatory is located 13km west of Sutherland, approximately 30km from the Gunstfontein study area.

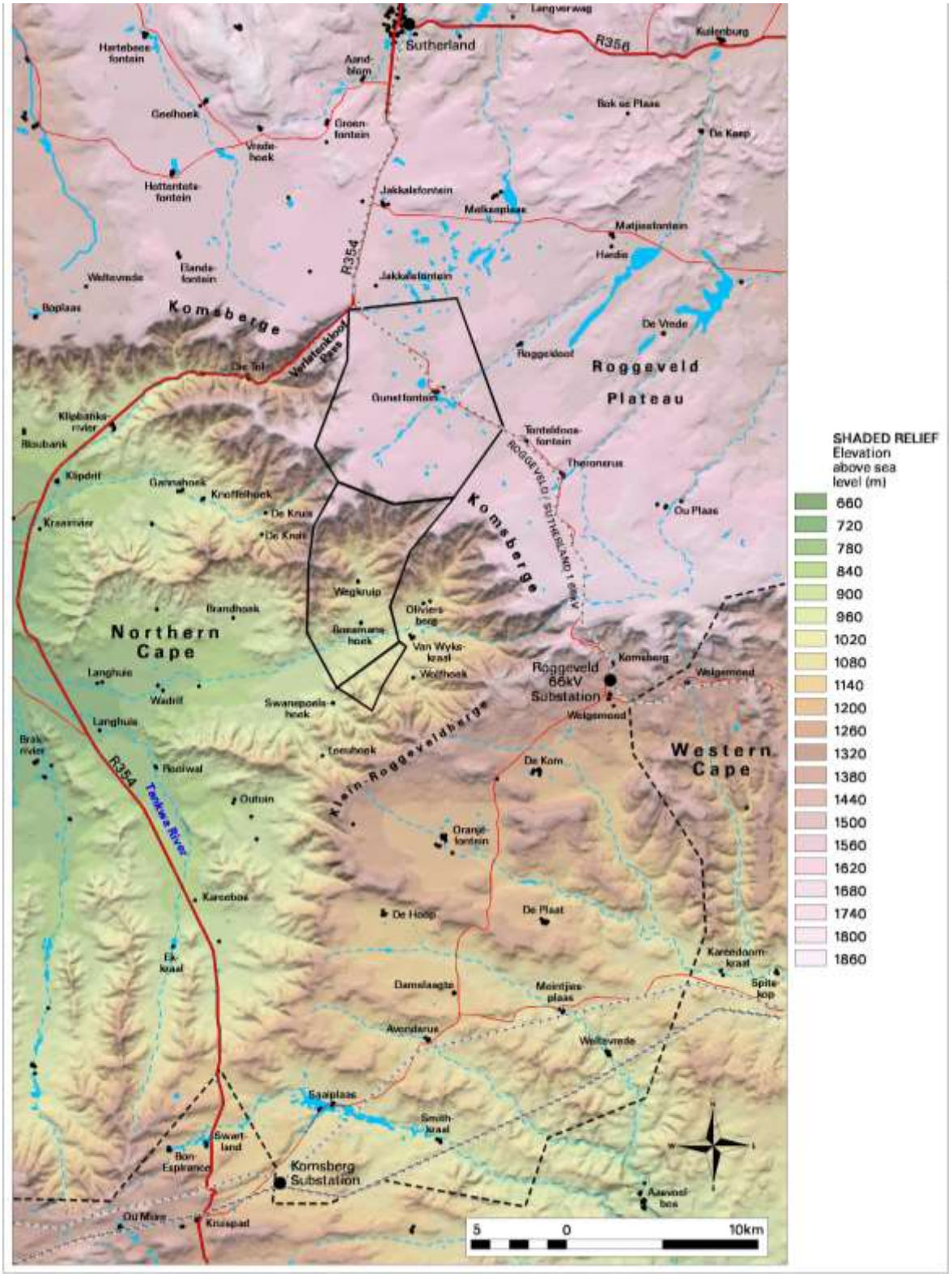

Figure 5.1: Shaded relief map (indicating the location of the study area and the topography and elevation above sea level) of the broader study area

5.2. Location and Land Use of the Study Area

The northern section of the proposed development site is easily accessible via the R354 arterial road from Sutherland, while the southern section can be accessed utilising secondary (gravel) roads. The R354 road from Sutherland traverses the escarpment at the Verlatekloof Pass (meaning desolate or deserted valley) and continues southwards towards the N1 national road at Matjiesfontein. A secondary road traversing the development site near the Gunstfontein homestead provides an alternative passage through the mountainous terrain via the Komsberg Pass, where the Roggeveld Substation is located.

Land use activities within the broader region are predominantly described as sheep farming with very little cultivation (either dryland or irrigated agriculture). Farm settlements or residences occur at irregular intervals throughout the study area. Some of these within the development site, include: *Gunstfontein, Wegkruip* and *Boesmanshoek.* The population density of the region is indicated at less than 1 person per km^2, predominantly concentrated within the town of Sutherland.

The region is not considered to be a major tourist destination, but it is well known due to the location of the SALT observatory 13km west of Sutherland. The telescope is the largest single optical telescope in the southern hemisphere and is funded by a consortium of international partners (USA, Germany, the UK, Poland, India, etc.). It is specifically located within this region due to the absence of light sources brought about by urban developments. The town and the region also hold the unofficial record for being one of the coldest places in South Africa and are frequented by visitors specifically attracted by its remoteness and rugged desolation. The Gunstfontein site is located approximately 30km from SALT.

5.3. Geology and Agricultural Potential

Geology: The geology of the area is mudstone, siltstone, sandstone and shale predominantly of the Beaufort Group but also of the Ecca Group of the Karoo Supergroup.

The sloping land is susceptible to erosion by water and its susceptibility classification, goes as high as 8 (on an 8 class scale). The susceptibility to wind erosion is moderate.

Land types and capability: There are six land types across the site (refer to Figure 5.2). The Db and Fc land types occupy the flatter plateau area. The Db land type is dominated by shallow duplex soils, which are soils with an abrupt transition to a structured clay rich horizon in the subsoil. The Fc land types are dominated by shallow soils that have developed directly in partially weathered rock. The Ib231 land type occupies the mountainous terrain of the escarpment and is dominated by rock outcrops with shallow soils that have developed directly in partially weathered rock.

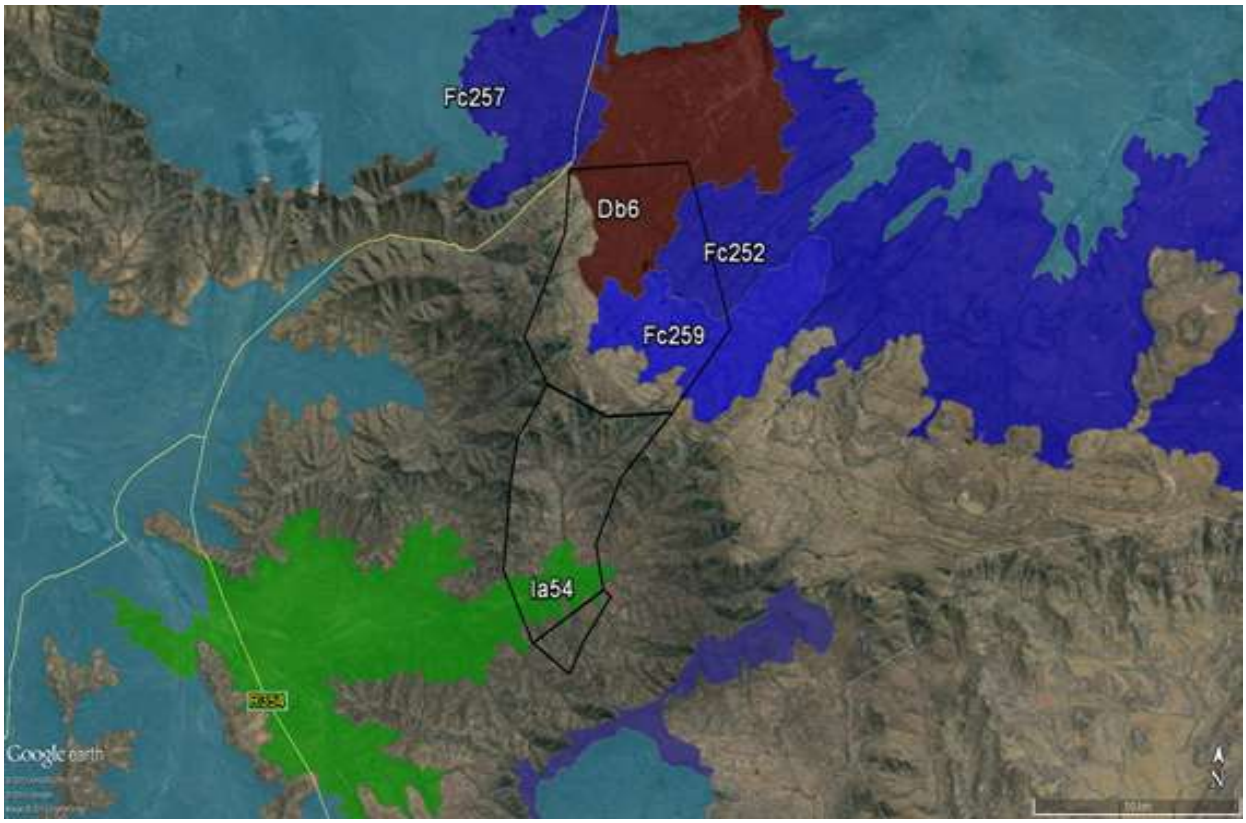

Figure 5.2: Land types of the study area

Land capability is the combination of soil suitability and climate factors. The study area is characterised by land capability described as non-arable, low potential grazing land, or non-utilisable wilderness.

Land use and grazing capacity: Due to severe soil and aridity constraints, agricultural land use is restricted to low intensity grazing only. The natural grazing capacity is low and varies mostly between 30 hectares per large stock unit across the site (may rise to 60ha per animal at the top of the escarpment where vegetation is less and the soil is more shallow).

5.4. Areas of Conservation Importance

5.4.1 Critical Biodiversity Areas and Centres of Endemism

The northern section of the development area falls within a broad ecological support area, designed to maintain the broad-scale connectivity of the landscape. A large proportion of the central part of the site consists of Critical Biodiversity Areas selected on account of the steep slopes and kloofs present in the area which are deemed ecologically sensitive and of higher biodiversity value than flatter areas. This is because steep areas associated with mountains contain sharp climatic gradients within a short distance while

south facing slopes are climatically sheltered and represent potential refuge areas for species affected by climate change (refer to Figure 5.3).

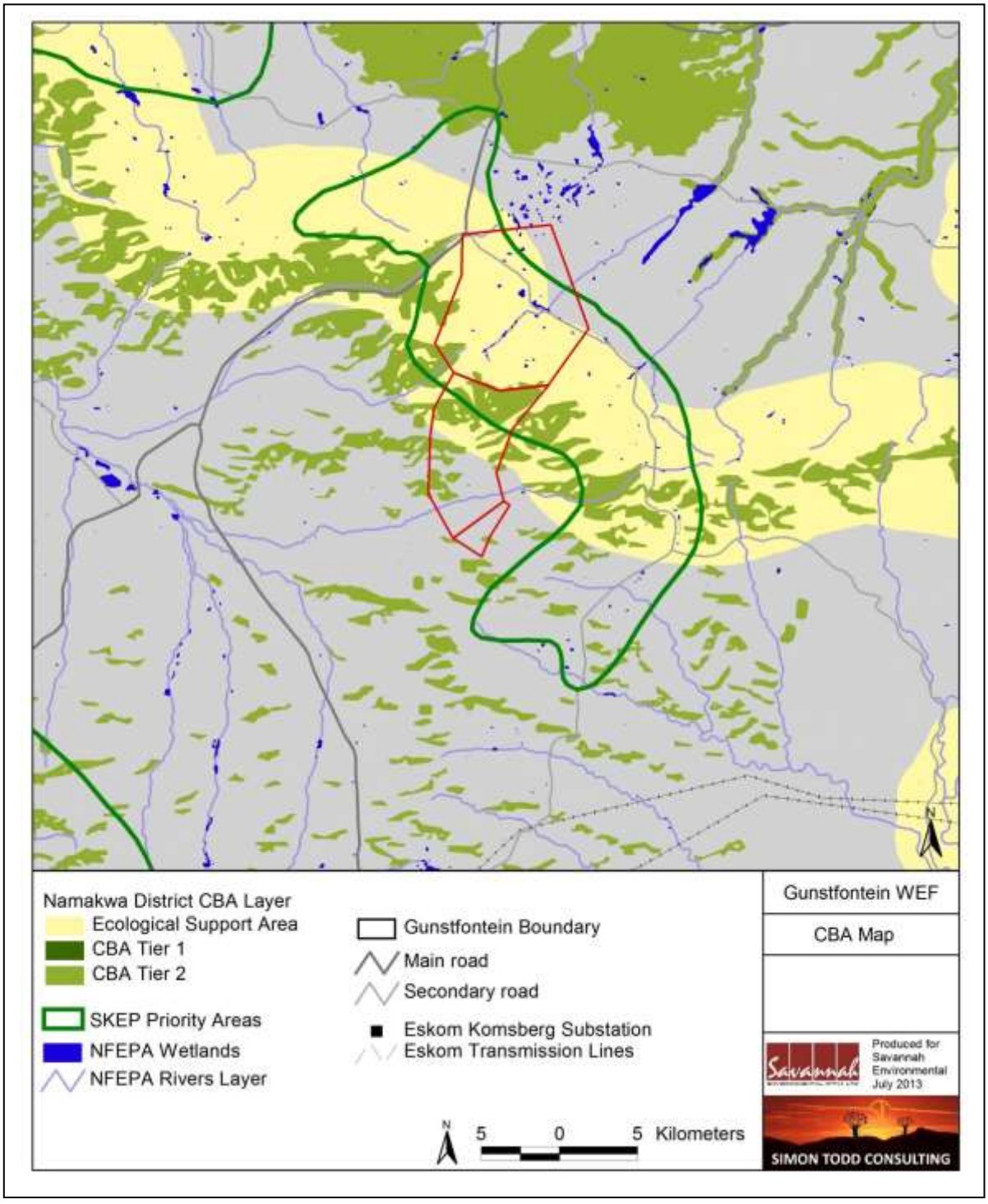

Figure 5.3: Critical Biodiversity Areas in the context of the study area

The CBA status of parts of the site is a potential concern for the development. However, as the CBAs are based on broad theoretical considerations rather than verified biodiversity patterns, the CBAs are not given very high weight at this point and validated ground-truthed data collected during the site visits for the EIA should inform the final layout of the facility as well as provide the basis for the assessment of impacts related to broad-scale biodiversity impacts and CBAs.

5.4.2 National Freshwater Ecosystem Priority Areas

The northern high-lying part of the site has drainage areas with associated pans and potential wetlands. The National Freshwater Ecosystem Priority Areas assessment (NFEPA) suggests the potential for natural wetlands in a good condition and which represent priority wetlands for conservation. These features are important to birds. The larger drainage lines that traverse this area are considered sensitive and would play an important ecological role in the area as they provide structure and habitat not available elsewhere.

5.4.3 Nature Reserves

The Komsberg Wilderness Nature Reserve is a private nature reserve which is located south east of the study area. There are no proclaimed nature reserves or conservancy areas in the vicinity (30km) of the site.

5.5. Ecological Profile of the Study Area including Flora and Fauna

5.5.1. Vegetation

Within the development area, the vegetation is divided into three vegetation types: Roggeveld Shale Renosterveld dominates the high-lying northern extent of the site, while Tanqua Escarpment Shrubland occurs on the hills along the escarpment and the low-lying areas along the larger drainage systems in the south of the site consist of Tanqua Wash Riviere.

All of the vegetation types of the study area consist of low and dwarf shrublands and only Tanqua Wash Riviere commonly has trees as a feature of the vegetation. The lowland vegetation types are associated with the Succulent Karoo and contain a high proportion of succulent shrubs and dwarf succulents, while the uplands consist of renosterveld vegetation types which are dominated by taller woody shrubs.

An important feature of the vegetation types in the area is that they are all less than 7 000 km^2 in extent, indicating that these are relatively restricted vegetation types which

do not have a wide distribution. Roggeveld Shale Renosterveld has 10 or more endemic species and serves to highlight the high diversity and endemicity of the region.

It is however important to note that all the vegetation types in the area have been very poorly investigated and it is therefore likely that there may be more such species present than what has been recognised to date. Given that the vegetation types with low numbers of endemic species still occupy ecologically sensitive areas such as drainage lines or steep escarpment areas, there is little basis to differentiate between the different vegetation types of the area in terms of botanical sensitivity. Therefore, the sensitivity of the different parts of the site are likely to be related to local ecological features and the presence of species and habitats of conservation concern, rather the broad distribution of vegetation types.

Protected plant species: Six hundred and ninety two (692) plant species have been recorded from the quarter degree squares 3220 CB, DA, CD, DC. This includes eleven (11) species of high conservation concern and twenty two (22) species of moderate conservation concern. Given the relatively restricted extent of the constituent vegetation types, this is a high number, which highlights the significance of the area for plant diversity and endemism.

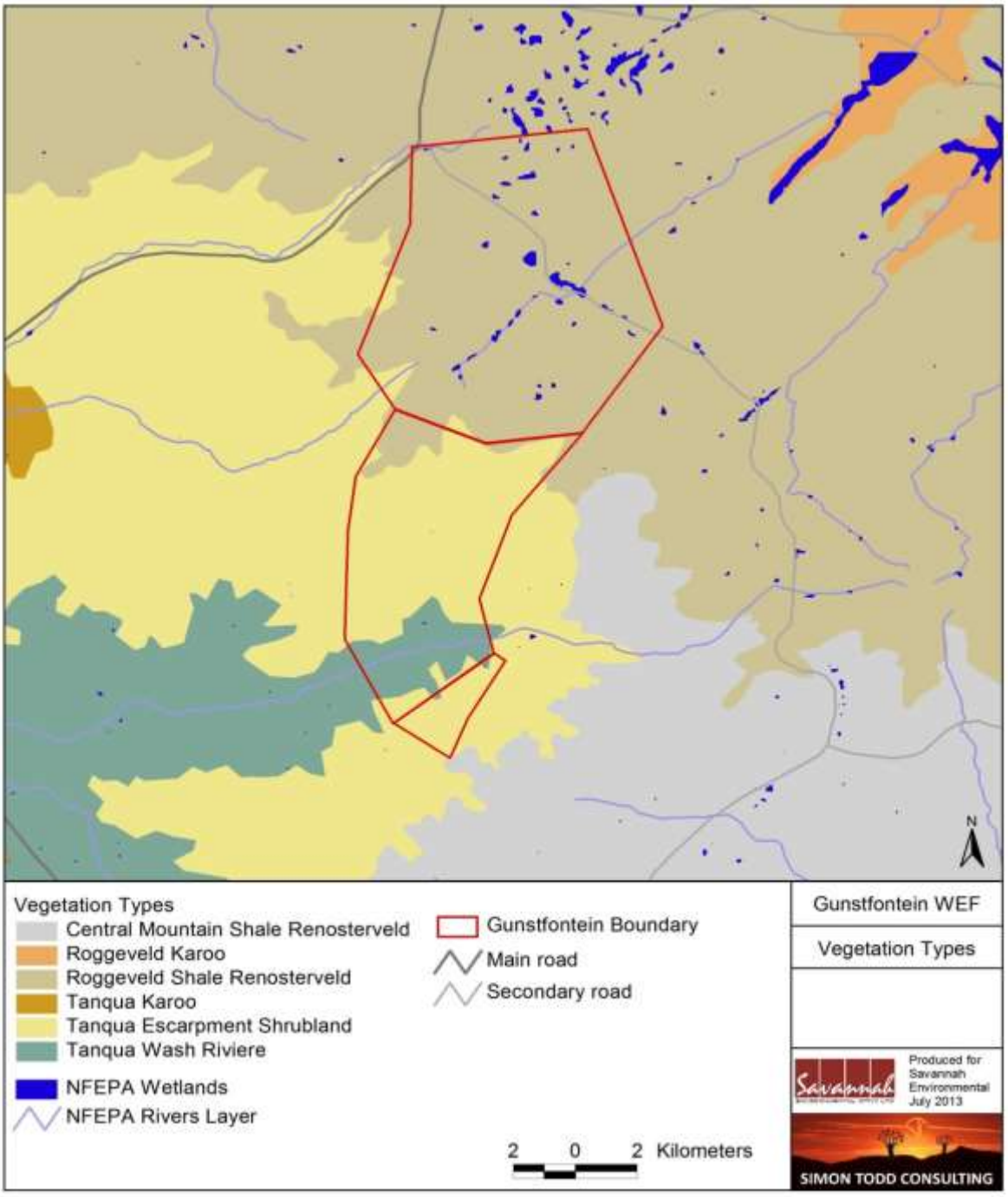

Figure 5.4: Broad-scale overview of the vegetation in and around the Gunstfontein Wind Energy Facility Project. The vegetation map is an extract of the national vegetation map as produced by Mucina & Rutherford (2006), and also includes rivers and wetlands delineated by the National Freshwater Ecosystem Priority Areas assessment (Nel et al. 2011).

5.5.2 Terrestrial Fauna

Mammals: The study area falls within or near the edge of the distribution range of forty four (44) mammal species. Although not all of these would occur at the site, a large proportion is likely to be present as the site has a relatively wide variety of habitats present, from arid lowlands to wetter uplands and specialised habitats such as wetlands and rocky bluffs. Larger species commonly observed at similar nearby sites in the area include Grey Rhebok and Klipspringer. The introduced Fallow Deer is also common in the area and is likely to occur at the site.

Listed species which may occur at the site include the Honey Badger, Black-footed Cat (Vulnerable) and Leopard (Near Threatened). All of these species have relatively large ranges across South Africa and the development would not result in a significant overall decline in the available habitat for these species. At a local level, there is likely to be some impact on the Black-footed Cat and possibly Leopard if they occur at the site.

The Riverine Rabbit is known from the broader area both to the east and the west and given that this species is listed as Critically Endangered, the potential that it occurs at the site requires examination. If this species occurs at the site, it would be associated with Tanqua Wash Riviere vegetation type. As this species is habitat specific within this part of its range, its possible presence can be evaluated based on the presence of suitable habitat at the site. Therefore, the extent and distribution of potential habitat at the site will be examined during the EIA phase to evaluate the potential significance of the area as habitat for this species.

Reptiles: Fifty two (52) reptile species are known to occur in the region it is clear that the site is likely to have a relatively high reptile richness, which can be attributed to the location of the site along the great escarpment as well as the wide variety of habitats present. In terms of species of conservation concern, there are not likely to be many such species at the site. The Namaqua Plated Lizard is listed by the IUCN (2009) as Near Threatened, but under the most recent South African Reptile Conservation Assessment (SARCA) assessment, its status has been revised to Least Concern. Similarly, the Armadillo Girdled Lizard was previously listed as Vulnerable, but has also been downgraded to Least Concern. There are no other currently or previously listed species which are likely to occur within the study area.

Amphibians: A total of only seven (7) amphibians are likely to occur in the area, indicating that the frog diversity of the site is likely to be very low. This can be ascribed to the dry nature of the lowlands and the very cold and relatively dry nature of the uplands. No listed species are likely to occur in the area. All of the species recorded in the area are widespread species of low conservation concern. Within the uplands species such the Cape River Frog are likely to occur along the larger drainage lines and perennial water bodies, while species such as Karoo Caco, Karoo Toad and Cape Sand Frog are less dependent on water and would be more widespread across the site.

5.5.3 Avifauna - Birds

Habitat availability: Micro-habitats available to birds within the study area include Karoo veld; pans and dams; drainage lines; escarpment; arable lands and ridges, the availability of which determine the distribution of important species within the study area.

Distribution of birds: Approximately 135 bird species are considered likely to be present within the Gunstfontein Wind Energy Facility site and/or its surrounding area. The bird community present may include up to 8 species of special conservation concern such as: Black Harrier *Circus maurus*, Martial Eagle *Polemaetus bellicosus* and Ludwig's Bustard *Neotis ludwigii*, classified as Endangered; Black Stork *Ciconia nigra*, Secretarybird *Sagittarius serpentarius* and Verreauxs' Eagle *Aquila verreauxii* considered Vulnerable, Karoo Korhaan *Eupodotis vigorsii* and Greater Flamingo *Phoenicopterus roseus*, classified as Near Threatened (Taylor 2014) (refer to Table 5.1).

One of the passerine species considered to be potentially present in the study site is regarded as endemic to South Africa, the Cape Bulbul *Pycnonotus capensis*, which is a fairly common and widespread species in South Africa. In addition, 18 other bird species are near endemic to South Africa, another 3 are endemic to South Africa, Lesotho and Swaziland, and one other species is a breeding endemic to South Africa, Lesotho and Swaziland (BLSA 2014).

A total of 81 species have been recorded, during the SABAP 1 data collection period, for the relevant QDS (3220DA). To date, the SABAP 2 census has recorded 114 different bird species for the relevant Pentads. It is worth highlighting that data from SABAP2 census for this area is still very low – only 15 cards for the full protocol were submitted for the 9x9 Grid Pentads where the project is inserted (centre in 3235_2040). In general the community is composed by several raptor species, a diverse waterbirds community, bustard species as well as a diverse community of passerine species, including several endemic species.

Table 5.1: Listed bird species potentially occurring in the study area, conservation status and likelihood of occurrence

Group	Common Name	Scientific Name	RLCS SA	RLCS WW	Endemic	Population Trend	Priority species
"Ciconids"	Hamerkop	*Scopus umbretta*	-	LC	-	Stable	X
"Ciconids"	Black Stork	*Ciconia nigra*	VU	LC	-	Unknown	X
"Ciconids"	African Sacred Ibis	*Threskiornis aethiopicus*	-	LC	-	Decreasing	X
Waterbirds	Greater Flamingo	*Phoenicopterus roseus*	NT	LC	-	Increasing	X

Waterbirds	Cape Shoveler	*Anas smithii*	-	LC	-	Increasing	-
Waterbirds	African Snipe	*Gallinago nigripennis*	-	LC	-	Unknown	-
Raptors	Secretarybird	*Sagittarius serpentarius*	VU	VU	-	Decreasing	X
Raptors	Verreauxs' Eagle	*Aquila verreauxii*	VU	LC	-	Stable	X
Raptors	Booted Eagle	*Hieraaetus pennatus*	-	LC	-	Decreasing	X
Raptors	Martial Eagle	*Polemaetus bellicosus*	EN	VU	-	Decreasing	X
Raptors	Black-chested Snake Eagle	*Circaetus pectoralis*	-	LC	-	Unknown	X
Raptors	African Fish Eagle	*Haliaeetus vocifer*	-	LC	-	Stable	X
Raptors	Common (Steppe) Buzzard	*Buteo buteo*	-	LC	-	Increasing	-
Raptors	Jackal Buzzard	*Buteo rufofuscus*	-	LC	(*)	Stable	X
Raptors	Pale Chanting Goshawk	*Melierax canorus*	-	LC	-	Stable	X
Raptors	Black Harrier	*Circus maurus*	EN	VU	(*)	Stable	X
Raptors	African Harrier-Hawk	*Polyboroides typus*	-	LC	-	Stable	X
Raptors	Spotted Eagle-Owl	*Bubo africanus*	-	LC	-	Stable	X
Falcons	Rock Kestrel	*Falco rupicolus*	-	NA	-	NA	-
Falcons	Greater Kestrel	*Falco rupicoloides*	-	LC	-	Stable	X
Falcons	Grey-winged Francolin	*Scleroptila africana*	-	LC	SLS	Stable	X
Bustards	Ludwig's Bustard	*Neotis ludwigii*	EN	EN	-	Decreasing	X
Bustards	Karoo Korhaan	*Eupodotis vigorsii*	NT	LC	-	Increasing	X
Passerine	Common Swift	*Apus apus*	-	LC	-	Decreasing	-
Passerine	Cape Clapper Lark	*Mirafra apiata*	-	LC	(*)	Decreasing	-
Passerine	Large-billed Lark	*Galerida magnirostris*	-	LC	(*)	Increasing	-
Passerine	South African Cliff Swallow	*Petrochelidon spilodera*	-	LC	BSLS	Increasing	-

5.5.4 Bats

Habitat availability: Specific features within the landscape will affect which species occur there. These specifics, or "micro" habitats, are formed by a combination of factors such as vegetation, land cover and man-made structures.

» **Water bodies and drainage lines:** Water bodies represent important features for bats and are likely to attract many species, since they provide water sources in hot and dry environments. However, their importance is not only restricted to water availability but also to insect abundance due to the associated vegetation present. The site contains some dams of reasonable dimension and several water lines which are important for bat species, especially if surrounded by well-developed vegetation.

- **Riverine thickets:** The vegetation surrounding the aforementioned water features is very important to several species, namely clutter and clutter-edge foragers. These features may therefore represent feeding locations for these species and consequently important elements for their survival.
- **Rocky Escarpment:** A large portion of the site is dominated by a steep and rocky escarpment area. These locations may be important for some bat species which may use small cavities between the boulders as roosts, such as the Long-tailed serotine, the Temminck's myotis or the Egyptian free-tailed bat.
- **Natural vegetation:** The proposed development area is occupied mainly by natural vegetation. The natural vegetation within the proposed development is composed by two main types of vegetation structures, spatially separated by the topography. Bat species associated with Succulent Karoo biomes, such as the Egyptian slit-faced bat, are most likely to occur below the escarpment. Other species, such as the Cape serotine bat or the Angolan wind gland bat may be found in the montane grassland areas on central escarpment portion of the site.
- **Pasture areas:** Pasture areas where livestock graze can be associated with bat presence since insects can be attracted to their waste. During field visits a few pasture areas were found with some sheep grazing, though this is not the most common land-use present on site.
- **Buildings and other man-made structures:** Considering the low human occupation within and around the site, few houses and smaller storage buildings are present. In addition, other man-made structures can prove to be important for bats, such as bridges and road culverts. These locations may be important for several bat species to be used as roosts. Species generally found in buildings include the Egyptian slit-faced bat, the Angolan wing gland bat Cape serotine bat and Geoffroy's horseshoe bat, among others.
- **Occurrence of bats:** Approximately 9 bat species have the potential to occur in the immediate vicinity of the site (refer to **Error! Reference source not found.**). The presence of known roosts was also investigated in the 100km radius from the proposed wind energy facility and no roost are known at this distance. The closest roost known to the Gunstfontein Wind Energy Facility is the Die Hel Cave, located approximately 150km southwest of the site, where at least 5 bat species are known to roost: Cape horseshoe bat, Geoffroy's horseshoe bat, Lesser long-fingered bat, Natal long-fingered bat and the Egyptian rousette. From these species only the Cape horseshoe bat, Geoffroy's horseshoe bat and Natal long-fingered bat are considered to have possible occurrence at the site.

From the 9 bat species considered to have potential occurrence in the proposed area, 8 are considered sensitive species. Of these 8 species, only 2 are considered to have a high likelihood of occurrence in the area (refer to Table 5.2). These include:

- The Egyptian free-tailed bat is considered as being prone to colliding with turbine blades (high risk of collision, according to Sowler & Stoffberg, 2014) as they are known to fly at high altitudes and use the vertical space at rotor level for foraging. These species prefer open spaces while avoiding denser vegetation such as forests or

thickets. It is therefore likely to occur within the site while foraging over the open shrubland area above the escarpment.

» The Cape serotine bat, which is considered to be a sensitive species to the project due to the classification of medium to high risk of collision by Sowler & Stoffberg (2014) and known records of this species fatality associated with wind turbines (Doty & Martin 2013). However, this species is considered to have a stable population (IUCN, 2013) and is widely common in South Africa.

Other species that are also considered to be sensitive to the project but have a lower likelihood of occurrence in the area are:

» The Egyptian silt-faced bat: although this species is likely to be using the area, the probability of being detected is scarce because they are acoustically considered whisperers and therefore their echolocation call is very difficult to record, even by modern detectors. This species is considered to be a sensitive species due to their migration behaviour. However, when foraging they usually fly at lower heights than the rotor blade's sweep area (this species has a low collision risk classification) according to the South African guidelines.
» The Natal long-fingered bat, which is a cave dependent, migrant species with a conservation status of concern. The Natal long-fingered female bats are known to migrate seasonally between caves which are sometimes up to 150 km apart (Monadjem *et al.* 2010).
» The Angolan wing-gland bat can occur in the area since it is adequate for its habitat requirements, however its distribution pattern is uncertain which raises doubt concerning its presence in the area. Nonetheless, this species is considered sensitive to impacts caused by wind energy facilities, especially due to its conservation status of concern; it is a species regarded as having low risk of collision with wind turbines (Sowler and Stoffberg, 2014).
» The Temminck's myotis is a seasonal migrator species known to roost in caves and switching between summer and hibernation roosts. Due to this behaviour the species is considered to have a medium to high risk of collision with wind turbines according to Sowler and Stoffberg, 2014.
» The Cape horseshoe bat use caves as roosts but is usually found on roofs of buildings that they use as night roosts where they rest and feed. These species have a low risk of collision (Sowler and Stoffberg 2014) since they are clutter foragers. Nonetheless they are considered sensitive to impacts due to their conservation status of concern, being possibly affected by habitat destruction or fragmentation.
» Geoffroy's horseshoe bat is considered to have a low probability of occurrence considering the MaxEnt analysis (Monadjem *et al.* 2010) and the partial habitat suitability for the species. Nonetheless this species has a conservation status of concern being potentially affected by habitat destruction and displacement if present in the area.

Species not considered to be sensitive to the projects' implementation and development include:

» The Long-tailed serotine is a species with a wide distribution throughout South Africa; with occurrence in rock regions, possibly due to its roosting requirements. This species is not considered especially sensitive to the impacts caused by wind energy facilities since it does not have a conservation status of concern and has a medium risk of collision.

Table 5.2: Likelihood and Conservation Status of Bat species potentially occurring in the study area

Species name	Common name	IUCN*	SA Red List **	Collision risk	Roost type	Habitat preferences	Foraging type	Sensitive species	Probability of occurrences
Nycteris thebaica	Egyptian silt-faced bat	LC	LC	Low	Caves, burrows, culverts and trunks of large trees; houses. Has day and night roots.	Savannah and karoo biomes. Avoids open grasslands	Clutter forager	X	Low
Miniopterus natalensis	Natal long-fingered bat	LC	NT	Med - High	Cave dependent. Uses separate caves as winter hibernacula and summer maternity roosts	Savannahs and grasslands.	Clutter-edge forager	X	Mod
Cistugo seabrae	Angolan wing-gland bat	LC	VU	Low	Buildings	Arid and semi-arid, riverine vegetation of dry river beds.	Clutter-edge forager	X	Low
Eptesicus hottentotus	Long-tailed serotine	LC	LC	Med	Caves, rock crevices	Woodland, rocky regions.	Clutter-edge forager		Mod
Myotis tricolor	Temminck's myotis	LC	NT	Med - High	Caves. Switches between winter hibernacula and summer maternity caves.	Mountains. Absent from flat and featureless terrain.	Clutter-edge forager (only capture aerial prey)	X	Mod
Neoromicia capensis	Cape serotine	LC	LC	Med - High	Under the bark of trees, foliage, buildings	Semi-arid areas to montane grassland, forests and savannah.	Clutter-edge forager	X	High
Rhinolophus capensis	Cape horseshoe bat	LC	NT	Low	Caves and mines	Closely tied to fynbos and	Clutter forager (forages	X	Mod

						succulent karoo biomes.	predominantly in the canopy of trees)		
Rhinolophus clivosus	Geoffroy's horseshoe bat	LC	NT	Low	Caves and mines. Uses feeding roosts during the night, as branches and roof of buildings	Savannah, woodland and riparian forest.	Clutter forager	X	Low
Tadarida aegyptiaca	Egyptian free-tailed bat	LC	LC	High	Caves, rock crevices, under exfoliating rocks, hollow trees and behind the bark of dead trees, also buildings	Wide variety of vegetation, avoids forests.	Open-air forager (avoids forests)	X	High

5.6. Archaeological Profile and Paleontological Potential

5.6.1 Archaeological profile

History of the study area

Evidence has been found that the predecessors of today's Khoi-San Bushmen lived in the area thousands of years ago. According to Hocking (1983), the Khoikhoi, nomadic cattle herders, had their forbears in East Africa and lived in the Northern Cape for at least 3000 years and dominated the region until the eighteenth century when the Tswana tribe arrived in the north of the province from the west.

It was in the early nineteenth century that the Griqua frontiersmen of the old Cape Colony crossed the Orange River from the south. The Griquas were half white and half Khoikhoi. These people dressed like Europeans and lived aboard wagons, much like the Trekboere who migrated northward from the Cape Colony.

The Trekboer movement had already begun by the end of the seventeenth century, as the quest for land, grazing and hunting inspired farmers to move into the central spaces of South Africa. These people were semi-nomadic, moving from fountain to fountain by ox wagon, without any desire to build a house or improve the land in which they were living. For more than a generation before the Great Trek, the first migration led to settlement across the Orange River. Trekboer families were however discouraged by the scarcity of surface water in the Northern Cape, and therefore advancement into the area was slow. The first Europeans to settle in the Northern Cape were missionaries, but

there was a larger influx of white men into the province during the 1860s and 1870s when diamonds were discovered in Griqualand.

When Willem Adriaan van der Stel issued grazing licences to stock farmers and lifted the ban on the bartering of cattle in the early eighteenth century, this opened up a new world of possibilities for white farmers. A new attitude was acquired among the stock farmers; they were able to occupy greater areas of land, and would need more land to obtain farms for their children.

By the late 1820s, a mass-movement of Dutch speaking people in the Cape Colony started advancing into the northern areas. This was due to feelings of mounting dissatisfaction caused by economical and other circumstances in the Cape. This movement later became known as the Great Trek. This migration resulted in a massive increase in the extent of that proportion of modern South Africa dominated by people of European descent. As can be expected, the movement of whites into the northern provinces would have a significant impact on the black people who populated the land. By 1860, the population of whites in the central Transvaal was already very dense and the administrative machinery of their leaders was firmly in place. Many of the policies that would later be entrenched as legislation during the period of apartheid had already been developed (Geskiedenisatlas van Suid-Afrika 1999: 170).

The discovery of diamonds and gold in the northern provinces had very important consequences for South Africa. After the discovery of these resources, the British, who at the time had colonized the Cape and Natal, had intensions of expanding their territory into the northern Boer republics. This eventually led to the Anglo-Boer War, which took place between 1899 and 1902 in South Africa, and which was one of the most turbulent times in South Africa's history. Even before the outbreak of war in October 1899 British politicians, including Sir Alfred Milner and Mr Chamberlain, had declared that should Britain's differences with the Z.A.R. result in violence, it would mean the end of republican independence. This decision was not immediately publicized, and as a consequence republican leaders based their assessment of British intentions on the more moderate public utterances of British leaders. Consequently, in March 1900, they asked Lord Salisbury to agree to peace on the basis of the status quo ante bellum. Salisbury's reply was, however, a clear statement of British war aims.

Little evidence could be found on the impact of the Anglo-Boer War in the Sutherland area. One can however visit Anglo-Boer War cemeteries near the town. The graveyards in this area are unique, as the gravestones were etched using handmade sandstone tools.

Archaeological context

Several Cultural Resource Management projects in the area provide a baseline of the heritage resources expected for the study area. From these studies it is clear that the study area is characterised by Pre-colonial and Colonial Archaeology sites consisting of

Middle Stone Age scatters, Late Stone Age sites containing ceramics, shelters with rock art, structures older than 60 years with middens, stone build kraals and graves.

Archaeological finds:
There is a medium to high likelihood of finding Middle Stone Age and Late Stone Age stone artefacts scattered over the study area and possibly indigenous pottery with some LSA scatters. It is highly likely that shelters/overhangs will contain Stone Age material and possibly rock art and will be of significance. There is a higher possibility of finding Stone Age sites close to water sources such as rivers and pans.

Potential Heritage sites

Based on this information cultural heritage sites relating to Pre-colonial and Colonial Archaeology sites consisting of Middle Stone Age scatters, Late Stone Age sites containing ceramics, shelters with rock art, structures older than 60 years with middens, stone built kraals and graves are expected in the study area..

Historical finds:
Historical finds include middens, structural remains (beacons, kraals etc) and cultural landscape. Most of the historical sites are expected close to water sources (pans and rivers). The desktop study highlighted that the area was occupied from the late 1800s and several Anglo Boer war events took place in the vicinity of Sutherland. Studies in the area (Orton and Halkett 2011) recorded previously unknown British fortifications. Several farm complexes occur within the study area and although no specific reference to these sites was found during the brief desktop study, the age of the structures could potentially exceed 60 years and would therefore be protected by legislation.

Burials and Cemeteries:
Graves and informal cemeteries can be expected anywhere on the landscape.

5.6.2 Paleontological potential

The study area is completely underlain by Late Permian sediments (the Abrahamskraal Formation) of the Adelaide Subgroup, Karoo Supergroup.

Abrahamskraal Formation: The Adelaide Subgroup consists of greenish or blue grey and greyish-red mudstones and sandstones. Palaeocurrent data suggests that the bulk of the sediment comprising the Adelaide Subgroup was derived from a source area lying to the south and southeast of the main Karoo Basin (i.e., the uplifted strata of the Cape Fold Belt). The ubiquitous presence of fining-upward cycles within the sediments, a terrestrial biota, red coloured mud rocks and distinctive sedimentary structures indicate that the unit was deposited under fluvial conditions. The high mud/sand ratios and fine-grained character of the sandstones suggests meandering rather than braided rivers.

The Adelaide Subgroup is differentiated into two distinct stratigraphic sequences which are located either side of the line of longitude of 24° east. To the east of that dividing line the Adelaide Subgroup consists of (in order of decreasing stratigraphic age) the Koonap, Middelton and Balfour Formations. To the west of 24° east the Adelaide subgroup is subdivided into a lower Abrahamskraal and an upper Teekloof Formations. The project area lies west of the dividing line of longitude and so must form part of the western succession. The Gunstfontein project development area is completely underlain by sediments of the Abrahamskraal Formation (refer to Figure 5.5. The Abrahamskraal Formation is distinguished from the overlying Teekloof Formation by the presence of a number of distinctive chert bands (a few centimetres to 2m in thickness) as well as a higher abundance of red mudstone. In practice the boundary between the two units is drawn at the base of the Poortjie Sandstone (a sandstone-rich stratigraphic succession).

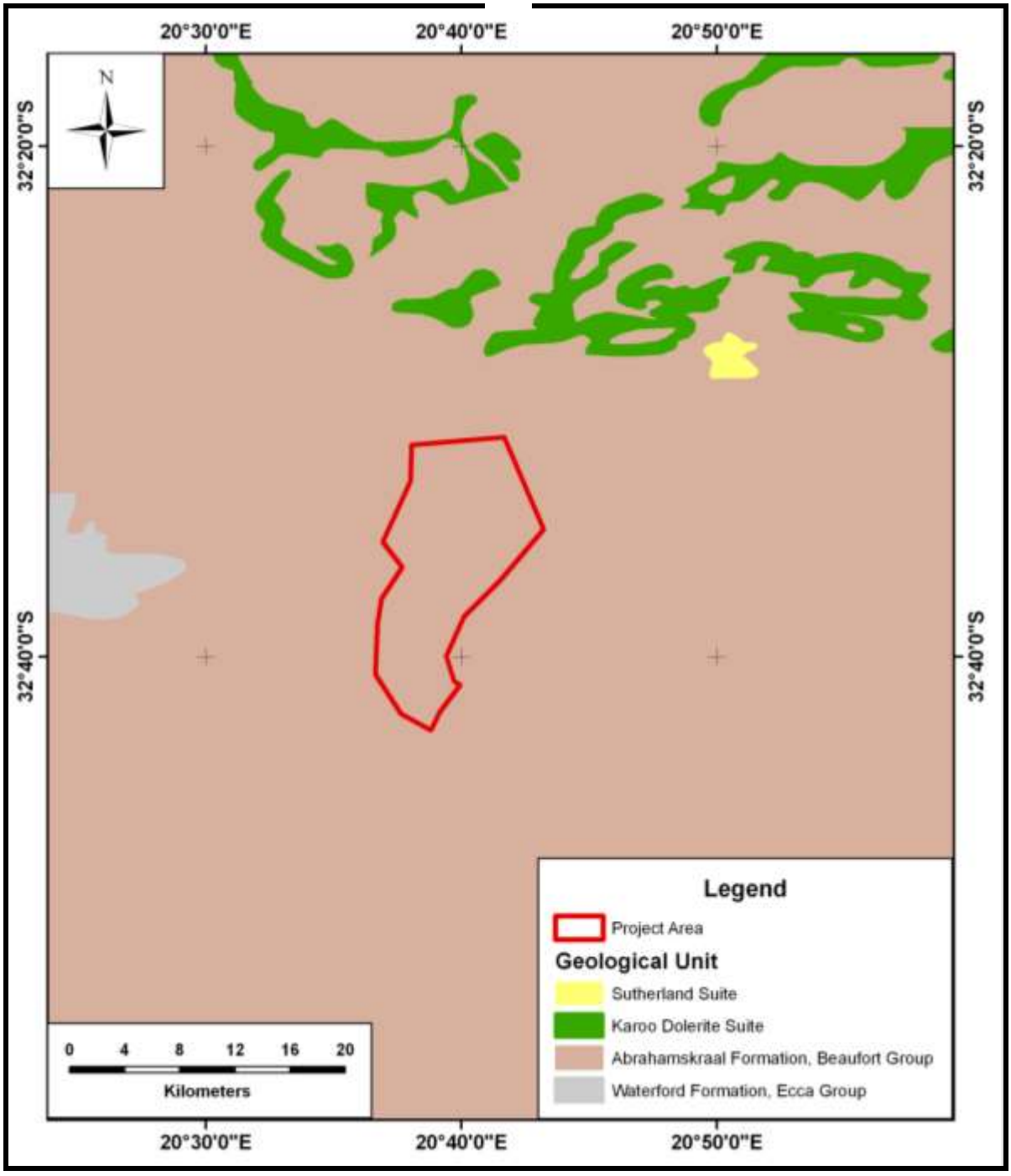

Figure 5.5: Map of bedrock geology underlying the study area

5.7 Social profile

In terms of its administrative setting, the study area is located in the Karoo Hoogland Local Municipality (KHLM) of the Northern Cape Province, which borders on the Laingsburg Local Municipality to the south, which is located in the Western Cape Province. The potential socio-economic opportunities and impacts associated with the

proposed project are likely to affect residents living in both the Karoo and Laingsburg Local Municipalities. The Karoo Hoogland Local Municipality falls within the Namakwa District Municipality and the Laingsburg Local Municipality is within the Central Karoo District Municipality.

Population growth: According to Census 2001 data, the total population of Laingsburg Municipality was 6 682, and that of Karoo Hoogland Local Municipality 10 513. More recent data for the Laingsburg Local Municipality estimated a 2006 population of around 7 330. Based on Census 2011 the population for the Laingsburg Local Municipality and Karoo Hoogland Local Municipality was 8 289 and 12 588. In 2001 the Coloured population made up the majority in both the Laingsburg (82.5%) and Karoo Hoogland (79%) Local Municipalities. The White group was second, namely 15.5% and 18%, respectively. Census 2001 further indicated that the overwhelming majority of the relevant populations, namely 98% and 98.5%, spoke Afrikaans as first language respectively. The scarcity of economic opportunities (and therefore limited appeal to economic in-migrants) is likely responsible for only small percentages of the Black group (viz. 2% and 3%, respectively) recorded in 2001. It is assumed that this situation would have remained more or less unchanged since 2001.

Dependency: The dependency ratio in both regions decreased from 58.7 to 50.9 in the Laingsburg Local Municipality, and 63.6 to 60.5 in the Karoo Hoogland Local Municipality. This implies that there were less people who are dependent on the economically active 15-64 age group. This represents positive socio-economic improvement in both areas. The age dependency ratio is the ratio of dependents, people younger than 15 or older than 64, to the working, age population, those ages 15-64. The age dependency ratio (% of working-age population) in South Africa in 2010 was 53.29. Over the past 50 years, the value for this indicator has fluctuated between 84.43 in 1966 and 53.29 in 2010.

Economic positioning: The percentage of formal dwellings in both areas is high (~97%) and increased by ~ 2%. In terms of employment, the official unemployment rate in both the Laingsburg Local Municipality and Karoo Hoogland Local Municipality decreased for the ten year period between 2001 and 2011. In the Laingsburg Local Municipality the rate fell from 26.3% to 17.9%, a decrease of 8.4%. The decrease in the Karoo Hoogland Local Municipality was from 28.6% to 14.6, a decrease of 14%. Youth unemployment in both regions also dropped over the same period. At the same time the education levels improved, with the percentage of the population over 20 years of age with no schooling dropping by 8.3% to 11.7% and 9.6% to 18.4% for the Laingsburg Local Municipality and Karoo Hoogland Local Municipality respectively. The percentage of the population over the age of 20 with matric also increased in both the Laingsburg Local Municipality and Karoo Hoogland Local Municipality by 4.3% and 3% respectively.

Education: General education levels for both areas were low. Thus, according to Census data, approximately 43% of the population of Laingsburg Local Municipality aged

20 and older was estimated to be functionally illiterate/ innumerate in 2001. The percentage for Karoo Hoogland is even higher, namely 48%. High adult illiteracy levels have been identified as a critical issue in the IDPs of both municipalities. Reskilling of people with only basic primary (agricultural labour) skills has been identified as a significant priority.

Municipal services: With the exception of a decrease of 6.6 % in the number of households in the Laingsburg Local Municipality with weekly municipal refuse removal and the decrease in households which use electricity for lighting (1.8%) in the Karoo Hoogland Local Municipality, the access to municipal services as measured in terms of flush toilets, refuse removal, piped water and electricity, has increased in both the Laingsburg Local Municipality and Karoo Hoogland Local Municipality.

Tourism potential: The Provincial Spatial Development Framework (PDSF) for the Northern Cape Province (NCP) (PSDF) notes that the tourism sector is identified as one of the key sectors with the capacity to 'grow, transform and diversify the provincial economy'. The vision for tourism is underpinned by a number of broad, essential and specific drivers. The 'broad drivers' consider the 'big picture' focusing on tourism's contribution to a larger development purpose, including overall economic growth, addressing social upliftment and poverty alleviation through facilitating job creation, and striving for more equitable ownership and participation in tourism through transformation.

Comparative advantages of the Northern Cape Province are identified as mainly eco-tourism opportunities, including unique sectorial or nature-based routes; National parks, nature reserves and game reserves, Natural and cultural manifestations, as well as festivals and cultural events.

SCOPING OF ISSUES ASSOCIATED WITH THE PROPOSED GUNSTFONTEIN WIND ENERGY FACILITY CHAPTER 6

This chapter serves to describe environmental issues and potential impacts (direct, indirect and cumulative impacts) that have been identified to be associated with the proposed wind energy facility and associated infrastructure, and to make recommendations for further studies required to be undertaken in the EIA phase. The scoping process has involved review of existing information, input from the project proponent, stakeholders, and the public.

Environmental issues associated with **construction and decommissioning** activities associated with the wind energy facility and associated infrastructure may include, among others, soil erosion, impacts on biodiversity, loss of habitat, impacts on SALT and impacts on the social environment and current land use. Environmental issues specific to the **operation** of a wind energy facility and power line could include visual impacts; noise produced by the spinning of rotor blades; avian mortality resulting from collisions with blades, and mortality, injury, and disturbance to other faunal species (e.g. bat mortality due to barotrauma).

The significance of impacts associated with a particular wind energy facility and its associated infrastructure is dependent on site-specific factors, and therefore impacts can be expected to vary significantly from site to site. Sections 6.1 and 6.3 provide a summary of the findings of the scoping study undertaken for the construction and operation phases of the proposed Gunstfontein project. Impacts of the proposed facility are evaluated, and recommendations are made regarding further studies required within the EIA Phase of the process.

In identifying and evaluating impacts associated with the proposed project, the full scope of the project has been considered. This project will comprise:

» **100 wind turbines**, each up to 4MW in capacity, but with the facility limited to 200MW;
» **Permanent concrete foundations** to support the turbines, and associated gravelled crane pad/laydown area;
» **Cabling between the turbines**, to be laid underground where practical and generally alongside the internal access roads, to connect to an on-site substation;
» An **on-site substation** to facilitate the connection between the wind energy facility and the electricity grid;
» **Internal access roads** to each turbine linking the wind turbines and other infrastructure on the site;
» **Buildings and dedicated areas for workshops**, control systems, maintenance and storage with parking areas where required; and
» Temporary **construction compound and temporary site offices**.

During **construction,** an area within the study area of approximately 12 000 ha could experience some level of disturbance and impact as a result of the required activities on site. However, once construction is complete, it is expected that less than 5% of this area will be permanently impacted by infrastructure associated with the wind farm.

The **cumulative impacts** associated with the proposed facility are expected to be associated with the scale of the project, i.e. up to a maximum of 100 turbines will be located on the proposed site, as well as with the presence of other similar developments within the region. The potential cumulative impacts associated with the project are expected to be associated predominantly with the potential visual impact, potential noise impacts, potential impacts on ecology, avifauna (birds) and bats in the surrounding area, impacts on SALT, and impacts on land use and the social environment within the vicinity of the project and the other similar developments within the region.

This Chapter present the potential issues identified for the Gunstfontein Wind Energy Facility. This chapter serves to describe the identified potential environmental impacts associated with the proposed project and to make recommendations for further studies required to be undertaken in the EIA phase, and/or recommendations for the management of these impacts for inclusion in the Environmental Management Programme (EMPr) to be prepared as part of the EIA Phase.

Specialist scoping reports are included within **Appendix D to M** wherein the potential issues relating to the project are identified. A discussion of the potential cumulative impacts associated with the proposed project at this stage of the process is presented in Section 6.3.

6.1. Scoping of Issues

The text and tables below provide an indication of the potential direct and indirect environmental issues and impacts which have been identified during the Scoping phase of the EIA and which may be relevant during the construction and operational phases of the proposed wind energy facility.

6.1.1 Potential Impacts on Land Use, Soil and Agricultural Potential

Land capability is the combination of soil suitability and climate factors. All the land types within the study area have a land capability classification, on an 8 category scale, either as: Class VII - non-arable, low potential grazing land, or as Class VIII - non-utilisable wilderness. As a result of the severe soil and aridity constraints, agricultural land use is restricted to low intensity grazing only.

The significance of agricultural impacts is influenced by the limited agricultural capability of the study area and that the footprint of disturbance will only impact on a very small proportion of the land surface.

It can be argued that a real impact of the project going ahead is that agriculture will continue on the land as the current marginally profitable agriculture will be now subsidised by income to the farmer landowner from the wind energy facility.

Table 6.1: Potential Impacts on Soil, Land Use and Agriculture

Issue	Nature of Impact	Extent of Impact	'No go' areas
Construction Phase			
Physical soil disturbance due to construction activities	» Soil erosion due to alteration of the land surface run-off characteristics. Alteration of run-off characteristics may be caused by construction-related land surface disturbance, vegetation removal, the establishment of hard standing areas and roads. Erosion will cause loss and deterioration of soil resources and may occur during all phases of the project. » Loss of topsoil due to poor topsoil management (burial, erosion, etc.) during construction-related soil profile disturbance (levelling, excavations, road surfacing etc.) and resultant decrease in that soil's agricultural suitability. » A change in the natural condition of the site will inevitably lead to some erosion of the soils.	Local	None identified at this stage. To be confirmed during the detailed soil survey
Impacts on current land use and agricultural potential due to construction activities	» Loss of agricultural land use due to direct occupation by turbines and associated infrastructure, including roads for the duration of the project. » Placement of spoil material generated from construction related excavations which can cover agricultural land and thereby render it unsuitable for future agriculture. » Temporary disturbance to livestock management due to disruptions to fences and stock watering infrastructure during the construction phase.	Local	None identified at this stage. To be confirmed during the detailed soil survey.
Operational Phase			
Impacts on current land use and agricultural potential due to operation activities.	» Loss of agricultural land use due to direct occupation by turbines and other associated infrastructure, including roads, for the duration of the project. This will take affected portions of land out of agricultural production. » Generation of additional land use income makes a positive contribution to farming cash flow, and thereby improves the financial sustainability of agricultural activity.	Local and Regional	None due to low agricultural potential and minimal percentage of the land being transformed by the WEF
Cumulative	» Cumulative impacts due to the regional loss	Regional	None due to low

Issue	Nature of Impact	Extent of Impact	'No go' areas
impacts	of agricultural resources and production as a result of other developments on agricultural land in the region.		agricultural potential and minimal percentage of the land being transformed by the WEF

Gaps in knowledge and recommendations for further study:

Currently there is no evidence to suggest that the wind energy facility cannot be supported from an agricultural perspective. However, the extent and significance of the risk posed to agricultural resources and from soil erosion at a low level is not yet fully understood. Field work will be conducted as part of the EIA level investigation which will consider the following parameters:

» More detailed assessment of local soil conditions
» Assessment of erosion and erosion potential on study area
» Assessment of specific on-site agricultural activities
» Assessment of the impacts of specific construction activities and layout on soil conditions.

6.1.2. Potential Ecological Impacts

The northern high-lying part of the site is relatively flat and, apart from some drainage areas with associated pans and possible associated wetlands, is considered to be of relatively low ecological sensitivity. Provided that the pans and possible associated wetlands can be avoided, development within this area is not likely to pose a high risk of significant ecological degradation. The vegetation in this area is usually fairly homogenous and while there may be some localised areas of higher sensitivity habitat, the majority of the vegetation is not likely to contain an abundance of species of conservation concern.

The northern two thirds of Farm Boschmanshoek are considered relatively high sensitivity on account of the mountainous terrain and very steep slopes characteristic of this area. Although it is not possible to predict at this point as to the sensitivity of the vegetation across this area, it is probable that due to the variation in topography and aspect, that certain aspects are likely to contain a higher abundance of species of conservation concern. The Critical Biodiversity Area map suggests that this would be the south-facing slopes, however, previous experience in the area indicates that more sunny slopes may also contain succulent plant communities with species of conservation concern. While development within this area may be feasible from a biodiversity perspective, the risk of ecological impact due to erosion would be very high and specific and extensive mitigation measures to reduce erosion risk to an acceptable level would be required.

Farm Wolvenhoek and the southern part of Boschmanshoek are less steep and are considered less sensitive as a result. The larger drainage lines that traverse these areas are considered sensitive and would play an important ecological role in the area as they provide structure and habitat not available elsewhere. Development within this area would need to mitigate potential impacts on the drainage areas as well as avoid erosion risk on the moderately steep slopes.

Faunal diversity of the site is likely to be moderate to low with relatively few species of conservation concern present. The Critically Endangered Riverine Rabbit is a potential concern as this species is known from the area but has not been recorded in the vicinity of the site. If to be found on the site it is likely to be located in the southern part of Boschmanshoek and on parts of Wolvenhoek where Tanqua Wash Riviere vegetation is found.

The preliminary ecological sensitivity assessment identifies at a high (regional) level those parts of the study area that have high conservation value or that may be sensitive to disturbance. Areas containing untransformed natural vegetation, high diversity or habitat complexity, or Red List organisms or systems vital to sustaining ecological functions are considered sensitive. There are a number of features that need to be taken into account in order to evaluate sensitivity in the study area. Sensitive features have been mapped in Figure 6.1 and include the following:

» Steep slopes;
» Mountainous areas;
» Wetland features; and
» Drainage features on the site.

The areas classified as Very High sensitivity should be avoided and no development or infrastructure should be placed within these areas. It may however be necessary for access roads to cross drainage features or watercourses also deemed to be of Very High sensitivity on the site, and where this arises, appropriate measures are required should construction take place.

The areas of High sensitivity are largely associated with steep hills and mountain sides or with buffers around drainage features. Although impacts to these areas should be avoided as far as possible as the likelihood of secondary impacts such as soil erosion is high, some mitigation may be possible and some turbines on the mountain slopes would be ecologically acceptable.

Direct loss of vegetation associated with the construction phase of the proposed development is likely to have a Low – Medium impact on a regional scale, depending on the final extent and position of the actual infrastructure footprints and the management of the land.

Indirect (mainly operational phase) impacts (disruption of ecological processes, etc.) are likely to be fairly insignificant due to the nature of the facility.

Overall, the faunal diversity of the site is likely to be moderate to low with relatively few species of conservation concern present. The Critically Endangered Riverine Rabbit is a potential concern as this species is known from the area but has not been recorded in the vicinity of the site. Although it is unlikely that the site contains important habitat for this species, the high conservation concern regarding this species suggests that a cautious approach is warranted and any suitable habitat at the site will be mapped during the EIA phase of the development. If deemed necessary, following an evaluation of the habitat on site, survey methods such as camera trapping will also be employed to try and verify the presence or absence of this species at the site.

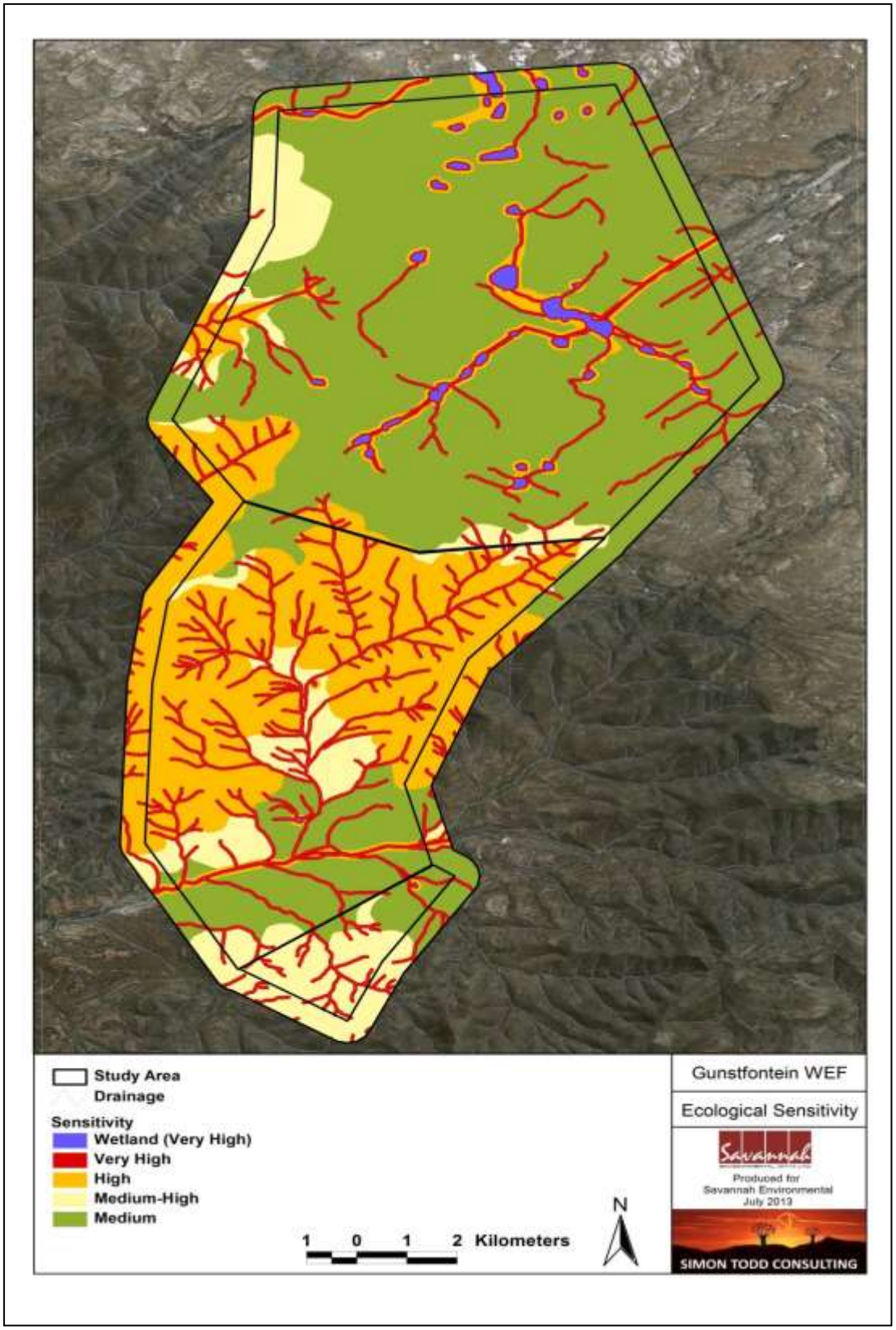

Figure 6.1: Preliminary Ecological Sensitivity Map of the study area proposed for the proposed Gunstfontein Wind Energy Facility

Table 6.2: Potential impacts on ecology

Issue	Nature of Impact	Extent of Impact	'No go' areas
Impacts on vegetation and listed plant species	Site preparation and construction will result in disturbance which would impact on indigenous vegetation and possibly plant species listed as being of conservation concern.	Highly localised- the total extent of the development is relatively low in relation to the receiving environment and would amount to about 5% of the area at most.	The areas classified as Very High sensitivity
Degradation of ecosystems	» The large amount of disturbance created during construction will leave the site vulnerable to alien plant invasion and soil erosion. » Erosion would also impact biodiversity through topsoil loss as well as through siltation of drainage lines and water bodies.	Local	The areas classified as Very High sensitivity Central part (South facing slope on the border between Boschmanshoek farm and Gunstfontein farm) of the site is very steep and erosion is a high and significant risk in this area
Direct impacts on fauna	» Increased levels of noise, pollution, disturbance and human presence will be detrimental to fauna. Sensitive and shy fauna are likely to move away from the area during the construction phase as a result of the noise and human activities present. » Some mammals and reptiles such as tortoises would be vulnerable to illegal collection or poaching during the construction phase as a result of the large number of construction personnel that are likely to be present.	Local	The areas classified as Very High sensitivity
Impacts on	» Parts of the development area	Local and	The areas classified

Issue	Nature of Impact	Extent of Impact	'No go' areas
Critical Biodiversity Areas (CBA) and Loss of Landscape Connectivity	lie within areas classified as Critical Biodiversity Areas. » Development would also result in landscape fragmentation and the loss of landscape connectivity for fauna and flora particularly along the escarpment which is vulnerable to cumulative impacts	regional	as Very High sensitivity

Gaps in knowledge and recommendations for further study:

The current study is a desktop study and as such this imposes some limitations on the study. The study relies on existing information as available in the various spatial databases and coverages. In many cases, these databases are not intended for fine-scale use and the reliability and adequacy of these data sources relies heavily on the extent to which the area has been sampled in the past. Many remote areas have not been well sampled with the result that the species lists obtained for the site do not always adequately reflect the actual fauna and flora present at the site. Furthermore, the condition of the vegetation and the impact of land use on the site cannot always be adequately judged from satellite imagery or aerial photography. The following activities will be undertaken during the EIA phase in order to fully assess potential impacts on the ecological receiving environment by the proposed facility:

» Ground-truth and refine the ecological sensitivity map of the site. Particular attention will be paid to the pans and possible associated wetlands within the northern high-lying parts of the site as well as the steep areas and other localised specialised habitats which are likely to occur across the site.
» Characterise the vegetation and plant communities present at the site. The SA vegetation map only provides a coarse picture of the vegetation present. Therefore, on-site surveys will be conducted to generate a species list for the site as well as identify and where necessary map different plant communities present at the site. This is likely to be particularly relevant in the central part of the site where the steep slopes are likely to generate a variety of different habitats with associated plant communities.
» Identify and map the presence of any unique and special habitats at the site such as gravel patches, rock fields and other localised habitats.
» Locate, identify and map the location of significant populations of species of conservation concern, so that the final development footprint can be adjusted so as to avoid and reduce the impact on such species. Some species of concern may be widespread and others localised and the distribution of such species will

be established during the site visit.
» Evaluate the likely presence of listed faunal species at the site such as the Riverine Rabbit, and identify associated habitats that should be avoided to prevent impact to such species.
» Evaluate, based on the site attributes, what the most applicable mitigation measures to reduce the impact of the development on the site would be and if there are any areas where specific precautions or mitigation measures should be implemented.
» Assess the impacts identified above in light of the site-specific findings and the final facility layouts to be provided by the developer.

6.1.3 Potential Impacts on Birds

The study area is extremely arid and is located within a winter rainfall area. This area is known for small unit livestock (mostly sheep) farming only, as the aridity prevents any crop cultivation or other development. It is expected that large terrestrial species such as cranes, bustards, korhaans and various large raptors, particularly Martial Eagle, Verreaux's Eagle and various smaller raptors (falcons, harriers and kestrels) will be the most important bird species in the area, and have been categorised as "target species" for the purposes of the avifaunal monitoring.

The Scoping process has identified the potential impacts on birds associated with the construction of the proposed wind energy facility as disturbance, habitat destruction and displacement. Operational phase issues are anticipated to include, most significantly, collision of birds with turbine blades.

Target species: Approximately 135 bird species are considered likely to be present within the Gunstfontein Wind Energy Facility site and/or its surrounding area. The bird community present may include up to 8 species of special conservation concern such as: Black Harrier *Circus maurus*, Martial Eagle *Polemaetus bellicosus* and Ludwig's Bustard *Neotis ludwigii*, classified as Endangered; Black Stork *Ciconia nigra*, Secretarybird *Sagittarius serpentarius* and Verreauxs' Eagle *Aquila verreauxii* considered Vulnerable, Karoo Korhaan *Eupodotis vigorsii* and Greater Flamingo *Phoenicopterus roseus*, classified as Near Threatened.

Sensitivity and Buffers: In general the area may be divided into two major areas regarding its sensitivity: the area of the escarpment and below it, which may be considered as having a higher sensitivity to the bird community; and the area above the escarpment, which in general may be regarded as having a lower sensitivity, though several features present deserve some attention. The main focus of concern are likely to be waterbird activity surrounding water features in the farm portions above the escarpment, and raptor and large birds activity and breeding in the escarpment area. One nest of Verreauxs' Eagle is an example of the area's suitability for breeding purposes. Recently fatal collisions of this species

with operating wind turbines have been recorded in the Eastern Cape, and at a considerable distance from the species breeding habitat (Smallie, 2015). Therefore this information was taken into account while defining the sensitive bird areas. The following buffer areas were proposed (Figure 5.2 provides a preliminary indication of the potential bird sensitive areas and their classification):

» The areas closer than (500 m) (to be confirmed in the EIA Phase) from the main water bodies above the escarpment and from the water line located below the escarpment area, which includes the riverine thickets and gorges, where abundant and diverse small bird communities have been observed, together with some raptors and a Black Stork (just one observation during the summer surveys);
» (2000m) (to be confirmed in the EIA Phase) from the Verreaux's Eagle nest. This buffer area is recommended to minimise impacts on the Verreaux's eagle, based on recent findings regarding collisions of this species at considerable distances from their breeding locations. Considering the Vulnerable conservation status of this species the precautionary approach is recommended; and
» The areas closer than (500m) (to be confirmed in the EIA Phase) from the general escarpment area, where abundant rocky outcrops are found and there is a regular presence of raptors. This area is of special concern as soaring birds tend to use ascending hot air currents (thermals) to cover ground with a minimum energy cost. While using this type of flight, birds will have high difficulties in executing active flight and if an obstacle is presented (e.g. wind turbines) they are less likely to be able to change course, increasing the risk of collision and possible fatality.

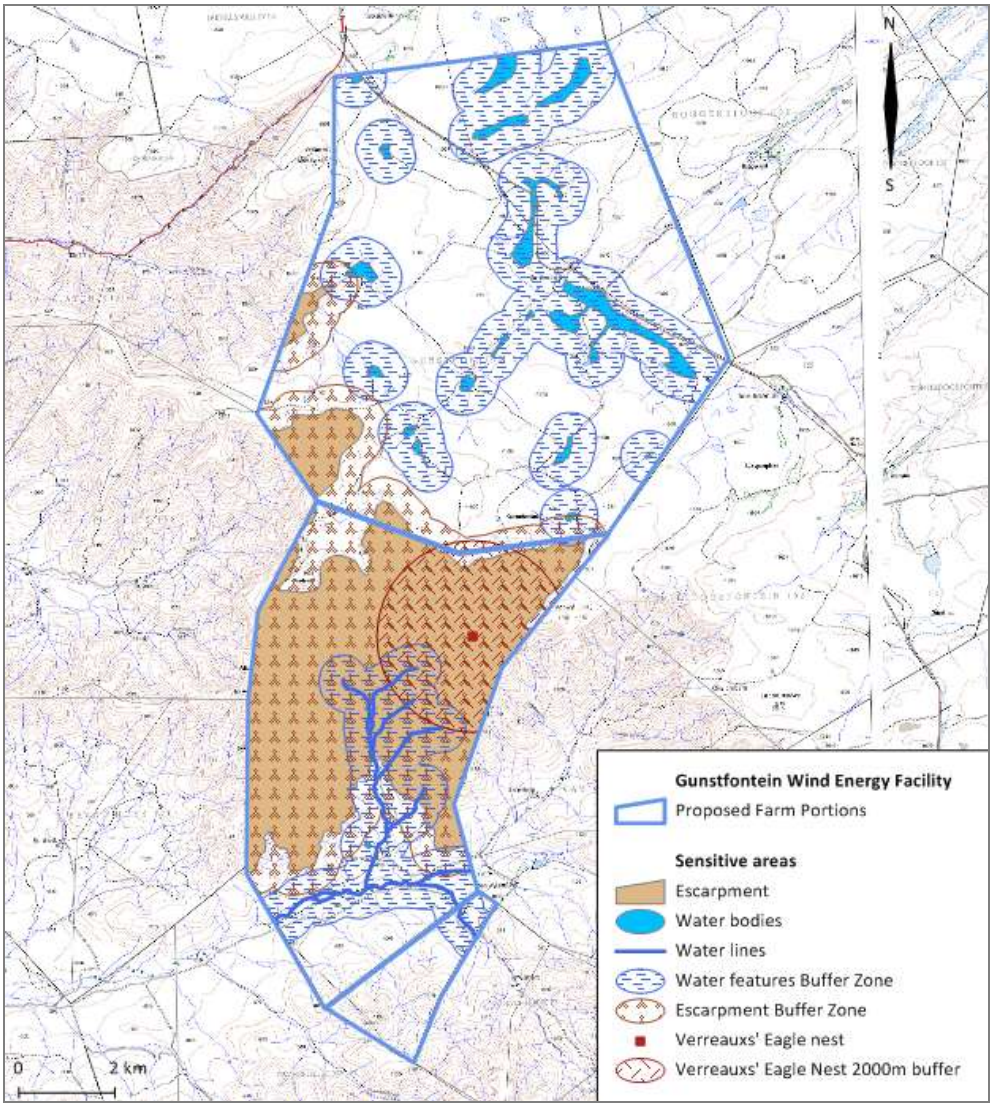

Figure 6.2 Preliminary bird sensitivity map of the study area

Table 6.3: Potential impacts on avifauna

Issue	Nature of Impact	Extent of Impact	'No go' areas
Construction phase			
Destruction of bird habitat & disturbance birds	Avifauna species currently in the study area will be affected as their habitat will be destroyed. The study area is mostly occupied by natural vegetation, characteristic of the Fynbos and Succulent Karoo biome. Therefore it is expected that these biotopes will be negatively affected by the construction phase.	Local	Surrounding water bodies and drainage lines, escarpment areas (suitable buffer) and sensitive bird species nests.
Displacement of birds from the site and barrier effects	With avifauna habitat disturbed, this could result in displacement of avifauna from their site and breeding species would be affected.	Local	
Operational phase			
Collision of birds with turbine blades	This impact is likely to affect species such as Martial Eagle, Greater Kestrel and Verreauxs' Eagle which were found in the study are most likely to collide with stationary or rotating turbine blades.	Regional (for species with large scale movements)	Surrounding water bodies and drainage lines, escarpment areas (suitable buffer) and sensitive bird species nests.
Disturbance due to maintenance activities	One nest of Verreauxs' Eagle was found within the study area, which is a good indicator that the species use the area and that disturbances caused by wind energy facility operation may reflect in its reproductive success.	Local	Sensitive bird species nests (suitable buffer)

Gaps in knowledge and recommendations for further study:

With this study the specific analysis of the bird activity through the area was not assessed. A full assessment will be conducted during the EIA Phase. Avifauna Impacts must be assessed in terms of the EIA Regulations as well as all other relevant guidelines and legislation. It is recommended that:

» Site visits be undertaken by the avifaunal specialist.
» Sensitive areas must be identified and mitigation measures recommended to minimise impacts on these areas.

» The possible impacts of avifauna on the new infrastructure be assessed and Suitable mitigation measures be recommended for all issues identified as significant.
» A pre-construction bird monitoring programme is recommended to be implemented in order to inform the EIA and validate the predicted impacts and significance as well as proposed appropriate mitigation measures.

6.1.4 Potential Impacts on Bats

The proposed Gunstfontein Wind Energy Facility site is located within the Fynbos biome, Succulent Karoo biome and Inland Azonal Vegetation biome, where in general the vegetation is adapted to the semi-arid climate. Some bat species are specifically associated with the karoo vegetation, such as the Egyptian slit-faced bat *(Nycteris thebaica*), while other may be present due to the riverine vegetation included in the Azonal Vegetation, such as the Vulnerable Angolan wing gland bat (*Cistugo seabrae*). Additionally, other species may be present in the area not for the vegetation structure, but rather for terrain features, including mountains, cliffs and ridges. The Long-tailed serotine bat (*Eptesicus hottentotus*) and the Temminck's myotis (*Myotis tricolor*) are examples of species closely associated with mountainous areas which may occur within the study site. These species roost in caves, mines or rock crevices, specifically, being the main reason why they are associated to these mountainous areas.

Sensitivity: Nine bat species are considered to have potential occurrence in the proposed area, 8 are considered sensitive species. Of these 8 species, only 2 are considered to have a high likelihood of occurrence in the area. These include:
» The Egyptian free-tailed bat is considered as being prone to colliding with turbine blades (high risk of collision, according to Sowler and Stoffberg, 2014) as they are known to fly at high altitudes and use the vertical space at rotor level for foraging. These species prefer open spaces while avoiding denser vegetation such as forests or thickets. It is therefore likely to occur within the site while foraging over the open shrubland area above the escarpment.
» The Cape serotine bat, which is considered to be a sensitive species to the project due to the classification of medium to high risk of collision by Sowler and Stoffberg (2014) and known records of this species fatality in wind turbines (Doty & Martin 2013). However, this species is considered to have a stable population (IUCN, 2013) and is widely common in South Africa.

Other species that are also considered to be sensitive to the project but have a lower likelihood of occurrence in the area are:
» The Egyptian silt-faced bat: although this species is likely to be using the area, the probability of being detected is scarce because they are acoustically considered whisperers and therefore their echolocation call is very difficult to

record, even by modern detectors. This species is considered to be a sensitive species due to their migration behaviour. However, when foraging they usually fly at lower heights than the rotor blade's sweep area (this species has a low collision risk classification) according to the South African guidelines.

» The Natal long-fingered bat, which is a cave dependent, migrant species with a conservation status of concern. The Natal long-fingered female bats are known to migrate seasonally between caves which are sometimes up to 150 km apart (Monadjem *et al.* 2010).
» The Angolan wing-gland bat can occur in the area since it is adequate for its habitat requirements, however its distribution pattern is uncertain which raises doubt concerning its presence in the area. Nonetheless, this species is considered sensitive to impacts caused by wind energy facilities, especially due to its conservation status of concern; it is a species regarded as having low risk of collision with wind turbines (Sowler and Stoffberg, 2014).
» The Temminck's myotis is a seasonal migrator species known to roost in caves and switching between summer and hibernation roosts. Due to this behaviour the species is considered to have a medium to high risk of collision with wind turbines according to Sowler and Stoffberg, 2014.
» The Cape horseshoe bat use caves as roosts but is usually found on roofs of buildings that they use as night roosts where they rest and feed. These species have a low risk of collision (Sowler and Stoffberg 2014) since they are clutter foragers. Nonetheless they are considered sensitive to impacts due to their conservation status of concern, being possibly affected by habitat destruction or fragmentation.
» Geoffroy's horseshoe bat is considered to have a low probability of occurrence considering the MaxEnt analysis (Monadjem *et al.* 2010) and the partial habitat suitability for the species. Nonetheless this species has a conservation status of concern being potentially affected by habitat destruction and displacement if present in the area.

Buffers: Considering the bat micro-habitats identified and the observations collected in the field visits, sensitive areas were identified within the affected farm portions of the proposed Gunstfontein Wind Energy Facility (Figure 6.3). The area presents two major areas regarding its sensitivity:

(i) the area of the escarpment and below it, which may be considered as having a higher sensitivity to the bat community; and
(ii) the area above the escarpment, which in general may be regarded as having a lower sensitivity, though several landscape features present deserve some attention.

According to the desktop analysis and data collected in the field, the general area of the site has a low utilisation by bats, though it is used by sensitive species with a medium to high risk of collision with wind turbines (e.g. Cape serotine, Natal Long-

fingered bat, Long-tailed serotine and the Egyptian free-tailed bat). Therefore **high sensitivity** areas for bats are outlined as:

» The areas closer than (500m) (to be confirmed in the EIA Phase) from the main water bodies above the escarpment and from the main valley traversing the upper part of the escarpment.
» The riverine thickets and gorges (suitable buffer from the main streams) in the areas below the escarpment.
» The areas closer than [(500m) (to be confirmed in the EIA Phase) to the upper ridge line on the northern farm portions, as this may be an approaching route of bat roosting in the escarpment which may travel to the upper escarpment area to forage.

Medium sensitivity areas for bats are outlined as:

» The general escarpment area, where abundant rocky outcrops that could serve as roosting places for bats are found and where bat activity is recorded on some occasions.
» Other minor water bodies in the area above the escarpment.
» A suitable buffer surrounding the bat roosts in the southern portion of the proposed area. As the number of individuals and species present is uncertain at this stage a (500m) (to be confirmed in the EIA Phase) buffer was considered in accordance with the recommendations made by the South African Bat Assessment Advisory Panel (SABAAP).

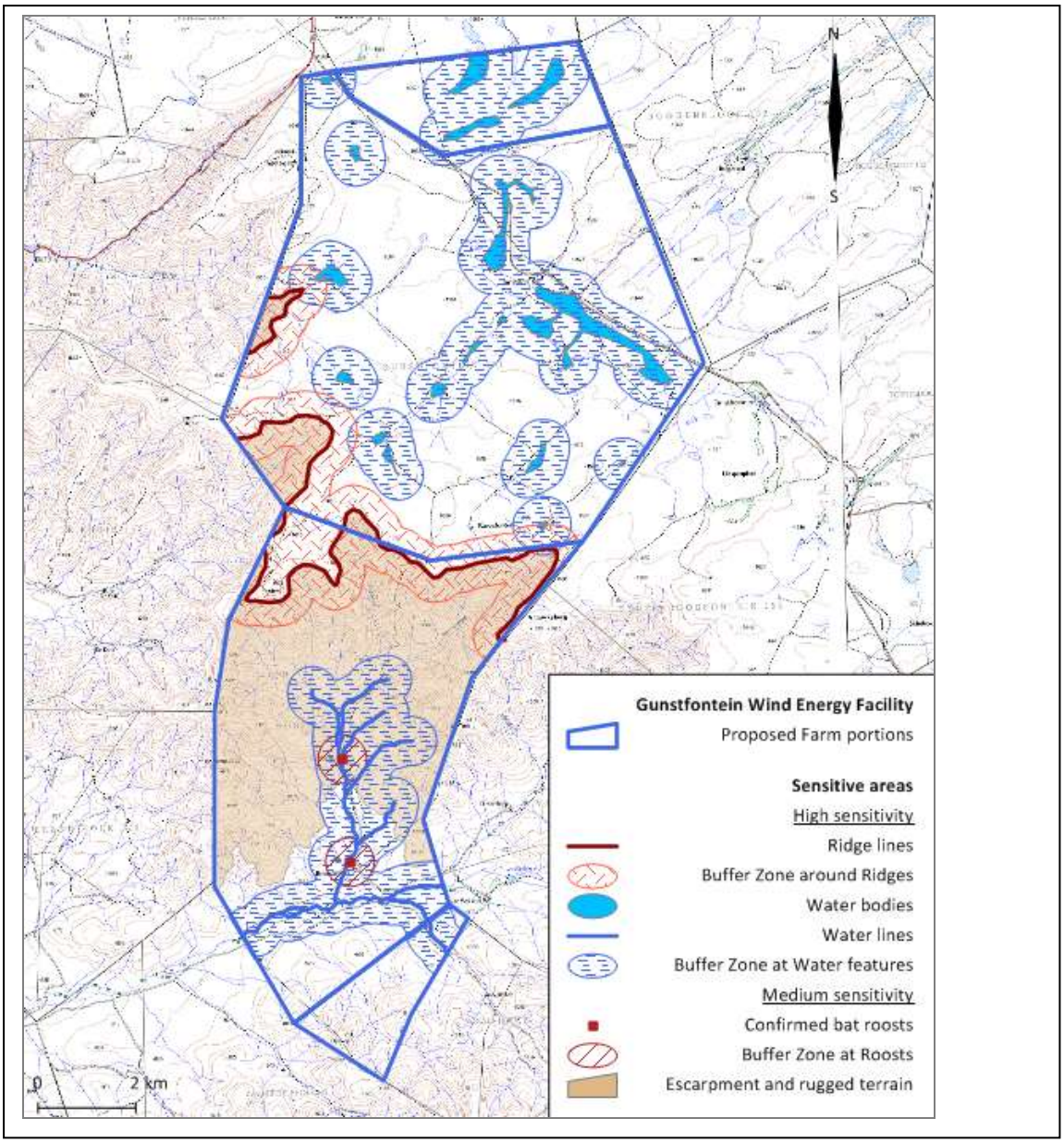

Figure 6.3 Preliminary bat sensitivity map of the study area

Table 6.4: Potential impacts on bats

Issue	Nature of Impact	Extent of Impact	'No go' areas
Construction Phase			
Habitat destruction and Disturbance and/or displacement	» Habitat destruction due to the construction of the concrete foundation of the turbines, access roads and associated infrastructure. » Increase in the movement of bats across the area due to removal or destruction of vegetation. » The disturbance due to the presence of people and vehicles is also expected to have a limited influence on bat activity, especially due to its temporary nature (and daytime character).	Local	Surrounding water bodies and drainage lines, escarpment areas (suitable buffer) and sensitive bat roosts
Operational Phase			
Collisions with turbines, associated infrastructure and barotrauma	» Attraction of insects to lights used at the facility, resulting in an increased incidence of bats in that area for feeding purposes.	Regional (for species with large scale movements)	None
	» The escarpment area, as well as some buildings and road culverts in the area have the potential to act as roosts for some bat species. Bat activity surrounding these features is also likely to be higher due to movements in and out of the roosting locations	Regional (for species with large scale movements)	Surrounding water bodies and drainage lines, escarpment areas (suitable buffer) and sensitive bat roosts
	» Exposure of bats to rapid decreases in external air pressure near the blade tips could result in barotrauma and bat mortality.	Possibly Regional (for species with large scale movements)	Surrounding water bodies and drainage lines, escarpment areas (suitable buffer) and sensitive bat roosts

Gaps in knowledge and recommendations for further study:

A full assessment will be conducted during the EIA Phase. Impacts on bats must be assessed in terms of the EIA Regulations as well as all other relevant guidelines and legislation. It is recommended that:

» Site visits must be conducted for the EIA Phase of this project to more accurately determine bat presence.

» Analyse the level of bat activity at rotor swept area, their location both in the horizontal and vertical plane, and relation with environmental variables (such as wind speed, temperature and others).
» Determine areas of collision risk in order to overlay them with this preliminary sensitivity mapping, allowing it to be confirmed and/or refined.
» Sensitive areas must be identified and mitigation measures recommended to minimise impacts on these areas.
» A monitoring program is seen as critical in extending knowledge of the proposed wind energy facility and bat interactions and to collect data on the relevant environmental factors. The assessment of impacts should be informed by the results of this study.

6.1.5 Potential impacts on Archaeological, Heritage and Paleontological Resources

Several Cultural Resource Management projects in the area provide a baseline of the heritage resources expected for the study area. From these studies it is clear that the study area is characterised by Pre-colonial and Colonial Archaeology sites consisting of Middle Stone Age scatters, Late Stone Age sites containing ceramics, shelters with rock art, structures older than 60 years with middens, stone build kraals and graves. The extent of occurrence on the site is as yet unknown.

The study area is completely underlain by Late Permian sediments (the Abrahamskraal Formation) of the Adelaide Subgroup, Karoo Super group. The Adelaide Subgroup consists of greenish or blue grey and greyish-red mudstones and sandstones. The Abrahamskraal Formation is distinguished from the overlying Teekloof Formation by the presence of a number of distinctive chert bands (a few centimetres to 2m in thickness) as well as a higher abundance of red mudstone. In practice the boundary between the two units is drawn at the base of the Poortjie Sandstone (a sandstone-rich stratigraphic succession).

Table 6.5: Potential heritage and paleontological impacts

Issue	Nature of Impact	Extent of Impact	'No go' areas
Construction Phase			
Potential impacts on heritage resources	Construction of a renewable energy facility and associated infrastructure impacting on heritage resources including graves, ruins, kraals and Stone Age sites.	Local	None identified at this stage; subject to confirmation during EIA phase)
Potential movement,	Potential damage or destruction of fossil materials during the construction	Local	None identified

Issue	Nature of Impact	Extent of Impact	'No go' areas
damage, or destruction of fossil material	of project infrastructural elements		
	Movement of fossil materials during the construction phase such that they are no longer in situ when discovered.	Local	None identified
	The loss of access for scientific study to any fossil materials present beneath infrastructural elements.	Local	None identified
Operational Phase			
Potential impact on sense of place	The proposed wind and solar energy facilities could directly impact on both the visual context and sense of place of historical sites.	Local and regional	None identified

Gaps in knowledge and recommendations for further study

The study area was not subjected to a field survey as this will be done in the EIA phase. It is assumed that information obtained for the wider area is applicable to the study area. Verification of the desktop information collected regarding the position and status of the heritage and archaeological sites identified is required to determine the significance of the impacts on the heritage environment. Likewise further site verification of possible palaeontology impacts will be done in the EIA phase.

Heritage and Archaeology

In order to comply with the National Heritage Resources Act (Act 25 of 1999) a Phase 1 Archaeological and Heritage Impact Assessment must be undertaken. During this study sites of archaeological, historical or places of cultural interest must be located, identified, recorded, photographed and described. During this study the levels of significance of recorded heritage resources must be determined and mitigation proposed should any significant sites be impacted upon, ensuring that all the requirements of the South African Heritage Resources Agency are met.

Palaeontology Recommendations

Thorough site investigation of the outcrops of the area by a palaeontologist prior to commencement of the construction phase of the project would make it possible that scientifically and/or culturally significant fossils present within the area may be discovered that would be otherwise damaged, destroyed or inadvertently moved. A secondary advantage of such an investigation would be that any fossil materials located could prove to have a positive effect on the understanding of the fossil record of South Africa and positively affect the palaeontological heritage of the country.

The possibility of any negative impact on the palaeontological heritage of the project area could be minimised by the conduct of a thorough site investigation by a palaeontologist as part of a full EIA study prior to commencement of the project.

Similarly, a thorough and on-going examination should be made of all excavations during the construction phase. Should any fossil materials be identified, the excavations should be halted and SAHRA informed of the discovery.

6.1.6 Potential Visual Impacts

The proposed project falls into a category 5 development (i.e. development will potentially have very high/ high visual impacts) as wind farms are de-facto ascribed to that category. Accordingly, using the Western Cape Guidelines to inform the impact assessment, a level 4 assessment should be undertaken.

The development of the upper plateau is likely to have greater visibility than development within the lower valleys, and the exact location of turbines is likely to have significant influence on the extent of the proposed windfarm that will be visible to these areas. The preliminary assessment indicates that:

- Approximately 35 farmsteads could be impacted.
- The western section of the town of Sutherland could be impacted.
- The South African Large Telescope could be impacted.
- Sections of the R354, the R356 and R365 could be impacted.
- There is little chance of the Tankwa Karoo National Park being impacted.

Possible visual receptors or areas, places and routes that may be sensitive to landscape change are indicated on Figure 6.4 which indicates a preliminary assessment of likely visibility or Zone of Theoretical Visibility (ZTV) of the proposed development**.**

The turbines associated with the proposed development are by far the largest structures and are therefore likely to be the most obvious elements that are visible for the greatest distance. Observations of existing wind farms during site visit to other similar projects include;

- Whilst a structure 190m tall in a flat landscape could be visible over a distance of up to 49kmin a flat landscape. This distance only takes into account the curvature of the earth with no consideration of atmospheric conditions, topography or physical limitations of the human eye. From observations during site visits to similar projects turbines have been noted as being visible from a distance of 30km or more.
- With the sun behind the turbines and the face of structures facing the viewer in shadow. In these conditions wind farms are generally not obvious from a distance and tend to merge with their background.

- » If the wind farm is viewed against a landform backdrop that is in shadow turbine structures tend to merge with its background under all weather conditions, whereas where there is no backdrop they tend to merge best when the sky is darker and are slightly more obvious against a lighter sky.
- » From close quarters, estimated at less than 2 - 4km, wind farm turbines generally dominate the view, the scale and detail of individual structures is obvious, due to this as well as the generally large extent of such facilities, wind farms tend to dominated local character.
- » From medium distance, estimated at up to 8 – 15km the wind farm structures provided an obvious focal point in the landscape that is difficult to ignore. The exception to this is where the wind farm structures are seen in shadow against the back drop of land form. In these circumstances the wind farm tends to blend with the backdrop and can be difficult to make out. When viewed from above at this range, the underlying vegetation and agricultural pattern is legible running through and around the wind farm.
- » At a distance in excess of 15 – 20km wind farm structures can be easy to miss in the landscape particularly if they are in shadow and cast against the landform. They become more easily visible if seen in profile above the skyline and if they are seen with the sun reflecting off the visible face. At this range the structures often blend into the background vegetation / agricultural pattern.

The potential impact on SALT is more to do with light pollution on the dark skies above SALT and on the possibility of light sources interfering with sensitive astronomical observations, than it is with respect to visual impact per se. These SALT specific matters are really technical rather than visual and hence are covered separately. The visual impact study must however assess the possible impact on visitors and tourists attracted by SALT.

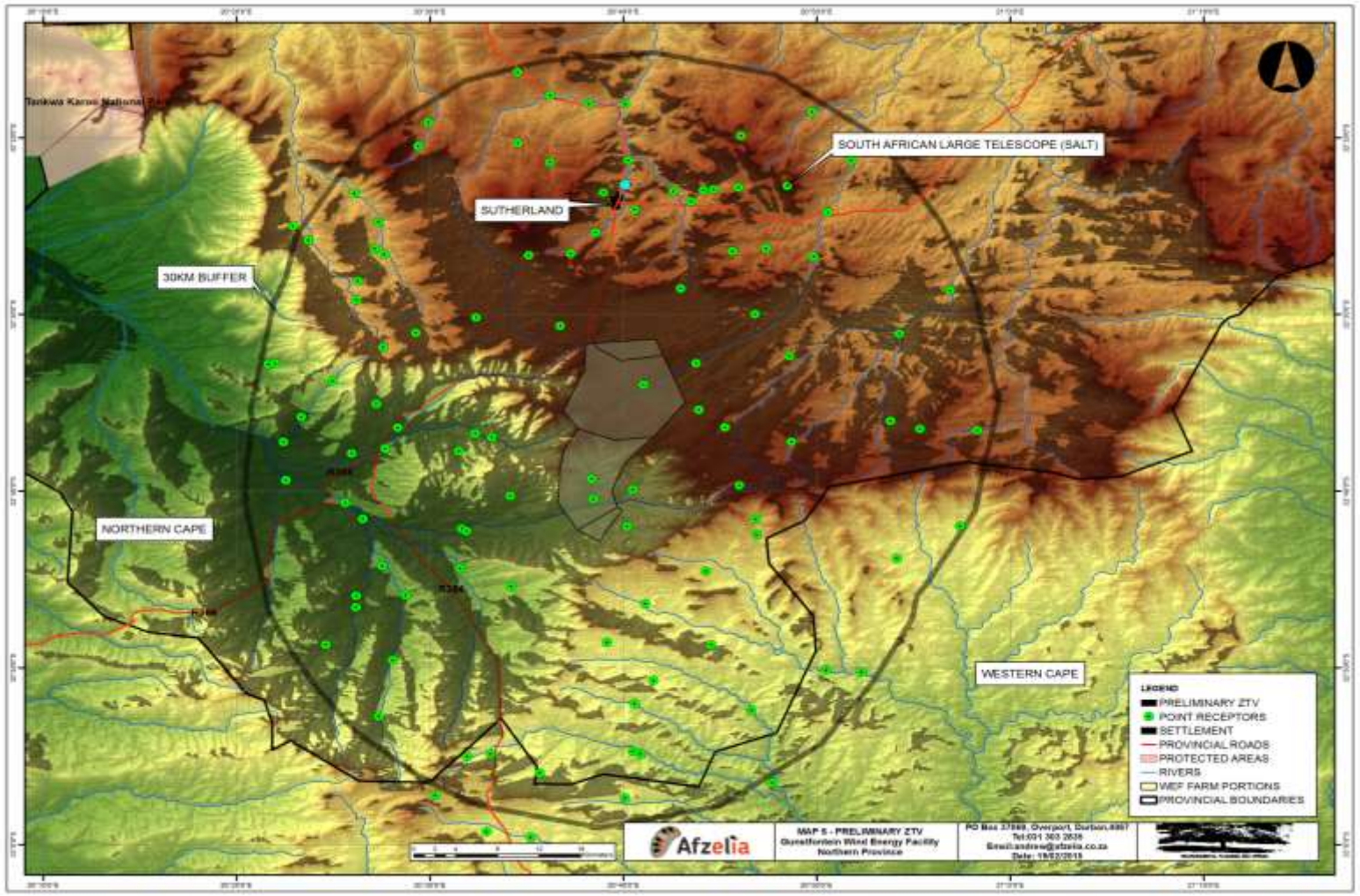

Figure 6.4: Preliminary assessment of likely visibility or Zone of Theoretical Visibility (ZTV) of the proposed development

Table 6.6: Potential visual impacts

Issue	Nature of Impact	Extent of Impact	'No go' areas
Construction Phase			
Potential visual impacts associated with the construction phase	Impacts on sensitive visual receptors	Local and regional	None identified
Secondary visual impacts	Construction of new access roads within areas with steep slopes and elevated topography.	Local and regional	None identified
Operational Phase			
Visibility to observers and residences	The visibility of the facility to, and potential visual impact on, observers travelling along the R354 and arterial roads and the major local roads traversing near the proposed facility.	Local and regional	None identified
Impact on scenic resources	The visibility of the facility to, and potential visual impact on observers residing at homesteads (farm residences) located within close proximity of the site. The potential visual impact on the scenic resources, landscape and topography of the region brought about by the construction of wind turbines within sensitive topographic units (i.e. hills, mountains and steep slopes).	Local and regional	None identified

Gaps in knowledge and recommendations for further study:

The severity of the visual impact and the extent of visual exposure were not determined during Scoping. From the review of the proposed project, it is proposed that the following issues should be addressed during the assessment:

- The visibility of the facility to, and potential visual impact on farmsteads that have been identified as potentially being impacted.
- The visibility of the facility to, and potential visual impact on the South African Large Telescope.
- The visibility of the facility to, and potential visual impact on sections of the R354, R356 AND R365 that have been identified as potentially being impacted.
- The visibility of the facility to, and potential visual impact the western section of the town of Sutherland that has been identified as potentially being impacted.

- » The impact of shadow flicker on farmsteads within and close to the proposed wind farm.
- » Visual impacts associated with construction of the proposed wind farm.
- » The possible impact of lighting associated with security and / or aviation warning lights.

These issues will be considered in the context of the Landscape Character Areas, visual effects identified and possible cumulative influence of other alternative energy projects that are planned in the vicinity. Possible mitigation measures will also be identified.

6.1.7 Potential Impacts on SALT

Interactions with the South African Astronomical Observatory (SAAO) in connection with the possible impacts of the Gunstfontein Wind Energy Facility on the South African Large Telescope (SALT) have been ongoing since September 2013, mostly as a result of the earlier scoping report (DEA Ref 14/12/16/3/3/2/395).

These interactions yielded the following potential impacts as needing investigation:

- » The impact of facility lighting (e.g. aviation lights, security lights etc.) on the dark skies above SALT.
- » The impact of facility lighting (e.g. aviation lights, security lights etc.) directly visible along the line of sight from the Observatory on sensitive astronomical observations.
- » Induced atmospheric turbulence having measurable and negative impact on SALT.
- » Induced vibrations having measurable and negative impact on SALT or on the seismic sensor located at SALT in terms of South Africa being signatory to the Comprehensive (Nuclear) Test Ban Treaty.

Significant progress has been made in investigating each of the above and it is believed that only facility lighting remains an issue still needing conclusive resolution, with a likely solution now reached as result of interactions by SAAO with the Civil Aviation Authority (CAA).

Table 6.7: Potential SALT impacts

Issue	Nature of Impact	Extent of Impact	'No go' areas
Construction Phase			
Potential lighting impacts associated with the construction phase	Impacts on night sky / sensitive astronomical observations	Local	None identified
Operational Phase			
Potential lighting	Impacts on night sky / sensitive	Local	None

Issue	Nature of Impact	Extent of Impact	'No go' areas
impacts associated with the operations phase	astronomical observations		identified

Gaps in knowledge and recommendations for further study:

The Gunstfontein Wind Energy Facility is now proposed to be limited to 200MW (previous scoping report approved at 280MW) and it is expected that the previous demonstration of negligible impact on SALT with respect to induced atmospheric turbulence and vibration will only be improved by ~ 30% reduction in size. This will be confirmed with the SAAO as part of the EIA Phase. Hence the only issue needing definitive resolution during the EIA Phase is expected to be that relating to the impact of facility lighting on SALT.

6.1.8 Potential Noise Impacts

Besides existing roads, no other significant ambient soundscape contributors currently exist in the study area. The ambient sound levels would have a suburban character at dwellings close to the R356 public road, becoming more rural the further away from the roads the dwelling is. Seven (7) potential noise-sensitive developments were identified in the noise specialist scoping study, three (3) of which are located inside the study area boundary and four (4) of which are located outside of the site boundary.

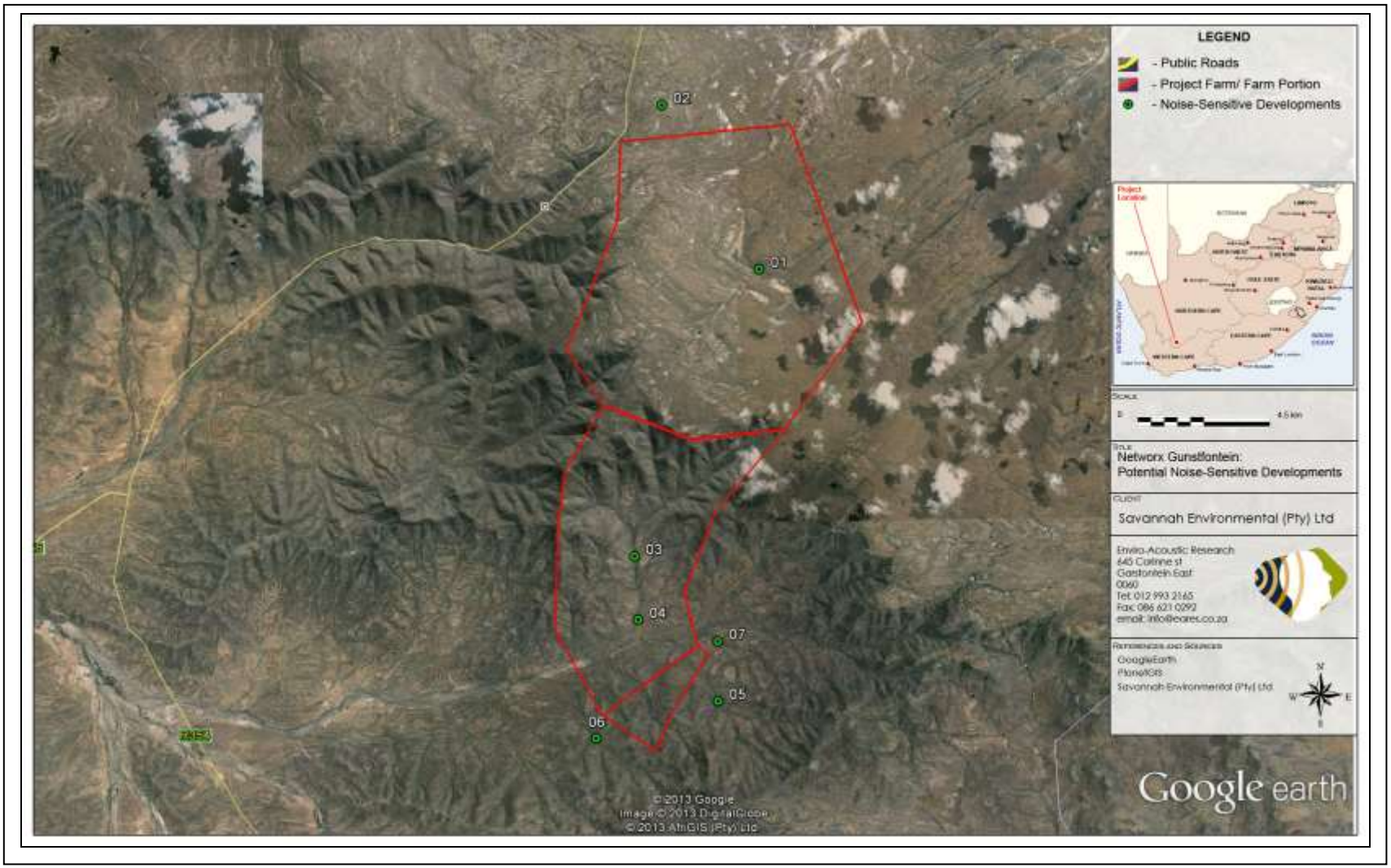

Figure 6.4: Location of potential noise sensitive developments

Table 6.8: Potential noise impacts

Issue	Nature of Impact	Extent of Impact	'No go' areas
Construction Phase			
Noise impact on identified noise sensitive developments (NSD)	Potential sources of noise from construction activities which could impact on the noise-sensitive developments include: » construction of access roads, » establishment of turbine tower foundations and electrical substation(s), » the possible establishment, operation and removal of concrete batching plants, » the construction of any buildings, » digging of trenches to accommodate underground power cables, » the erection of turbine towers and assembly of wind turbines, » Construction equipment e.g. excavator/grader, bulldozer, dump trucks, vibratory roller, bucket loader, rock breaker, (potentially) drill rig, flat bed trucks, concrete truck(s), cranes, fork lift and various 4WD and service vehicles, » Blasting (if required), and » Construction related traffic.	Local	None
Operational Phase			
Wind turbine noise: aerodynamic sources	» Potential sources of noise from operation activities which could impact on the noise-sensitive developments. » Interaction of the turbulent boundary layer with the blade trailing edge. » Noise due to inflow turbulence (turbulence in the wind interacting with the blades). » Discrete frequency noise due to trailing edge thickness. » Discrete frequency noise due to laminar boundary layer instabilities (unstable flow	Local	Noise sensitive developments indicated in Figure 5.4 are potential areas which should be avoided (suitable buffer zone (setback) to be determined).

Issue	Nature of Impact	Extent of Impact	'No go' areas
	close to the surface of the blade). » Noise generated by the rotor tips.		
Wind turbine noise: mechanical sources	Potential sources of noise include: » the gearbox and the tooth mesh frequencies of the step up stages; » generator noise caused by coil flexure of the generator windings which is associated with power regulation and control; » generator noise caused by cooling fans; » control equipment noise caused by hydraulic compressors for pitch regulation and yaw control.	Local	Noise sensitive developments indicated in Figure 5.4 are potential areas which should be avoided (suitable buffer zone (setback) to be determined).

Gaps in knowledge and recommendations for further study:

There is currently no information available regarding the existing soundscape of the area. Projected impacts from the Gunstfontein Wind Energy Facility can only be modelled once more information regarding the layout, duration of construction, operation and equipment used are known. It is recommended that the potential noise impact be investigated in more detail in the EIA Phase. The following will be conducted during the EIA Phase:

A site visit and the measurement of ambient sound levels;

» Data as received from the developer (layout and equipment to be used) will be used to model the potential noise impact;
» The potential impact will be evaluated (where possible) in terms of the nature (description of what causes the effect, what/who might be affected and how it/they might be affected) as well as the extent of the impact;
» The potential significance of the identified issues will be calculated based on the evaluation of the issues/impacts; and
» Propose potential mitigation measures (if required) and recommendations.

6.1.9 Potential Impacts on the Social Environment

The potential positive social impacts during the construction phase are largely linked to the creation of employment and skills development opportunities. The potential negative impacts are linked to the impact on local road surfaces associated with the transport of heavy components and the impact on local communities and current farming activities associated with the presence of

construction workers on the site. A number of key social issues are potentially associated with the construction and operation of the wind energy facility as detailed in the table below.

Table 6.9: Potential social impacts

Issue	Nature of Impact	Extent of Impact	'No go' areas
Construction phase			
Impact on rural sense of place	Impact on sense of place closely linked to the visual impacts from the wind and solar energy facilities	Local and regional	N/A
Impact on farming activities	» Safety and security impacts, stock losses, damage to farm infrastructure and damage to farm roads. » Potential impact on farming operations and loss of productive land (during the construction and operational phase).	Local and regional	None
Impact on existing infrastructure	Potential damage to roads by heavy equipment and increased traffic volumes (during the construction and operational phase)	Local and regional	N/A
Influx of job seekers into the area	» The influx of job seekers may result in an increase in sexually transmitted diseases, including HIV/AIDS; increase in prostitution; increase in alcohol and drug related incidents; increase in crime; and creation of tension and conflict in the community. » Potential threat to farm safety due to increased number of people in the area and construction workers.	Local and Regional	N/A
Creation of employment and business opportunities	Positive impact associated with indirect business opportunities created as a result of the proposed project.	Local and regional	N/A
Creation of potential training and skills development opportunities for local communities and businesses	Positive impact associated with potential for skills development and business opportunities.	Local and Regional	N/A
Potential up	Maximising opportunities to local and	Local, Regional and	N/A

Issue	Nature of Impact	Extent of Impact	'No go' areas
and down-stream economic opportunities for the local, regional and national economy	regional SMMEs and other businesses to provide a range of services, which may include, but not limited to, catering, laundry, transport (limited positive impact)	National	
Operational phase			
Impact on property prices	» Generation of additional land use income makes a positive contribution to farming cash flow, and thereby improves the financial sustainability of agricultural activity. » Decrease in value of property due to reduced grazing capability.	Local and regional	N/A
Impact on tourism	Positive or negative impact on tourism potential due to viewer perception of the wind energy facility.	Local and Regional	None
Creation of potential training and skills development opportunities	Positive impact associated with potential for skills development and business opportunities.	Local and Regional	N/A
Renewable energy	Provision of clean, renewable energy source for the national grid.	Local and Regional	N/A
Local content	Benefits associated with the establishment of a Community Trust / Local Community Company as a shareholder in the project.	Local and Regional	N/A

Gaps in knowledge and recommendations for further study:

With regard to local level policy documents, the Namakwa District Municipality and Laingsburg IDP make positive reference to the potentially viable development of renewable energy sources. In addition, economic diversification, employment creation and skilling are identified in both the Hoogland Karoo and Laingsburg IDPs as urgent, crucial needs. It is therefore reasonable to assume that the establishment of renewable energy projects in the area is supported; however, the extent and significance of the social impacts at a local level are not fully understood.

The following typical, generic project information is required to be considered in order to address the gaps in information at a local level:

» Comments received from I&APs during the public participation process, including comments reflected in the Final Scoping Report;
» A plan of the proposed layout of the facility (including an indication of the phasing sequence on the site), supporting structures and infrastructure;
» Duration of the construction phase (months);
» Number of people employed during the construction phase and during the operations phase;
» Breakdown of number of people employed in terms of skills categories (low skilled, semi-skilled and skilled);
» Estimate of the total wage bill for the construction phase and operations phase and breakdown in % as per skills categories;
» Estimate of total capital expenditure for the construction phase and ongoing expenditure during the operations phase;
» Indication of where construction workers and operations workers will be sourced from and where they will be housed;
» Opportunities for construction phase and operations phase on-site skills development and training;
» Description of the typical activities associated with the construction phase, specifically on-site construction activities. This includes a description of how the components associated with a wind energy facility will be transported to and assembled on site;
» The size of the vehicles needed to transport the components and the routes that will be used to transport the large components to the site, and an estimate of the number of vehicle trips required;
» Information on the nature of the agreements with the affected landowners and or communities, specifically with regard to compensation for damage to land, infrastructure etc.;
» Indication of the shareholding in the project to be held by a Community Trust / Local Community Company and the order of magnitude of the dividend flow to the local community therefrom; and
» Information on other socio-economic and enterprise development initiatives that are likely to provide benefit to the community during construction and during operations.

The identification and assessment of social impacts will be guided by the Guidelines for specialist SIA input into EIAs adopted by DEA&DP in the Western Cape in 2007. The Guidelines are based on accepted international best practice guidelines, including the Guidelines and Principles for Social Impact Assessment (Inter-organizational Committee on Guidelines and Principles for Social Impact Assessment, 1994). The approach will include:

» Review of existing project information, including the Planning and Scoping Documents;
» Collection and review of reports and baseline socio-economic data on the area (IDPs, Spatial Development Frameworks etc.);
» Site visit and interviews with key stakeholders in the area including local land owners and authorities, local community leaders and councillors, local resident associations and residents, local businesses, community workers etc.; and
» Identification and assessment of the key social issues and opportunities.

6.2. Cumulative impacts

Cumulative impacts, in relation to an activity, refer to the impact of an activity that in-itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area. For cumulative effects analysis to help the decision-maker and inform interested parties, it must be limited to effects that can be evaluated meaningfully (DEAT, 2004). Boundaries must be set so analysts are not attempted to measure effects on everything.

Cumulative effects are commonly understood as the impacts which combine from different projects and which result in significant change, which is larger than the sum of all the impacts (DEAT, 2004). The complicating factor is that the projects that need to be considered are from past, present and reasonably foreseeable future development. Cumulative effects can be characterised according to the pathway they follow. One pathway could be the persistent additions from one process. Another pathway could be the compounding effect from one or more processes. Cumulative effects can therefore occur when impacts are:

» additive (incremental);
» interactive;
» sequential; or
» synergistic.

Canter and Sadler (1997) describe a three step process for addressing cumulative effects in an EIA:

» delineating potential sources of cumulative change (i.e. GIS to map the relevant renewable energy facilities in close proximity to one another).
» identifying the pathways of possible change (direct impacts)
» indirect, non-linear or synergistic processes; and
» Classification of resultant cumulative changes

The proposed development site for the wind energy facility is proposed on Portion 1 and the Remainder of the Farm Gunstfontein 131, Farm Boschmans Hoek 177, and remainder of the farm Wolven Hoek 182. Table 6.10 and Figure 6.5 below shows

the known wind projects in the broader area (t 8 other facilities, 3 of which are preferred bidder projects).

Table 6.10: The other projects/ developments within 50km from the Gunstfontein Wind Energy Facility development site

Project Name	Approximate distance from the wind Facility development site	Project Status
Soetwater Wind Energy facility	Immediately to the south of the study area	Preferred Bidder Round 4
Karusa Wind Energy Facility	~10km south of the study area	Preferred Bidder Round 4
Suurplaat Wind Energy Facility	~35km	Received Authorisation
Mainstream Sutherland Wind Energy Facility	~4km	Received Authorisation
Roggeveld Wind Energy Facility	~20km southwest of the study area	Preferred Bidder Round 4
Roggeveld Wind Farm 3	~30km southwest of the study area	Proposed
Great Karoo Wind Farm	~23km south of the study area	Received Authorisation
Kareebosch Wind Farm (Proposed)	~12km South-west of the study area	Proposed

The cumulative impacts associated with the proposed Gunstfontein Wind Energy Facility and associated infrastructure primarily refers to those impacts associated with ecology, soil, avifauna, bats, noise, visual, SALT and social impacts, and are mainly associated with the proposed facility in the area. Potential cumulative impacts associated with numerous wind farm developments within the study area are expected to be associated with:

» *Ecology –the study area is dominated by natural* vegetation. The Gunstfontein site impacts a CBA area and there are a number of conservation areas in the vicinity. Although a wind farm generally results in permanent disturbance of less than 5% of a development site, any impacts on natural vegetation in this area are considered significant. Therefore, numerous developments (regardless of their nature) within the study area are expected to have an impact on vegetation at a regional level. It could be possible to avoid this impact through the careful placement of infrastructure outside of natural vegetation and sensitive habitats. However cumulative habitat loss and fragmentation in the area can be expected.
» *Avifauna*– The study area is known to support a number of threatened bird species, and could also associated with important bird flight paths. Therefore,

cumulative impact on birds as a result of the development of turbines and power lines within the study area could be significant and needs investigation.

» *Bats* – Approximately 9 bat species could occur in the Wind Energy Facility area. Of these 8 species are considered sensitive species, however only 2 are considered to have a high likelihood of occurrence in the area. Nevertheless the cumulative impact on bats as a result of the development of turbines within the study area could be significant and needs investigation.
» *Noise* – The development of numerous wind farms could result in noise pollution for people residing in the area although the spatial diversity is such that cumulative noise impacts are not expected, but must be tested.
» *Visual impacts* – The most significant impact associated with these projects and associated infrastructure is the visual impact on the scenic resources and cultural landscape of this region imposed. The development of numerous wind energy facilities could significantly alter the visual character of the area. These projects being grouped can also be argued as preferable so as to likely create a cohesive character in a specific area rather than a more spread-out and disjointed imposition on the general visual landscape.
» *SALT* - The most significant impact associated with these projects and associated infrastructure is the increased propensity for light pollution on the dark skies that currently benefit SALT. Current discussions with the Civil Aviation Authority (CAA) are likely to yield a satisfactory solution, however this still needs realisation.
» *Social* – The development of numerous wind farms within the study area will have a cumulative impact on several existing issues within the area, predominately associated with the potential influx of workers and job seekers, this exacerbated if the projects occur concurrently. With the increased population density, if so resultant, this may lead to a cumulative impact on housing requirements, services (i.e. water, electricity and sanitation), health issues, safety and security. With the existing rural settlements in the area this may have a cumulative impact on the environment and health (i.e. in terms of water supply and ablution facilities). The main social impact, however, will be in terms of visual impacts and associated impacts on sense of place.

Potential cumulative impacts associated with numerous wind farm developments within the study area are also positive and these too need to be considered, for instance:

» The development of renewable energy facilities will have a positive impact at a national and international level through the generation of "green energy" which would lessen South Africa's dependency on coal generated energy and the impact of such energy sources on the bio-physical environment.
» The proposed project would fit in with the government's aim to implement renewable energy projects as part of the country's energy generation mix over

the next 20 years as committed to by government and as detailed in the Integrated Resource Plan (IRP), *inter alia*.

» The development of renewable energy facilities will have a positive impact at a regional and local level through increased work and skills development opportunities and the associated reduced poverty levels.
» More projects within a single area will enhance the shareholding benefits that flow to the local community and will create cumulative positive impacts via the increased socio-economic and enterprise obligations that benefit the local community.
» Renewable energy, specifically wind energy, is the cheapest form of energy available to the country and hence the exploitation of high wind resource areas so as to reduce electricity tariffs is of direct benefit to the national economy and all South Africa's citizens.

Cumulative impacts will be fully assessed in the EIA phase.

Gaps in knowledge & recommendations for further study:

» Each specialist study will consider and assess the cumulative impacts of proposed, approved and authorised renewable projects in the area.

6.3. Further impacts as a result of I&AP comment

The only I&AP comment received that triggered the need to consider a possible impact not previously identified by the Draft Scoping Report is that made by Falcon Oil and Gas Ltd (Falcon).

Falcon is seeking an exploration licence for shale gas exploration ("fracking") on some 30,326.958 square kilometres in the Western Karoo, which area includes the properties comprising the proposed Gunstfontein Wind Farm.

Falcon has concerns that the proposed Gunstfontein Wind Farm will impact Falcon's seismic exploration program and their subsequent shale gas extraction operations. These issues will need investigation during the EIA phase.

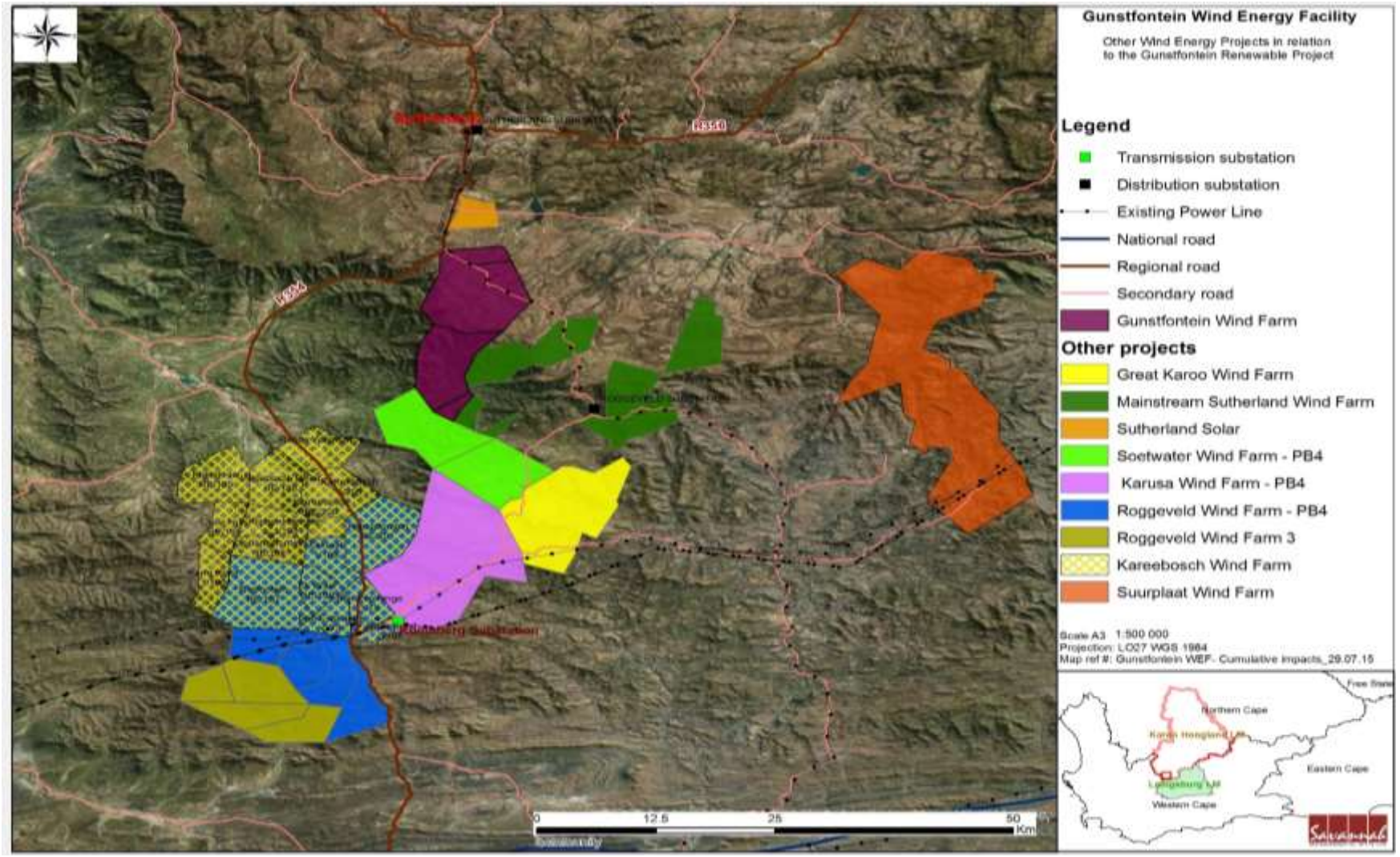

Figure 6.5: Wind and solar energy projects surrounding the Gunstfontein Wind Energy Facility (these projects areas were identified using the Department of Environmental Affairs Geographic Information System digital data developed by the CSIR. It must be noted that this secondary product has not yet been verified by DEA)

CONCLUSIONS CHAPTER 7

Gunstfontein Wind Farm (Pty) Ltd is proposing to develop a commercial wind energy facility and all associated infrastructure on a site located approximately 20km south of Sutherland in the Northern Cape Province. The proposed area for the development of the Gunstfontein Wind Energy Facility (~12 000 ha in extent) includes the following farm portions: Portion 1 and the Remainder of the farm Gunstfontein 131, Boschmans Hoek 177, and the Remainder of the farm Wolven Hoek 182. The project site falls within the Karoo Hoogland Local Municipality, under the jurisdiction of the Namakwa District Municipality. This facility is to be known as the Gunstfontein Wind Energy Facility.

A previous application by Networx Eolos Renewables (Pty) Ltd for establishment of the Gunsfontein Wind Energy Facility (with a total generating capacity of 280MW) was submitted in August 2013 (and allocated the following reference number: DEA Ref No.:14/12/16/3/3/2/395). A Scoping Report for the Gunstfontein Wind Energy Facility was submitted and subsequently accepted by the DEA in October 2014. Due to a change in the Applicant as well as the project scope, the application was withdrawn on 17 August 2015.

A new application has now been lodged with the DEA under the NEMA EIA Regulations, 2014 for the proposed Gunstfontein Wind Energy facility with a contacted capacity of up to 200MW which is some 30% reduced from the previous 280MW. The footprint would occupy up to only 5% of the approximately 12 000 ha site.

The Scoping Phase for the proposed Gunstfontein Wind Energy Facility has been undertaken in accordance with Section 24 (5) of the National Environmental Management Act (No 107 of 1998). In terms of the EIA Regulations (2014) of GN R982 as well as GN R983, GN R984 and GN R985, a Scoping and EIA Study are required to be undertaken for this proposed project.

This Scoping Report is aimed at detailing with the nature and extent of this facility, identifying and describing potential issues associated with the proposed project, and defining the extent of studies required within the EIA. This is achieved through an evaluation of the proposed project, considering existing information for the area, input from the project team with experience on similar projects, and a public consultation process with key stakeholders (including government authorities) and interested and affected parties (I&APs). In accordance with the requirements of the EIA Regulations, feasible project-specific alternatives (including the "do nothing" option) have been identified for consideration within the EIA process.

The conclusions and recommendations of this Scoping Report are the result of on-site inspections and desk-top evaluations of impacts identified by the project team. A summary of the conclusions of the evaluation of the potential impacts identified to be associated with the proposed project is provided below. Recommendations regarding investigations required

to be undertaken within the EIA are provided within the Plan of Study for EIA, contained within Chapter 8 of this report.

7.1. Conclusions drawn from the Evaluation of the Proposed Project

In identifying and evaluating impacts associated with the proposed wind farm and associated infrastructure, it has been assumed that although during operation, the area affected will comprise up to 100 turbines (could be as few as 50 turbines depending on which turbine type is ultimately selected by the developer), access roads and an onsite substation, during construction adjacent areas could suffer some level of disturbance. However, once construction is complete, only a small portion (up to 5%) of the approximately 12 000 ha of the proposed site will be permanently impacted by infrastructure associated with the wind energy facility. During the operational phase it is expected that the noise and visual impacts will extend beyond the site boundaries.

Currently most of the development constraints within the study area are associated with overall ecological sensitivity and the presence of sensitive bird and bat habitat. The location of the Southern African Large Telescope some 27km away also poses some extraneous constraints.

7.2. Summary of potential impacts and evaluation of the proposed project

Potential issues identified through this scoping study associated with the proposed wind energy facility (as identified in Chapter 6) are summarised in Tables 7.1 and 7.2 below.

Table 7.1 Potential impacts associated with the construction phase

Potential Positive Impacts	<u>Social Impacts</u> » Generation of additional land use income makes a positive contribution to farming cash flow, and thereby improves the financial sustainability of agricultural activity » Skills development » Poverty alleviation » Job and direct and indirect business opportunities » Improvement in opportunities for local and regional SMMEs » Electricity security, pollution and carbon reduction
Potential Negative Impacts	<u>Soil and agricultural impacts</u> » Physical soil disturbance, erosion and disruption to current agricultural or grazing practices due to construction activities <u>Ecological impacts</u> » Impacts on a Critical Biodiversity Areas, Ecological support areas and loss of landscape connectivity » Degradation of ecosystems » Direct impacts on fauna, their habitat and movement » Impact on listed plant species occurring within the study area. <u>Impact on birds</u>

	» Destruction of bird habitat and disturbance of birds » Displacement of birds from the site and barrier effects Impacts on bats » The destruction of habitats resulting in a reduced prey-base and/or the destruction of roost sites Heritage and palaeontology » Impacts on heritage resources (graves, ruins, kraals and Stone Age sites) » Impacts on paleontological resources (Abrahamskraal Formations are fossiliferous) Visual impacts » Visual impacts associated with the construction of the facility and associated infrastructure SALT Impacts » Impacts associated with construction stage facility lights Noise impacts » Noise impacts due to movement of construction machinery and vehicles, traffic and blasting (if required) Social impacts » Impacts on farming activities » Influx of job seekers and associated social issues » Loss of sense of place » Impacts on existing infrastructure (e.g. traffic) Falcon Impacts » Impact on the proposed seismic exploration

Table 7.2: Potential impacts associated with the operation phase

Potential Positive Impacts	Policy Alignment » Compliance with the Kyoto Protocol and other important government commitments » Project aligns with and reinforces government policy at the national, regional and local level Clean energy » Provision of a clean, renewable energy source for the national grid » Distributed power generation around the country » Pollution reduction Economy » Wind energy is currently the cheapest power available to the South African economy » Cheap power benefits all citizens Social Impacts » Generation of additional land use income makes a positive contribution to farming cash flow, and thereby improves the financial sustainability of agricultural activity. » Creation of opportunities to local business during the operational phase, including but not limited to, provision of maintenance, security, staff transport, and other services » Potential up and down-stream economic opportunities for the local, regional and national economy

	» Potential positive impacts on existing tourism potential due to visitors from other areas wanting to view the facility » Potential positive impacts on local farmers due to upgrade of roads and other infrastructure thereby improving efficiencies » Assistance towards provision of secure power supply in South Africa » Financial benefits to local community via Community Trust / Local Community Company ownership in the project and hence dividend entitlement » Socio-economic and enterprise development commitments as a percentage of turnover which gets ploughed back into the local community Falcon Impacts » Shard infrastructure, thereby reducing the environmental impact of fracking
Potential Negative Impacts	Soil and agricultural impacts » Soil erosion due to alteration of the land surface run-off characteristics Ecological impacts » Change in runoff and drainage patterns » Establishment of alien plant species » Loss of listed vegetation species Impacts on birds » Collision of birds and increased mortality due to collision with turbine blades Impacts on bats » Increased mortality of bats as a result of collision with turbine blades and barotrauma Heritage Impacts » Indirect impact on heritage sites and impact on cultural landscape and sense of place Visual impacts » Visual impact of wind turbines (due to scale) and associated infrastructure on observers from roads, built-up areas, homesteads and farmsteads » Visual impact on affecting perception of sensitive topographic features and sense of place SALT Impacts » Impacts associated with operation stage facility lights Noise impacts » Wind turbine noise: aerodynamic sources » Wind turbine noise: mechanical sources Social impacts » Potential localised negative impacts on farming activities and land use » Visual and sense of place impacts on existing receptors, including nearby rural and urban residences Falcon impacts » Potential compromises required to accommodate both wind farming and fracking

The majority of potential impacts identified to be associated with the construction of the wind energy facility and associated infrastructure are anticipated to be localised and restricted to the proposed site itself (apart from social impacts – job creation which could have more of a regional positive impact), while operational phase impacts range from local to regional and national (being the positive impact of contribution of clean energy as part of

the energy mix in South Africa). Furthermore the SALT impacts are anticipated to be capable of satisfactory mitigation.

Although no environmental fatal flaws were identified to be associated with the project at this stage in the process, areas of potential environmental sensitivity were identified through the scoping phase. The most prominent hydrological features within the study area, mainly located on top of the plateau, are a number of non-perennial pans and farm dams. The northern section of the development area falls within the broad ecological support area, designed to maintain the broad-scale connectivity of the landscape. A large portion of the central part of the site consists of Critical Biodiversity Areas selected on account of the steep slopes and kloofs present in the area which is deemed ecologically sensitive and of higher biodiversity value. The extent and sensitivity of these watercourses and ecology will be verified during the detailed EIA phase studies.

A sensitivity map for the proposed development site has been developed to illustrate the sensitivities identified during the scoping phase studies (refer to Figure 7.1). This sensitivity map is a rough scale estimate of sensitivity on the site identified at a desk-top level. These areas will be subject to survey and ground-truthing during the EIA phase of the project. These potentially sensitive areas will, therefore, be further investigated and assessed through detailed specialist studies (including field surveys) during the EIA phase of the process in order to identify and confirm exclusion or no-go areas (refer to Chapter 8 for more details). The map will be further refined in the EIA phase on the basis of these specialist studies, in order to inform the final design of the facility. In order to assess potential impacts within sensitive areas, the preliminary layout for the wind energy facility will be considered in the EIA phase.

Areas where High to Very-High sensitivity classes overlap (e.g. High Bird Sensitivity Areas overlapping with Very High Ecologically sensitive areas) in Figure 7.1 are those areas which could potentially pose the most significant constraints to the proposed siting of a wind energy facility.

In order to assess potential impacts within sensitive areas, a preliminary layout for the wind energy facility is required to be compiled by the applicant, and this will be informed by the results of the bird and bat monitoring already underway.

The potentially sensitive areas/environmental features that have been mapped in Figure 7.1 include:

- Areas of ecological sensitivity;
- Areas of avifaunal sensitivity;
- Potential noise sensitive developments; and
- Area of bat sensitivity.

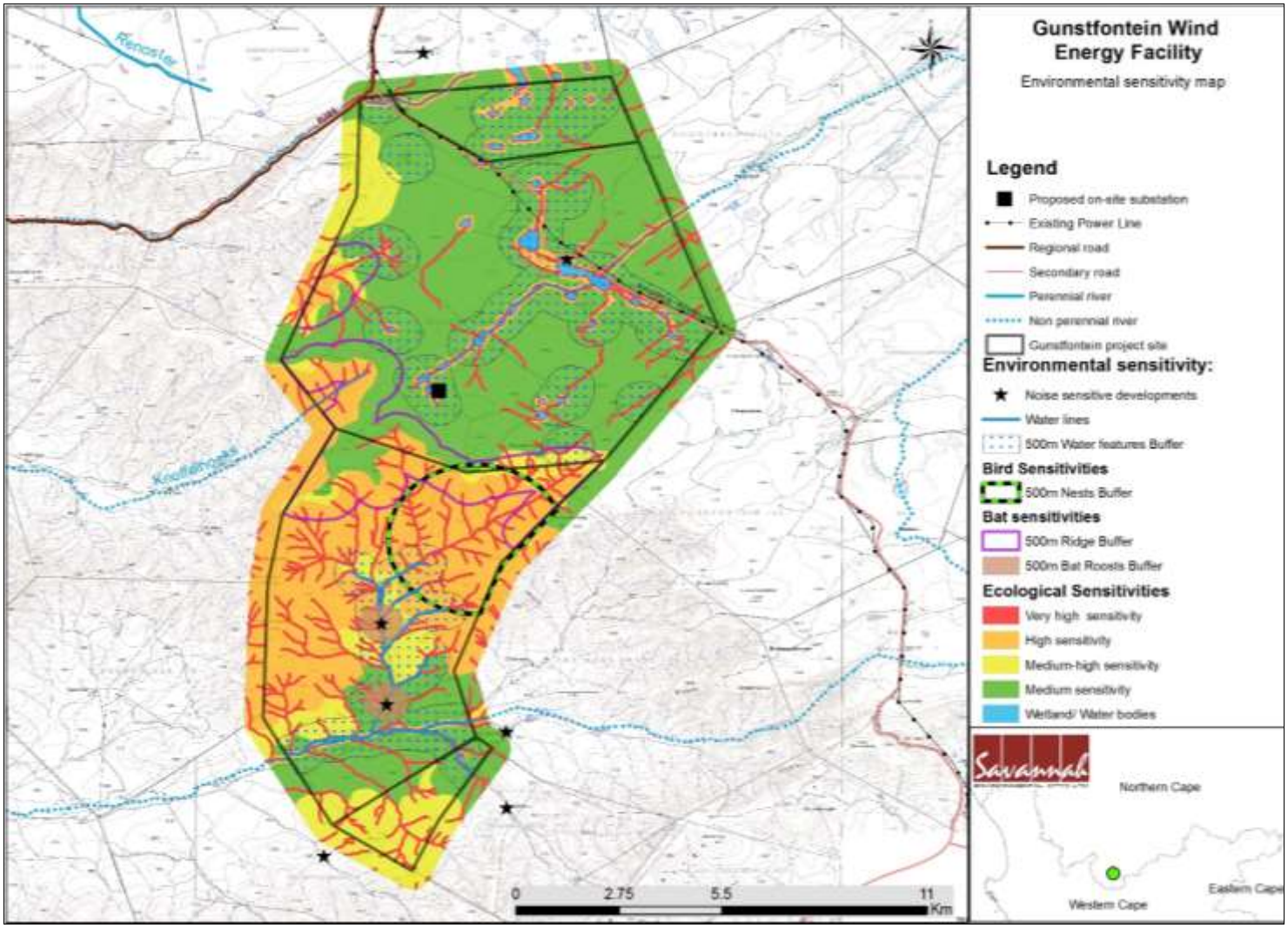

Figure 7.1: Preliminary sensitivity map of the Wind Energy Facility based on sensitivities identified at Scoping Phase.

The following is evident from the preliminary sensitivity map:

- » The major sensitive features in the northern section of the site are the pans and potential wetland features which are of high environmental sensitivity. The rest of the northern portion of the site is rated as medium environmental sensitivity.
- » The central part of the site (escarpment) is very rugged with a high risk of soil erosion if disturbed and likely contains plants of medium to high ecological sensitivity.
- » The low-lying southern part of the site contains some significant drainage lines which originate in the wetter northern parts of the site and are likely to be ecologically significant within the context of the surrounding arid landscape and are therefore deemed to be of high sensitivity.
- » The area to the north of the site is assigned a low to medium bird sensitivity except adjacent to water features and the escarpment where this is increased to medium to high, with the southern area of the site generally being of a medium bird sensitivity. Areas of potential bird sensitivity include the following buffers (which generally correlate with areas of likely medium to high ecological sensitivity):
    - (500m) (to be confirmed in the EIA phase) buffer around large pans and dams and water resources
    - (500m) (to be confirmed in the EIA phase) around both sides of the escarpment edge
    - (2000m) (to be confirmed in the EIA phase) around a potential eagle nest
- » A (500m) (to be confirmed in the EIA phase) buffer has been assigned to areas associated with bat feeding areas including natural vegetation patches, riparian vegetation and water-bodies (generally corresponds with areas of high ecological sensitivity) and local roosts.
- » The study area that is allocated a medium ecological sensitivity includes areas of natural or previously transformed land where the impacts are likely to be largely local and the risk of secondary impact such as erosion is expected to be low. Development within these areas (where they do not overlay with areas of high or medium to high bird sensitivity) can proceed with relatively little ecological impact provided that appropriate mitigation measures are in place.
- » Very little of the study area is allocated a low ecological sensitivity status.
- » Three identified noise sensitive developments (residential dwellings) are identified within the study area.

Cumulative effects: The proposed Gunstfontein wind energy facility is located in close proximity to authorised/proposed wind energy facilities located within the region. No operational wind energy facilities are located on the surrounding farms to the Gunstfontein Wind Energy Facility. Nonetheless, other projects have already been proposed or are already approved in the adjacent farm portions to the Gunstfontein proposed project and within the 20km vicinity: Soetwater Wind Farm (Preferred Bidder Round 4), Mainstream Sutherland Wind Farm (Proposed); Great Karoo Wind Farm (Proposed); Karusa Wind Farm (Preferred Bidder Round 4); Kareebosch Wind Farm

(Proposed); Roggeveld Wind Farm (Preferred Bidder Round 4); Roggeveld Wind Farm 3 (Proposed) and Suurplaat Wind Farm (Proposed).

Cumulative effects (positive and negative) of other wind projects within approximately 20km from the study area will be addressed during the EIA phase.

7.3. Conclusions

The findings of the Scoping Report were based primarily on a desktop assessment, and based on this assessment no fatal flaws associated with the proposed wind energy facility have been identified at this stage. Further investigation is required.

As indicated in this Scoping Report, the proposed area for the development of the Gunstfontein Wind Energy Facility (~12 000 ha in extent) includes the following farm portions: Portion 1 and the Remainder of the farm Gunstfontein 131, Boschmans Hoek 177, and the Remainder of the farm Wolven Hoek 182. However based on the Specialist findings and sensitivities identified during the scoping phase, it is recommended that limited wind farm infrastructure should be placed on the following farms:

- Boschmans Hoek 177; and
- The Remainder of the Farm Wolven Hoek 182.

As only the powerline linkages connecting the Gunstfontein Wind Farm to the Eskom grid need to be located on these farms, and as these powerlines will be assessed and authorized under a separate Basic Assessment Report, these farms will not be assessed further during the EIA Phase. It is recommended that the proposed site (which consists of Portion 1 and the Remainder of the farm Gunstfontein 131) should be considered further in an EIA phase assessment according to the Plan of Study contained in this report (refer to Chapter 8).

PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT CHAPTER 8

A detailed description of the nature and extent of the proposed Gunstfontein Wind Energy Facility and associated infrastructure, details regarding the Scoping process followed, as well as the issues identified and evaluated through the Scoping Phase have been included in this Scoping Report. This Chapter of the report provides the Plan of Study for Environmental Impact Assessment (EIA) for the wind energy facility and the associated infrastructure.

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

8.1. Aims of the EIA Phase

The EIA Phase will aim to achieve the following:

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

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

8.2. Authority Consultation

Consultation with the regulating authorities (i.e. DEA and Northern Cape DENC) will be under taken and will continue throughout the EIA process. On-going consultation will include the following:

» Submission of a Final Scoping Report following a 30-day public review period (and consideration of comments received).

» Submission of an EIA Report for a 30-day review period, as well as a final report including all comments received.
» Consultation and a site visit with DEA and DENC in order to discuss the findings and conclusions of the EIA Report.

8.3. Consideration of Alternatives

The following project alternatives will be investigated in the EIA:

» **The 'do nothing' alternative:** The applicant does not establish the proposed Gunstfontein Wind Energy Facility or associated infrastructure (maintain status quo).
» **Site-specific alternatives:** In terms of the position of the facility within the larger farms, and layout and/or design of the facility within the 12 000 ha development footprint, particularly the layout of the wind turbines and corridors for associated infrastructure such as the access roads.
» **Site alternatives:** The applicant has determined the quality of the wind resource over the farm portions included in this report. In addition, the siting of the facility was informed by an environmental screening study. The proposed site is considered to be feasible for the proposed development. No feasible site alternatives are currently proposed.
» **Alternative technologies:** Various wind turbine options will be evaluated during the project development process in order to maximise the production of electricity on the site while minimising the environmental impact. Such options will include considering smaller wind turbines (e.g. 100 number 2.0MW wind turbines) versus fewer larger wind turbines (e.g. 50 number 4.0MW wind turbines). The technology provider and turbine model will only be selected after this further evaluation and final interaction with wind turbine suppliers.

8.4. Assessment of Potential Impacts and Recommendations regarding Mitigation Measures

A summary of the issues which require further investigation within the EIA phase, as well as the proposed activities to be undertaken in order to assess the significance of these potential impacts is provided in Table 8.1. The specialists which have been involved in the Scoping Phase and are to be involved in the EIA Phase are also reflected in this table. These specialist studies will consider the study area proposed for the development of the project components and will assess all project components and feasible alternatives.

Table 9.1: Summary of the issues which require further investigation within the EIA phase and activities to be undertaken in order to assess the significance of these potential impacts relevant to the Gunstfontein Wind Energy Facility

Issue	Terms of Reference for EIA study: Activities to be undertaken in order to assess significance of impacts	Specialist
Soils, land use, land capability and agricultural potential	<u>The EIA Phase will include the following activities:</u> » A field investigation of the site surveying all different soils classes and land types. Through completing a comprehensive field investigation it is possible to obtain more information and ground truth all uncertainties. This can assist in describing the land type and soil properties as well as understanding the specific soil and agricultural conditions on site. Hand auger sampling will be undertaken, assisting in understanding the environment and specific soil conditions. » Identify and assess all potential impacts (direct, indirect and cumulative) and economic consequences of the proposed development on soils and agricultural potential. » Describe and map soil types (soil forms) and characteristics (soil depth, soil colour, limiting factors, and clay content of the top and sub soil layers). » Map soil survey points. » Describe the topography of the site. » Describe historical and current land use, agricultural infrastructure, as well as possible alternative land use options. » Describe the erosion, vegetation and degradation status of the land. » Determine and map, if there is variation, the agricultural potential across the site. » Provide recommended mitigation measures, monitoring requirements, and rehabilitation guidelines for all identified impacts. <u>Assessment of Impacts for the EIA:</u> This methodology assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive). The nature of the impact will be defined and described, and refers to the causes of the effect, what will be affected and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures.	Jaco Jansen (Savannah Environmental) and Jasper Dreyer (North West University)

Issue	Terms of Reference for EIA study: Activities to be undertaken in order to assess significance of impacts	Specialist
	Environmental Management Programme: For each overarching anticipated impact, management recommendations for the design, construction, and operational phase will be drafted.	
Ecology (flora and fauna)	The EIA Phase will include the following activities: Ecology: Flora and fauna » Ground-truth and refine the ecological sensitivity map of the site. Particular attention will be paid to the pans and possible associated wetlands within the northern high-lying parts of the site as well as the steep areas and other localised specialised habitats which are likely to occur across the site. » Characterise the vegetation and plant communities present at the site. The SA vegetation map only provides a coarse picture of the vegetation present and on-site surveys will be conducted to generate a species list for the site as well as identify and where necessary map different plant communities present at the site. This is likely to be particularly relevant in the central part of the site where the steep slopes are likely to generate a variety of different habitats with associated plant communities. » Identify and map the presence of any unique and special habitats at the site such as gravel patches, rock fields and other localised habitats. » Locate, identify and map the location of significant populations of species of conservation concern, so that the final development footprint can be adjusted so as to avoid and reduce the impact on such species. Some species of concern may be widespread and others localised and the distribution of such species will be established during the site visit. » Evaluate the likely presence of listed faunal species at the site such as the Riverine Rabbit, and identify associated habitats that should be avoided to prevent impact to such species. » Evaluate, based on the site attributes, what the most applicable mitigation measures to reduce the impact of the development on the site would be and if there are any areas where specific precautions or mitigation measures should be implemented. » Assess the impacts identified above in light of the site-specific findings and the final layout to be provided by the developer.	Simon Todd (Simon Todd Consulting) Gerhard Botha (Savannah Environmental)

Issue	Terms of Reference for EIA study: Activities to be undertaken in order to assess significance of impacts	Specialist
	Ecology: Pans and Wetland » Demarcate significant landscape features such as seasonal pans, wetlands and seeps; » Delineate pans and wetlands that occur within the boundaries of the wind energy facility and provide a sensitivity map; and » The delineation method documented by the Department of Water Affairs and Forestry (2005), will be followed throughout the field survey. <u>Assessment of Impacts for the EIA:</u> This methodology assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive). The nature of the impact will be defined and described, and refers to the causes of the effect, what will be affected and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures. <u>Environmental Management Programme:</u> For each overarching anticipated impact, management recommendations for the design, construction, and operational phase will be drafted.	
Avifauna	<u>The EIA Phase will include the following activities:</u> » A pre-construction bird monitoring programme in order to establish the baseline species utilising the wind energy facility site and surroundings. » Based on the findings of the pre-construction monitoring, the sensitivity zones and suitable buffer zones will be confirmed and mapped for the site. » The identified impacts and cumulative impacts will be assessed and final recommendations will be made regarding the significance of each identified impact as well as the layout to be provided by the developer. » Where necessary and possible, recommended mitigation measures for the management of the	Ricardo Ramalho (Bioinsight South Africa)

Issue	Terms of Reference for EIA study: Activities to be undertaken in order to assess significance of impacts	Specialist
	identified impacts will be developed and described. Pre-construction bird monitoring for the proposed wind energy facility will be required to be undertaken (refer to Section 8.6.1) over a 12 month period (4 different seasons, resulting in 8 surveys during a 12-month period),and the results integrated into the EIA Report <u>Assessment of Impacts for the EIA:</u> This methodology assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive). The nature of the impact will be defined and described, and refers to the causes of the effect, what will be affected and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures. <u>Environmental Management Programme:</u> For each overarching anticipated impact, management recommendations for the design, construction, and operational phase will be drafted.	
Bats	<u>The EIA Phase will include the following activities:</u> » The assessment of potential impacts and cumulative impacts resulting from the construction and operation of the Wind Energy Facility over the bat community within the study area. » A pre-construction monitoring programme in order to establish the baseline species utilising the wind energy facility site and surroundings, which must include passive bat detection which will be conducted at a minimum height of 7 meters at ground level and the requirement of the passive detection to sample preferably 100% of one year period, with 75% being acceptable. The main objectives of this monitoring are to: » characterise the bat community present within the wind farm site in order to establish a reference characterisation and enable to detect the potential changes in the bat community and the eventual exclusion/displacement effect in the following project phases (for example: avoidance of the wind	Ricardo Ramalho (Bioinsight South Africa)

Issue	Terms of Reference for EIA study: Activities to be undertaken in order to assess significance of impacts	Specialist
	facility area after construction); » document patterns of bats at the wind farm site and its immediate surroundings and establish a pre-impact baseline scenario of bat utilisation of the study area; » determine and monitor the utilisation of relevant bat roosts in the wind energy facility and immediate surroundings; » identify sensitive areas and to propose mitigation and/or management measures (for both construction and operation phases of the project); » based on the findings of the pre-construction monitoring, the sensitivity zones and suitable buffer zones will be confirmed and mapped for the site. » inform the final layout of the wind energy facility; and » establish the baseline scenario for the monitoring of the subsequent phases of the project. Pre-construction bat monitoring for the proposed wind energy facility will be required to be undertaken (refer to Section 8.6.2) over a 12 month period, and the results integrated into the EIA Report. <u>Assessment of Impacts for the EIA:</u> This methodology assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive). The nature of the impact will be defined and described, and refers to the causes of the effect, what will be affected and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures. <u>Environmental Management Programme:</u> For each overarching anticipated impact, management recommendations for the design, construction, and operational phase will be drafted.	
Noise Impacts	<u>The EIA Phase will include the following activities:</u>	Morné de Jager

Issue	Terms of Reference for EIA study: Activities to be undertaken in order to assess significance of impacts	Specialist
	» A site visit to obtain information regarding background noise levels, the prevailing meteorological conditions during this background noise level survey, as well as confirming and identifying Noise Sensitive Developments (NSDs). » Currently identified (potential) NSDs will be investigated during the EIA phase, and any additional NSDs will be identified. Their relative sensitivity to noise impacts will be determined. This will be based on the SANS 10103 guideline, as well as current land uses on the properties (residential vs business/industrial). » Using the data (proposed processes, noise characteristics of the selected equipment, locations of the WTG) as provided by the project developer, the predicted impact of the Wind Energy Facility on NSDs will be predicted using the CONCAWE method as recommended by SANS 10357:2004 for both the construction and operational phases, as well as the ISO 9613-2 model for the operational phase. » Using the calculated noise levels at the identified NSDs, the projected significance of the facility (whether construction or operational) will be determined using the criteria as proposed (subject to possible changes after any stakeholder input). Further recommendations on the most suitable buffer zone can be made after more information is available for the proposed facility. » The potential impact and cumulative impacts will be evaluated (where possible) in terms of the nature (description of what causes the effect, what/who might be affected and how it/they might be affected) as well as the extent of the impact. » The potential significance of the identified issues will be calculated based on the evaluation of the issues/impacts. <u>Assessment of Impacts for the EIA:</u> This methodology assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive). The nature of the impact will be defined and described, and refers to the causes of the effect, what will be affected and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures.	(Enviro Acoustic Research)

Issue	Terms of Reference for EIA study: Activities to be undertaken in order to assess significance of impacts	Specialist
	Environmental Management Programme: For each overarching anticipated impact, management recommendations for the design, construction, and operational phase will be drafted.	
Heritage Resources and Paleontological Resources	The EIA Phase will include the following activities: **Heritage Resources** » In order to comply with the National Heritage Resources Act (Act 25 of 1999) a Phase 1 Archaeological Impact Assessment must be undertaken. » During this study sites of archaeological, historical or places of cultural interest must be located, identified, recorded, photographed and described. » The levels of significance of the recorded heritage resources must be determined and mitigation proposed should any significant sites be impacted upon, ensuring that all the requirements of SAHRA are met. » Identification and assessment of all potential impacts (direct, indirect and cumulative) identified in this scoping phase report and; » Recommendations will be made for the management of identified impacts. **Paleontological Resources** » Illustrated, fully-referenced review of palaeontological heritage within study area based on desktop study and data (especially those studies undertaken for the adjacent properties with the same underlying geology). » Site visit to confirm the desktop study and to adjust it as may be required; » Identification and ranking of highlights and the potential of sensitivity to development of fossil heritage within study area (assessment of impact significance, including direct, indirect and cumulative impacts). » Confirmation from the specialist that the site is unfossiliferous. » Specific recommendations for any further palaeontological mitigation. Assessment of Impacts for the EIA: This methodology assists in the evaluation of the overall effect of a proposed activity on the	**Heritage** Jaco van der Walt (Heritage Contracts and Archaeological Consulting) **Palaeontology** John Almond

Issue	Terms of Reference for EIA study: Activities to be undertaken in order to assess significance of impacts	Specialist
	environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive). The nature of the impact will be defined and described, and refers to the causes of the effect, what will be affected and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures. <u>Environmental Management Programme:</u> For each overarching anticipated impact, management recommendations for the design, construction, and operational phase will be drafted.	
Visual	<u>The EIA Phase will include the following activities:</u> » Conduct site visit and confirm / add to the issues raised in scoping phase. » Description of the receiving environment and the proposed project. » Establishment of view catchment area, view corridors, viewpoints and receptors. » Indication of potential visual impacts using established criteria. » Inclusion of potential lighting impacts at night. » Description of alternatives, mitigation measures and monitoring programmes. » Complete 3D modelling and simulations, with and without mitigation. The following issues will be addressed during the assessment: » The visibility of the facility to, and potential visual impact on farmsteads that have been identified as potentially being impacted. » The visibility of the facility to, and potential visual impact on the South African Large Telescope. » The visibility of the facility to, and potential visual impact on sections of the R354, R356 AND R365 that have been identified as potentially being impacted. » The visibility of the facility to, and potential visual impact the western section of the town of Sutherland that has been identified as potentially being impacted.	Jon Marshall (Afzelia Environmental Consultants and Environmental Planning and Design)

Issue	Terms of Reference for EIA study: Activities to be undertaken in order to assess significance of impacts	Specialist
	» The impact of shadow flicker on farmsteads within and close to the proposed wind farm. » Visual impacts associated with construction of the proposed wind farm. » The possible impact of lighting associated with security and / or aviation warning lights (refer to section below with regards to SALT). » Layout adjustment to mitigate impacts. These issues will be considered in the context of the Landscape Character Areas, visual effects identified and possible cumulative influence of other alternative energy projects that are planned in the vicinity. Possible mitigation measures will also be identified. <u>Assessment of Impacts for the EIA:</u> This methodology assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive). The nature of the impact will be defined and described, and refers to the causes of the effect, what will be affected and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures. <u>Environmental Management Programme:</u> For each overarching anticipated impact, management recommendations for the design, construction, and operational phase will be drafted.	
SALT	<u>The EIA Phase will include the following activities:</u> » Meet with the South African Astronomical Society (SAAO). » Discuss previous studies with regards to induced atmospheric turbulence and vibration in the context of a 200MW facility (previously 280MW). » Meet with Civil Aviation Authority (CAA) to confirm agreement with regards to aviation lights. » Evaluate night sky impact and line of sight impact on sensitive astronomical observations	EAP (Savannah) plus Gunstfontein Wind Farm (Pty) Ltd, supported by third party specialists to the extent required.

Issue	Terms of Reference for EIA study: Activities to be undertaken in order to assess significance of impacts	Specialist
	The following issues will be addressed during the assessment: » Review previous studies with regards to induced atmospheric turbulence and vibration in the context of a 200MW facility (previously 280MW) to the extent required. » Night sky and line of sight impacts associated with construction of the proposed wind farm. » Night sky and line of sight impacts associated with operation of the proposed wind farm. These issues will be considered in the context of the Astronomy Geographical Advantage Act, night sky and line of sight visual effects identified and possible cumulative influence of other alternative energy projects that are planned in the vicinity. Possible mitigation measures will also be identified. <u>Assessment of Impacts for the EIA:</u> This methodology assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive). The nature of the impact will be defined and described, and refers to the causes of the effect, what will be affected and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures. <u>Environmental Management Programme:</u> For each overarching anticipated impact, management recommendations for the design, construction, and operational phase will be drafted.	
Social	<u>The EIA Phase will include the following activities:</u> » Review of existing project information, including the Planning and Scoping Documents. » Collection and review of reports and baseline socio-economic data on the area (IDPs, Spatial Development Frameworks etc.). » Site visit and interviews with key stakeholders in the area including local land owners and authorities, local community leaders and councillors, local resident associations and residents, local businesses, community workers etc.	Tony Barbour (Environmental Consultant and Researcher)

Issue	Terms of Reference for EIA study: Activities to be undertaken in order to assess significance of impacts	Specialist
	» Identification and assessment of the key social issues and opportunities. Preparation of Draft Social Impact Assessment (SIA) Report, including identification of mitigation/optimization and management measures to be implemented. <u>Assessment of Impacts for the EIA:</u> This methodology assists in the evaluation of the overall effect of a proposed activity on the environment. It includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive). The nature of the impact will be defined and described, and refers to the causes of the effect, what will be affected and how it will be affected. For each anticipated impact, recommendations will be made for desirable mitigation measures. <u>Environmental Management Programme:</u> For each overarching anticipated impact, management recommendations for the design, construction, and operational phase will be drafted.	
<u>Falcon</u>	<u>The work required here will be informed by interaction with Falcon which has yet to take place. To the extent required a specialist consultant will be appointed to interact with Falcon, to assess their concerns and to advise of mitigation requirements.</u>	<u>Golder Associates</u>

8.5. Methodology for the Assessment of Potential Impacts

Direct, indirect and cumulative impacts of the above issues, as well as all other issues identified will be assessed in terms of the following criteria:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional:
  - Local extending only as far as the development site area – assigned a score of 1;
  - Limited to the site and its immediate surroundings (up to 10 km) – assigned a score of 2;
  - Will have an impact on the region – assigned a score of 3;
  - Will have an impact on a national scale – assigned a score of 4; or
  - Will have an impact across international borders – assigned a score of 5.
- The **duration**, wherein it will be indicated whether:
  - The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  - Lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  - Medium-term (5–15 years) – assigned a score of 3;
  - Long term (> 15 years) - assigned a score of 4; or
  - Permanent - assigned a score of 5.
- The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
  - 0 is small and will have no effect on the environment;
  - 2 is minor and will not result in an impact on processes;
  - 4 is low and will cause a slight impact on processes;
  - 6 is moderate and will result in processes continuing but in a modified way;
  - 8 is high (processes are altered to the extent that they temporarily cease); and
  - 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale, and a score assigned:
  - Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
  - Assigned a score of 2 is improbable (some possibility, but low likelihood);
  - Assigned a score of 3 is probable (distinct possibility);
  - Assigned a score of 4 is highly probable (most likely); and
  - Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).
- The **significance**, which shall be determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.
- The **status**, which will be described as *either positive, negative or neutral*.

» The degree to which the impact can be *reversed*.
» The degree to which the impact may cause *irreplaceable loss of resources*.
» The degree to which the impact can be *mitigated.*

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

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

S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

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

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

As the applicant has the responsibility to avoid and/or minimise impacts as well as plan for their management (in terms of the EIA Regulations), the mitigation of significant impacts will be discussed. Assessment of mitigated impacts will demonstrate the effectiveness of the proposed mitigation measures.

The results of the specialist studies and other available information will be integrated and synthesised by the Savannah Environmental project team, the EIA Report will be compiled, and will include:

» **Detailed description** of the proposed activity
» A description of the property(ies) on which the activity is to be undertaken and the location of the activity on the property(ies)
» A description of the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects
» Details of the **public participation process** conducted, including:
  * steps undertaken in accordance with the plan of study for EIA;
  * a list of persons, organisations and organs of state that were registered as interested and affected parties;

    - a summary of comments received from, and a summary of issues raised by registered interested and affected parties, the date of receipt of these comments and the response to those comments; and
    - copies of any representations, objections and comments received from registered interested and affected parties
- A description of the **need and desirability** of the proposed project and identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity
- An indication of the methodology used in determining the **significance** of potential environmental impacts
- A description and comparative **assessment of all alternatives** identified during the environmental impact assessment process
- A summary of the findings and recommendations of **specialist reports**
- A description of all environmental issues that were identified during the environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures
- An assessment of each identified potentially significant impact
- A cumulative assessment considering other proposed projects which would result in cumulative impacts arising
- A description of any assumptions, uncertainties and gaps in knowledge
- An environmental **impact statement** which contains:
    - a summary of the key findings of the environmental impact assessment;
    - a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and
    - a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.
- A **concluding statement** indicating the preferred alternative development location within the approved site, as well as the preferred grid connection corridor.
- A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation
- An indication of any deviation from the approved scoping report, including the plan of study, including—
    - any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and
    - a motivation for the deviation
- A draft **environmental management programme** for the project
- Copies of specialist reports

The Draft EIA Report will be released for a 30-day public review period. The comments received from I&APs will be captured within a Comments and Response Report, which

will be included within the Final EIA Report, for submission to the authorities for decision-making.

8.6. Pre-construction monitoring for birds and bats

Pre-construction bird and bat monitoring data and reporting will be undertaken in accordance with the respective bird[5] and bat[6] monitoring guidelines[7] for wind farms in order to be presented to DEA for consideration to assist the decision making process. The monitoring programmes facilitate the collection of further baseline data than what is normally gathered during the course of an EIA phase study. The results will be analysed and interpreted in order to inform the decisions regarding the project feasibility, the final facility design, construction, and ultimately the management strategy of the development.

8.6.1. Birds

The primary objectives of pre-construction monitoring at the Gunstfontein site are:

» Characterising the avifauna community and its utilisation of the development site;
» Establishing the baseline scenario during the pre-construction phase - providing the information required to identify potential changes in the bird community occurring within the study area, as well as the eventual exclusion/displacement effect (avoidance of the wind facility area post-construction);
» Evaluating the potential changes that may arise in relation to how the target-species and overall bird community utilise the site;
» Documenting patterns of bird activity and movements within the site and its immediate surroundings, as well as to establish a pre-impact baseline scenario of bird utilisation in the study area;
» Estimating predicted collision risks for target-species; and
» Identifying sensitive areas and proposing mitigation measures.

The results of the pre-construction monitoring will be used for the final turbine layout and proposed mitigation measures/strategies for the subsequent phases of the project (construction and operation).

In order to meet these objectives, the following tasks will be implemented throughout the monitoring:

[5] BirdLife South Africa / Endangered Wildlife Trust best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in southern Africa, 2012.
[6] Endangered wildlife Trust "South African Good Practice Guidelines for Surveying Bats in Wind Farm Developments – 3rd Edition" (Sowler & Stoffberg, 2014).
[7] Pre-construction monitoting will be covering at least four seasons before construction.

- **Linear walking transects** to characterise the bird community (paying special attention to small terrestrial and target species) occurring within the area of the wind energy facility. All bird species seen or heard will be recorded;
- **Vantage points and Vehicle based transects** to determine and monitor the usage of the area by target species as well as those which are sensitive to the impacts derived from wind energy facilities (with special emphasis on raptors and other large birds) within and in close proximity to the wind farm. This aims to determine bird activity patterns and movements within the site and its immediate surroundings;
- **Priority species nest search and monitoring** to identify and monitor active nesting sites of target-species within the study area and its immediate surroundings (continuous efforts will be directed to identify relevant water bodies throughout the year, and relevant nesting locations will be monitored at least twice a year);
- **Water body search and monitoring** to evaluate the species present, as well as their primary movements at main water bodies (continuous efforts will be directed to identify relevant water bodies throughout the year. Relevant water bodies will be monitored at least twice a year); and
- **Incidental observations** to register all important observations located in the vicinity of the site.

All of the methodologies will be implemented within the wind energy facility and its immediate surroundings, as well as a relatively similar control site[8].

8.6.2 Bats

The primary objective of pre-construction monitoring at the Gunstfontein site are:

- To characterise the bat community present within the wind farm site in order to establish a reference characterisation and enable to detect the potential changes in the bat community and the eventual exclusion/displacement effect in the following project phases (for example: avoidance of the wind facility area after construction);
- To document patterns of bats at the wind farm site and its immediate surroundings and establish a pre-impact baseline scenario of bat utilisation of the study area;
- To determine and monitor the utilisation of relevant bat roosts in the wind energy facility development area and immediate surroundings;
- To identify sensitive areas and to propose mitigation and/or management measures (for both construction and operation phases of the project);
- To inform the final layout of the wind energy facility; and
- To establish the baseline scenario for the monitoring of the subsequent phases of the project.

In order to meet these objectives the following tasks will be implemented throughout the monitoring, covering at least four annual seasons before construction:

[8] A complex analysis of the vantage point data in relation to the distance from the wind turbines, will allow for the implementation of a BACI analysis in the subsequent phases of the project, without conducting vantage points in a control area during the pre-construction monitoring phase.

- **Bat roosts searches, inspection and monitoring** within and in the vicinity of the wind energy facility;
- **Active detection** of ultra-sounds within the wind energy facility and at control area; and
- **Passive detection** of ultra-sounds within the wind energy facility and at a control area.

8.7. Public Participation Process

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

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

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

The EIA report will be made available for public review for a 30-day period prior to finalisation and submission to the DEA for review and decision-making. In order to provide an overview of the findings of the EIA process and facilitate comments, meetings suitable to accommodating the needs of the I&APs and stakeholders as described above will be held during this public review period.

8.8. Key Milestones of the programme for the EIA

The envisaged key milestones of the programme for the EIA phase of the project are outlined in Table 8.2.

Table 8.2: Envisaged key milestones of the programme for the EIA phase of the project

Key Milestone Activities	Proposed timeframe
Make Scoping Report available to the public, stakeholders and authorities	3 September 2015 to 5 October 2015
Finalisation of Scoping Report, and submission of the Final Scoping Report to DEA	October 2015
Authority acceptance of the Final Scoping Report and Plan of Study to undertake the EIA	Within 43 days of receipt of the Final Scoping Report
Undertake specialist studies and public participation process	August 2015 to October 2015
Make EIA Report and Draft EMPr available to the public, stakeholders and authorities	November 2015- January 2016
Finalisation of EIA Report, and submission of the Final EIA Report to DEA	February 2016
Authority review period and decision-making	February 2016 – May 2016

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