DRAFT SCOPING REPORT FOR THE PROPOSED PHEZUKOMOYA 315 MW WIND ENERGY FACILITY, NOTHERN AND EASTERN CAPE PROVINCES

On behalf of

PHEZUKOMOYA WIND POWER (PTY) LTD

June 2017

Prepared By:

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EXECUTIVE SUMMARY

INTRODUCTION

Phezukomoya Wind Power (Pty) Ltd are applying for environmental authorisation to construct the Phezukomoya 315 MW Wind Energy Facility (WEF) and its associated infrastructure, including a 132 kV grid connection (the proposed Phezukomoya WEF). Arcus Consultancy Services South Africa (Pty) Ltd has been appointed by Phezukomoya Wind Power (Pty) Ltd to conduct the Environmental Impact Assessment (EIA) process as required by the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), as amended.

The proposed Phezukomoya WEF aims to generate and distribute electricity from renewable wind energy sources into the national grid by connecting the on-site switching station with 132 kV powerlines to the proposed 132/400 kV Umsobomvu Substation to be located approximately 15 km west from the on-site switching station.

In accordance with the Department of Energy's Renewable Energy Independent Power Producer Procurement Program's (REIPPPP) bid requirements, InnoWind established Phezukomoya Wind Power (Pty) Ltd as a Special Purpose Vehicle (SPV) that will be used to own all the authorisations, contracts, permits and licenses required to lawfully build and operate the proposed Phezukomoya WEF. The project will apply for an operational lifespan of 20 years through the REIPPPP.

InnoWind is a South African based integrated renewable energy company that develops, finances, builds, owns and operates commercial wind-powered generation facilities to supply energy into the national power grid. InnoWind's technical expertise in project management and operations emanates from its French-based parent company, EDF Energies Nouvelles, a global leader in renewable energy operations with an asset base of approximately 10 GW across 18 countries worldwide.

Arcus Consultancy Services South Africa (Pty) Ltd is a specialist environmental consultancy providing environmental services to the renewable energy market. Arcus has advised on over 150 renewable energy projects in the United Kingdom and South Africa with environmental management and in-house specialist services.

SITE LOCATION AND PROPOSED DEVELOPMENT DESCRIPTION

The proposed development site is located approximately eight kilometres south east of the town of Noupoort in the Northern Cape Province, bordering the Eastern Cape Province. The proposed development site falls within the Umsobomvu Local Municipality, in the Pixley ka Seme District Municipality in the Northern Cape, as well as in the Inxuba Yethemba Local Municipality and Chris Hani District Municipality in the Eastern Cape. The towns of Middelburg and Colesburg are located approximately 28 km and 59 km to the south and north east of the site respectively.

The proposed Phezukomoya WEF will comprise of up to 63 wind turbine generators (WTG), each with a hub height of 150 m, blade length of up to 75 m and a rotor diameter of 150 m. An onsite switching station will be constructed as part of the proposed Phezukomoya WEF, which will transfer the electricity generated by the WEF to the proposed Umsobomvu 132/400 kV substation, to be located approximately 15 km away from the on-site switching station, which will be connected via 132 kV double or single string transmission lines.

The grid connection alternatives run in a south-westerly direction from the development site on the plateau, down the escarpment through plains with the last section crossing areas consisting of steep slopes, mountain ridges and koppies. On the plains below the escarpment, the vegetation type is classified as Eastern Upper Karoo. On the steep slopes, mountain ridges and koppies, Besemkaree Koppies Shrubland is found.

This Draft Scoping Report aims to present and assess the initial proposed wind turbine layout and associated infrastructures. While a preliminary turbine layout has been provided, the precise location of each wind turbine, and the routing of the overhead power lines have not as yet been finalised and will be determined by the findings of the various specialists during the EIA Phase as well as other technical and financial constraints for this proposed site.

ENVIRONMENTAL LEGISLATIVE REQUIREMENTS

The EIA Regulations 2014 published in Government Notice (GN) No. R982, provide for the control of certain Listed Activities. These activities are listed in GN No. R.983 (Listing Notice 1 – Basic Assessment), R.984 (Listing Notice 2 – Scoping & EIA Process) and R.985 (Listing Notice 3 – Basic Assessment) of 4 December, and are prohibited to proceed until environmental authorisation has been obtained from the competent authority, in this case, the Department of Environmental Affairs (DEA).

On 7 April 2017 in Government Gazette 40772 the Minister of Environmental Affairs published amendments to the Environmental Impact Assessment (EIA) Regulations of 2014 (in Notice Number 326), Listing Notice 1 (in Notice Number 327), Listing Notice 2 (in Notice Number 325) and Listing Notice 3 (in Notice Number 324). The table below indicates, the listing notices, as amended in 2017.

Listed Activities applicable to this proposed project are presented in the table below. All potential impacts associated with these Listed Activities will be considered and assessed in this EIA.

As this proposed Phezukomoya WEF development triggers Listed Activities in Listing Notices 1 – 3, a full Scoping and EIA process will be followed for this application.

Applicable Listed Activities in terms of the NEMA

LISTING NOTICE	ACTIVITIES
LN 1 GN R327[1]	11(i); 12 (iii, x, xii); 19 (i); 24 (ii); 27; 48 (iii); 56 (i, ii).
LN 2 GN R325[2]	1; 6; 9; 15.
LN 3 GN R324[3]	4 (a)(ii) & (b)(ii); 10(a)(ii) & (b)(ii); 12(a)(ii) & (d)(ii); 14 (a)(ii) & (c)(ii); 18 (a)(ii) & (b)(ii); 23(a)(ii) & (b)(ii).

Depending on the final design of the Phezukomoya WEF, there may be a requirement for the following additional permits/ authorisations:

- Waste Management License/s as required by the NEMA, Waste Act, 2008 (Act No. 59 of 2008);
- Mining Permits as required by the Minerals and Petroleum Resources Development Act, 2002 (MPRDA) (Act No. 28 of 2002)(MPRDA); and
- Water Use Licenses as required by the National Water Act, 1998 (Act No. 36 of 1998) (NWA).

These permits will be applied for should the project be authorised and be selected as a preferred bidder.

[1] "Listing Notice 1 of the EIA Regulations, promulgated under Government Notice R983 of 4 December 2014, as amended by Government Notice R327 of 7 April 2017."

[2] "Listing Notice 2 of the EIA Regulations, promulgated under Government Notice R984 of 4 December 2014, as amended by Government Notice R325 of 7 April 2017."

[3] "Listing Notice 3 of the EIA Regulations, promulgated under Government Notice R985 of 4 December 2014, as amended by Government Notice R324 of 7 April 2017."

AREAS OF INITIAL INVESTIGATION

A number of initial specialist investigations have been completed for this Draft Scoping Report and their findings are included in Sections 7 - 15 of this document.

Should further fields of study be identified as requiring further investigation during the Scoping Phase, usually through the public participation process, these will be considered for inclusion into the scope of the EIA.

Each of the specialist assessments (geology, soils and agriculture, flora and fauna, avifauna, bats, freshwater and wetlands, noise, landscape and visual, cultural heritage, archaeology and palaeontology, socio-economics) will follow a systematic approach to the identification and assessment of impacts, with the principal steps being:

- Description of existing environment/baseline conditions;
- Prediction of likely potential impacts, including cumulative impacts (both positive and negative);
- Assessment of likely potential impacts (positive and negative);
- Identification of appropriate mitigation measures; and
- Assessment of residual (potential) environmental impacts.

The individual baseline descriptions and assessment methodologies are set out in Sections 7 – 15 of this report. The approaches are in line with legal requirements and industry guidelines and will make use of the considerable experience and expertise of the EAP and the specialists.

PLANNING CONTEXT

Spatial framework and strategic planning/policy documents that are the most relevant to this proposal on a national, provincial, metropolitan and local level were reviewed as part of this study. The following planning policies are discussed in Section 15.3 of the Draft Scoping Report (DSR) (this report – Volume 1) and in further detail in the Social Impact Assessment, which is included in Volume 2.

It is established that policy supports the development of renewable energy at all levels of governance. The intent of local, provincial and national policies aim to address energy supply issues, and aim to promote economic growth in South Africa.

The following national level legislation, policy and planning documents were assessed, namely:

National

- National Energy Act, 2008 (Act No. 34 of 2008);
- White Paper on the Energy Policy of the Republic of South Africa (December 1998);
- White Paper on Renewable Energy (November 2003);
- Integrated Resource Plan (IRP) for South Africa (2010-2030);
- The National Development Plan (2011);
- New Growth Path Framework (2010);
- National Infrastructure Plan (2012);
- Astronomy Geographic Advantage (AGA) Act, 2007 (Act 21 of 2007); and
- Northern Cape Spatial Development Framework.

Provincial

- Northern Cape Provincial Growth and Development Strategy (2004-2014);
- Northern Cape Climate Change Response Strategy; and
- Northern Cape Spatial Development Framework.

District and Local

- Pixley ka Seme District Municipality Integrated Development Plan (2014/15);

- Umsobomvu Municipality Integrated Development Plan (2014/15); and
- Inxuba Yethemba Local Municipality IDP (2014/15).

NEED AND DESIRABILITY

Although the proposed development is located in the Northern and Eastern Cape Provinces, the Western Cape Department of Environmental Affairs and Development Planning's 2010 Guideline on Need and Desirability is relevant. This document states that while the "*concept of need and desirability relates to the type of development being proposed, essentially, the concept of need and desirability can be explained in terms of the general meaning of its two components in which need refers to time and desirability to place – i.e. is this the right time and is it the right place for locating the type of land-use/activity being proposed? Need and desirability can be equated to wise use of land – i.e. the question of what is the most sustainable use of land.*"

Section 4 of this report describes need and desirability for this development in detail, and provides an explanation as to why wind energy can be considered as an alternative to meeting the need for increased electricity demand over other sources of generation such as fossil fuels. Summarily, these reasons include:

- Positive impact on climate change;
- Overcoming the country's energy constraints;
- Diversification and decentralisation of supply;
- Reduced costs of energy; and
- Positive economic development including job creation.

With regards to this proposal, the wind resource in this area is competitive by national and international comparison. Average wind speeds across the site are above viable levels with a relatively unidirectional wind rose. The fairly unidirectional wind allows for the placement of turbines in close proximity to each other with a reduced internal wake effect. This further supports productivity and efficiency.

ALTERNATIVES

Alternatives are different means of meeting the general purpose and need of a proposed development and may include alternative sites, alternative layouts or designs, alternative technologies and the "no development" or "no go" alternative.

This report (Section 6) provides an outline of the site selection process that was undertaken in relation to the proposed Phezukomoya WEF. Analysis of preliminarily site considerations were investigated to evaluate the project site location. These factors included:

- Grid connection options and capacity availability on the existing national grid;
- The feasibility of site access;
- Technical construction issues such as geological conditions and topography; and
- Preliminary high level environmental considerations.

The proposed Phezukomoya WEF is the preferred site, based on the anticipated wind resource (high wind speeds), proximity to existing grid infrastructure, land availability, minimum technical constraints from a construction perspective and the absence of high level environmental issues at the monitoring and pre-feasibility stage. These will be further investigated during the EIA process.

A number of alternatives for the grid connection were investigated, including alternative voltages for the connection. Two alternative routes for the connection of the WEF to the proposed Umsobomvu Substation will be assessed during this EIA process.

Consideration will also be given to the design and layout of the WEF within the site boundaries. It is important that wind turbines are sited in the optimum position to maximise the wind energy yield whilst minimising environmental impacts. Various wind turbine

designs and layouts will be considered for the site in order to maximise the electricity generation capacity and efficiency as well as limit the impact on the environment.

An additional alternative that will be considered is the "No Development Scenario" or "No-Go Option", which assumes that the proposed development does not proceed. It is equivalent to the future baseline scenario in the absence of the proposed development, and this situation is also assessed.

ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The EIA process is a decision-making tool with the specific aim of selecting an option that will provide an appropriate balance between the benefits of a proposed development and adverse impacts. The EIA process should identify activities which may have a detrimental effect on the environment, and proposed mitigation measures to minimise or eliminate these potential impacts. Should this balance be achieved the competent authority will issue an environmental authorisation, with conditions, for the development to proceed.

Scoping Phase

The first phase of the EIA process is Scoping. The purpose of the scoping phase is to, through consultation with Interested and Affected Parties (I&APs), determine the extent of the impact assessment, including the potential impacts and issues that must be assessed during the EIA phase. The scoping phase also assesses each alternative (design, technology, location, etc.) of the development, against these potential impacts, to determine the best environmental option for the site to be further assessed during the EIA phase. The scoping phase also determines the methodology and terms of reference for specialist's studies to be undertaken for the proposed development.

This Draft Scoping Report (DSR) describes the proposed development and includes an assessment of its alternatives. The report documents legal, planning and policy context for the proposed development as a renewable energy development. The baseline environment is described, potential impacts are predicted (and initially assessed). It documents the Scoping Phase PPP, noting key stakeholders and it describes the EIA Phase assessment methodologies in the Plan of Study for EIA (PSEIA).

Environmental surveys have been initiated and where possible, this survey information is included in the DSR. The DSR will be made available for public comment for the prescribed statutory consultation period of 30 days. All comments received in response to the DSR will be incorporated into a Final Scoping Report (FSR) and PSEIA, which will then submitted to the DEA, as the competent authority for approval to mark the end of the Scoping phase. Interested and Affected Parties (I&APs) will be able to comment on the FSR and PSEIA by submitting their comments directly to the DEA.

EIA Phase

Once the FSR is accepted by the DEA, the EAP will compile the Draft EIA Report (DEIAR) and Environmental Management Programme (EMPr) which will be made available for public comment for a further period of 30 days. All comments will be considered and incorporated into the Final EIA Report (FEIAR). I&APs will then be notified of the availability of the FEIAR and advised that comments are to be submitted directly to the DEA.

The reports will document the assessment of all potential impacts of the proposed development on the existing baseline environment. This will include an assessment of cumulative impacts between the proposed development, and other developments in the area.

Once the FEIAR has been submitted to the DEA, the DEA will then issue a decision on whether to grant or refuse Environmental Authorisation.

SUMMARY OF FINDINGS

The Draft Scoping Report has captured the key and/or scoped issues and impacts for this proposed development by taking into account the findings of the public participation process as well as the specialist's reports.

The specialist reports document anticipated environmental impacts that may be experienced within the realms of both the biophysical and social environments. The impacts of an initial proposed turbine layout have been preliminarily assessed. All specialist reports are included in Volume 2 of this report.

The Soils and Agricultural Study noted that the prevailing potential of the soils on the sites for rain-fed cultivation throughout most of the area is low to very low. It is thus unlikely that any further, more detailed investigation will be required.

All the remaining specialists, however, are to conduct site visits where necessary, and investigate and assess the proposed development in more detail during the EIA Phase. Identified no-go areas and areas unsuitable for turbine placement were supplied to the applicant, and a revised layout is being produced which will be assessed in the EIA Phase. A Plan of Study for the EIA Phase is included in Section 18 of this document.

The following initial observations can be made from the findings of the initial specialists' investigations and preliminary assessments:

- At this preliminary Scoping level stage of the process, the majority of potential impacts seem to be mitigatable from High or Medium significance to a Low or lower significance.
- No potential impacts remain at high negative post mitigation.
- The SIA has found that the establishment of WEFs in this area is supported by national, provincial and local policies and planning documents.

During this Scoping Phase the specialist's assessments have identified areas of further investigation and the project can proceed into the EIA phase. All identified potential impacts are to be investigated and assessed in further detail during the EIA Phase, together with any additional impacts or concerns raised during the public participation process.

Public Review of the Draft Scoping Report from 22 August 2017 to 23 September 2017. The Report will be available at the Noupoort Public Library, and on the Arcus Company website. **You may submit your comments by fax, E-mail or directly to the following address:**

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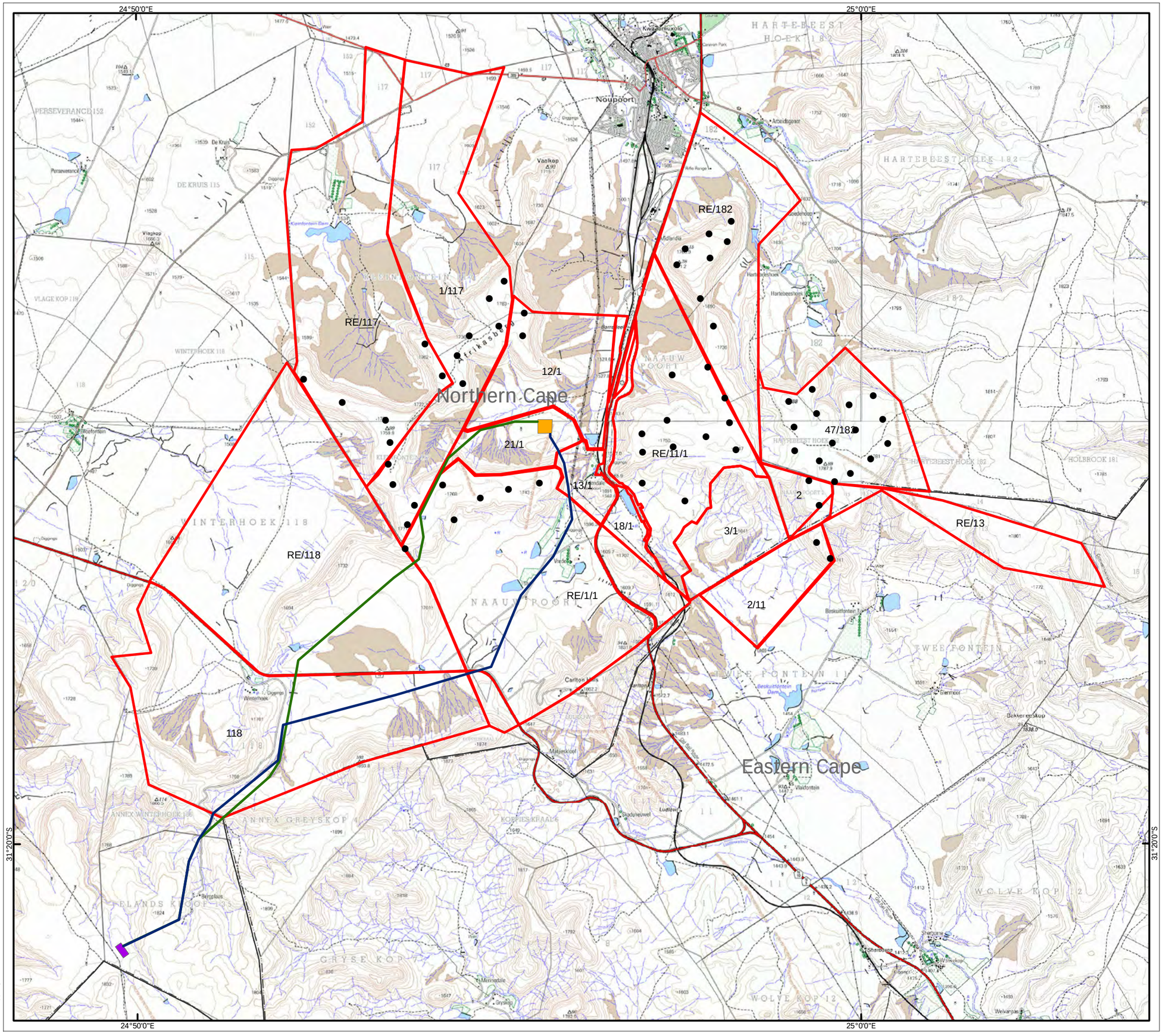


InnoWind

ARCUS

- Site Boundary
- Proposed Turbine Location
- Preferred Grid Route
- Alternative Grid Route
- Umsobomvu 132/400 kV Substation
- Phezukomoya Switching Station

1:80,000 Scale @ A3

N

0 1.5 3 km

Produced: AA Reviewed: SC Approved: AB	Ref: 2245/REP/007
	Date: 03/05/2017

Site Development Plan
Executive Summary

Phezukomoya Wind Energy Facility
Draft Scoping Report

Basemapping from the Chief Directorate: National Geo-Spatial Information of South Africa

ABBREVIATIONS, ACRONYMS AND UNITS

AGA	Astronomy Geographic Advantage Act, 2007 (Act No 27 of 2007)
ATNS	Air Traffic and Navigation Services SOC Limited
BGIS	Biodiversity Geographic Information System
BID Document	Background Information
CARA	Conservation of Agricultural Resources, 1983 (Act No. 43 of 1983)
CBA	Critical Biodiversity Area
CCRS	Climate Change Response Strategy
CSP	Concentrated Solar Power
DAFF	Department of Agriculture, Forestry and Fisheries
dB	Decibel
DEA	Department of Environmental Affairs (National)
DENC	Department of Environment and Nature Conservation (Northern Cape)
DENC	Provincial Department of Environmental Affairs and Nature Conservation
DoE	Department Of Energy
DSR	Draft Scoping Report
DWA	Department of Water Affairs
EAP	Environmental Assessment Practitioner
ECA	Environment Conservation Act, 1989 No. 73 of 1989)
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPr	Environmental Management Programme
ESA	Ecological Support Area
ESA	Early Stone Age
Eskom	Eskom Holdings SOC Limited
EWT	Endangered Wildlife Trust
FEPA Area	Freshwater Ecosystem Priority
FSR	Final Scoping Report
GHG	Greenhouse Gas
GIS	Geographical Information Systems
GNR	Government Notice Regulation
GPS	Global Positioning System
GWh	Gigawatt hour
HDI Individuals	Historically Disadvantaged
HIA	Heritage Impact Assessment
HV	High Voltage
Hz	Hertz
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IPP	Independent Power Producer
IRP	Integrated Resource Plan
kV	Kilovolt
kWh	Kilowatt Hours
LSA	Late Stone Age
mamsl	Meters above mean sea level
MSA	Middle Stone Age
MW	Megawatt
NCR	Noise Control Regulations
NDP	National Development Plan
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NFEPA	National Freshwater Ecosystem Priority Area
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NSD	Noise-sensitive Developments
NWA	National Water Act, 1998 (Act No. 36 of 1998)
PES	Present Ecological State
PGDS	Provincial Growth and Development Strategy
PICC	Presidential Infrastructure Coordinating Committee
PPA	Power Purchase Agreement
PPP	Public Participation Process
PSDF	Provincial Spatial Development Framework
PSEIA	Plan of Study for EIA
PV	Photovoltaic
RBS	Revised Balanced Scenario
RE	Renewable Energy

REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
RSH	Rotor Swept Height
SABAAP	South African Bat Assessment Advisory Panel
SABIF	South African Biodiversity Information Facility
SABS	South African Bureau of Standards
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SALT	Southern African Large Telescope
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
SANS	South African National Standards
SCADA	Supervisory Control and Data Acquisition
SDF	Spatial Development Framework
SDIP	Sustainable Development Implementation Plan
SEA Assessment	Strategic Environmental
SES	Sustainable Energy Strategy
SHEQ	Safety Health Environment and Quality
SIA	Social Impact Assessment
SIPS	Strategic Infrastructure Projects
SKA	Square Kilometre Array Project
SODAR	Sonic Detection and Ranging
SPV	Special Project Vehicle
TWI	Total Wetness Index
WEF	Wind Energy Facility
WHO	World Health Organisation
WTG	Wind Turbine Generator
WULA	Water Use License Application

GLOSSARY OF TERMS

'Do nothing' alternative or 'no-go option'	The 'do nothing' alternative, or 'no go' option 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.
Ambient noise	The all-encompassing sound at a point being composed of sounds from many sources both near and far. It includes the noise from the noise source under investigation.
Ambient sound level	The level of the ambient sound indicated on a sound level meter in the absence of the sound under investigation (e.g. sound from a particular noise source or sound generated for test purposes). Ambient sound level as per Noise Control Regulations.
Amplitude modulated sound	A sound that noticeably fluctuates in loudness over time.
Archaeology	Remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures.
Attenuation	Term used to indicate reduction of noise or vibration, by whatever method necessary, usually expressed in decibels.
Broadband noise	Spectrum consisting of a large number of frequency components, none of which is individually dominant.
Calcrete	A soft sandy calcium carbonate rock related to limestone which often forms in arid areas.
Cultural landscape	The combined works of people and natural processes as manifested in the form of a landscape
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
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.
Early Stone Age	The archaeology of the Stone Age between 700 000 and 2500 000 years ago.
Environmental management programme (EMPr)	An operational and construction phase programme 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.
Fossil	Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.
Generator	The generator is what converts the turning motion of a wind turbine's blades into electricity
Heritage	That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999.
Holocene	The most recent geological time period which commenced 10 000 years ago.
Late Stone Age	The archaeology of the last 20 000 years associated with fully modern people.
Midden	A pile of debris, normally shellfish and bone that have accumulated as a result of human activity.
Middle Stone Age	The archaeology of the Stone Age between 20-300 000 years ago associated with early modern humans.
Miocene	A geological time period (of 23 million - 5 million years ago).
Nacelle	The nacelle contains the generator, control equipment, gearbox and anemometer for monitoring the wind speed and direction.
Palaeontology	Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.
Palaeosole	An ancient land surface.
Pleistocene	A geological time period (of 3 million – 20 000 years ago).
Pliocene	A geological time period (of 5 million – 3 million years ago).

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).
Structure (historic)	Any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith. Protected structures are those which are over 60 years old.
Tower	The tower supports the rotor, and is constructed from tubular steel and/or concrete. The nacelle and the rotor are attached to the top of the tower. The tower raises the wind turbine so that its blades safely clear the ground in order to reach the stronger winds at higher elevations. Large modern wind turbines are usually mounted on towers ranging from 80 to 130 m tall. The tower must be strong enough to support the wind turbine and to sustain vibration, wind loading and the overall weather elements for the lifetime of the wind turbine.
Wind rose	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.

DEPARTMENT OF ENVIRONMENTAL AFFAIRS INFORMATION REQUIREMENTS FOR WIND FARM APPLICATIONS

The Department of Environmental Affairs' requirements for information for all applications for Wind Energy Facilities (WEFs) is included in this section of the report. Where this information is not provided in the tables below, the location of where it can be found in the report is indicated. Should the information not be available at this stage of the EIA Process (Scoping Phase), it is indicated that it shall be documented during the EIA Phase.

Table A: DEA Information Requirements –WEF and Grid Connection General Site Information

Description	Report Reference
Descriptions of all affected farm portions	Section 3
21 digit Surveyor General codes of all affected farm portions	Section 3
Copies of deeds of all affected farm portions	Landowner consent forms and title deeds are to be submitted to the DEA with the application form.
Photos of areas that give a visual perspective of all parts of the site	To be produced in EIA phase.
Photographs from sensitive visual receptors (tourism routes, tourism facilities, etc.)	To be produced in EIA phase.
Wind plant design specifications including:	
Type of technology	Wind turbine. Wind turbine specification to be determined during the EIA phase.
Structure height (Tip Height)	225 m (Hub height of 150 m with blade length of 75 m).
Surface area to be covered (including associated infrastructure such as roads)	To be determined based on preferred turbine layout during the EIA phase.
Structure orientation	Vertical turbines to be spread across the site, as well as ancillary infrastructure, such as the substation and overhead power lines.
Laydown area dimensions (Construction period and Operation)	Approximately 7500 m^2 per turbine.
Generation capacity of the facility as a whole at delivery points	315 MW
Transmission capacity of the facility as a whole at delivery points	132 kV

Table B: DEA Information Requirements – Sample of Technical Details of the WEF

Component	Description / Dimensions
Number of Turbines	Up to 63
Hub Height	150 m
Blade Length	75 m
Rotor Diameter	150 m
Area occupied by inverter transformer stations / substations	5000 m^2
Capacity of on-site substation	2 x 80 MVA
Area occupied by both permanent and construction laydown areas	Approximately 7500 m^2 per turbine.
Operations and maintenance buildings (O&M building) with parking area	7500 m^2
Length of internal roads	To be determined during EIA Phase.
Width of internal roads	During the construction of the WEF 14 m internal roads will be required to allow large delivery vehicles and cranes to turn. These internal roads will be rehabilitated to 7 m roads for use during the operational phase of the WEF.
Proximity to grid connection	15 km
Height of fencing	Up to 3 m around switching stations and offices.
Type of fencing	Palisade and/or diamond mesh.

Table C: DEA Information Requirements – Grid Connection Sample of Technical Details

Component	Description / Dimensions
Height of pylons	To be determined during EIA Phase
Length of transmission line	15 km
Type of poles used	To be determined during EIA Phase
Area occupied by pylon servitude	34 m in width
Transmission capacity	132 kV
Area occupied by both permanent and construction laydown areas	600 m x 600 m

Component	Description / Dimensions
Area occupied by buildings	Not applicable
Length of service road	15 km
Width of service road	4 m
Proximity to grid connection	15 km
Height of fencing	Not applicable
Type of fencing	Not applicable

Table D: DEA Information Requirements - Site Maps and GIS Information

Site Maps and GIS Information	Section of this Report
All maps / information layers must also be provided in ESRI Shapefile format.	
All affected farm portions must be indicated.	Figure 3.2 Proposed Site Development Plan
The exact site of the application must be indicated (the areas that will be occupied by the application).	Figure 1.1 Site Location Figure 3.2 Proposed Site Development Plan
A *status quo* map / layer must be provided that includes the following: Current use of land on the site including:	
Buildings and other structures	Figure 12.4 Potential Noise-sensitive Developments To be produced during the EIA Phase.
Agricultural fields	To be produced during the EIA Phase.
Grazing areas	To be produced during the EIA Phase.
Natural vegetation areas (natural veld not cultivated for the preceding 10 years) with an indication of the vegetation quality as well as fine scale mapping in respect of Critical Biodiversity Areas and Ecological Support Areas	Figure 8.1 Vegetation Types To be determined during EIA Phase. No CBA or ESA mapping available for the area at the time of the specialist reporting.
Critically endangered and endangered vegetation areas that occur on the site	Figure 8.2 Broad-scale Ecological Sensitivity Map None identified by specialist at this scoping stage.
Bare areas which may be susceptible to soil erosion	To be produced during the EIA Phase.
Cultural historical sites and elements	To be produced during the EIA Phase.

Site Maps and GIS Information	Section of this Report
Rivers, streams and water courses	Figure 11.2 Watercourses in the Proposed Development Site
Ridgelines and 20 m continuous contours with height references in the GIS database	Figure 1.2 Slope analysis Ridgelines and contours to be produced during the EIA Phase.
Fountains, boreholes, dams (in-stream as well as off-stream) and reservoirs	NFEPA wetlands and artificial dams shown in Figure 11.1 Quaternary Catchments and Mainstem Rivers within the Region. Map of reservoirs, fountains and boreholes to be confirmed during the EIA Phase.
High potential agricultural areas as defined by the Department of Agriculture, Forestry and Fisheries	No high potential agricultural areas have been identified by the specialist.
Buffer zones (also where it is dictated by elements outside the site): **500m from any irrigated agricultural land** **1km from residential areas**	Figure 17.1 Preliminary Environmental Constraints Map Figure 12.4 Potential Noise-Sensitive Developments
Indicate isolated residential, tourism facilities on or within 1km of the site	Figure 12.4 Potential Noise-Sensitive Developments
A slope analysis map/layer that include the following slope ranges: **Less than 8% slope (preferred areas for turbines and infrastructure)** **Between 8% and 12% slope (potentially sensitive to turbines and infrastructure) Between 12% and 14% slope (highly sensitive to turbines and infrastructure)** **Steeper than 18% slope (unsuitable for turbines and infrastructure)**	Figure 1.2 Slope Analysis
A map/layer that indicate locations of birds and bats including roosting and foraging areas	Figure 10.1 Preliminary Bat Sensitivity Map Figure 9.3 Preliminary Avifaunal Sensitivity Map To be confirmed during the EIA Phase.

Site Maps and GIS Information	Section of this Report
A site development proposal map(s)/layer(s) that indicate: **Turbine positions** **Foundation footprint** **Permanent laydown area footprint** **Construction period laydown footprint** **Internal roads indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve (to make commenting on sections possible).**	Figure 3.2 Proposed Site Development Plan Details to be determined during the EIA Phase.
River, stream and water crossing of roads and cables indicating the type of bridging structures that will be used.	To be produced during the EIA Phase.
Substation(s) and/or transformer(s) sites including their entire footprint.	Figure 3.2 Site Development Plan To be confirmed during the EIA Phase.
Cable routes and trench dimensions (where they are not along internal roads) Connection routes to the distribution/transmission network (the connection must form part of the EIA even if the construction and maintenance thereof will be done by another entity such as ESKOM).	Figure 3.2 Propose Site Development Plan. Figure 3.3 Grid Route Alternatives and Land Parcels To be informed by the outcome of the specialist investigations in the EIA Phase.
Cut and fill areas at turbine sites along roads and at substation/transformer sites indicating the expected volume of each cut and fill	To be produced during the EIA Phase.
Borrow pits	To be produced during the EIA Phase.
Spoil heaps (temporary for topsoil and subsoil and permanently for excess material) Buildings including accommodation	To be produced during the EIA Phase.

Table E: Legislative Requirements for the Content of this Draft Scoping Report

EIA Regulations Appendix 2 Requirements	Location in Scoping Report
2 (a) details of- *(i) the EAP who prepared the report; and* *(ii) the expertise of the EAP, including a curriculum vitae;*	Section 1.4.1 Appendix A –*Curriculum Vitae of EAP.*
(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 (ii) is not available, the co-ordinates of the boundary of the property or properties;*	Figure 1.1 Site Location Table 3.1 Property Details Figure 3.2 Site Development Plan Section 3.2

EIA Regulations Appendix 2 Requirements	Location in Scoping Report
(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;*	Figure 3.2 Proposed Site Development Plan. Grid connection coordinates will be provided for the preferred corridor during the EIA phase.
(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;*	Section 3 Table 5.1
(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;	Section 5
(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;	Section 4
(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;*	Section 6
(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Section 16
(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;	Section 16
(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Sections 7 - 15
(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;*	Sections 7 - 15
(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;	Section 2 Section 17.3
(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;	Sections 7 - 15
(viii) the possible mitigation measures that could be applied and level of residual risk;	Sections 7 - 15
(ix) the outcome of the site selection matrix;	Section 6
(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and	Section 6
(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	Section 6

EIA Regulations Appendix 2 Requirements	Location in Scoping Report
(i) a plan of study for undertaking the environmental impact assessment process to be undertaken, including- *(i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;* *(ii) a description of the aspects to be assessed as part of the environmental impact assessment process;* *(iii) aspects to be assessed by specialists;* *(iv) a description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists;* *(v) a description of the proposed method of assessing duration and significance;* *(vi) an indication of the stages at which the competent authority will be consulted;* *(vii) particulars of the public participation process that will be conducted during the environmental impact assessment process; and* *(viii) a description of the tasks that will be undertaken as part of the environmental impact assessment process;* *(ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.*	Section 18
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;*	Page xvi Appendix A –Commissioner of Oaths of EAP.
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;	Section 19

ENVIRONMENTAL ASSESSMENT PRACTITIONER DECLARATION OF INDEPENDENCE

This Draft Scoping Report has been commissioned by InnoWind (Pty) Ltd on behalf of Phezukomoya Wind Farm (Pty) Ltd to undertake the environmental impact assessment in terms of the 2014 EIA Regulations under the National Environmental Management Act, 1998 (Act No. 107 of 1998, as amended) ('the Regulations').

In compiling this report, the authors comply with the general requirements for Environmental Assessment Practitioners (EAPs) as set out below in the Regulations:

"*General requirements for EAPs or a person compiling a specialist report or undertaking a specialised process:*

17. An EAP appointed in terms of regulation 16(1) must—

(a) be independent;

(b) have expertise in conducting environmental impact assessments, including knowledge of the Act, these Regulations and any guidelines that have relevance to the proposed activity;

(c) perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;

(d) comply with the Act, these Regulations and all other applicable legislation;

(e) take into account, to the extent possible, the matters referred to in Regulation 8 when preparing the application and any report relating to the application; and

(f) disclose to the applicant and the competent authority all material information in the possession of the EAP that reasonably has or may have the potential of influencing—

(i) any decision to be taken with respect to the application by the competent authority in terms of these Regulations; or

(ii) the objectivity of any report, plan or document to be prepared by the EAP in terms of these Regulations for submission to the competent authority."

Ashlin Bodasing

Environmental Assessment Practitioner

TABLE OF CONTENTS

Table of Figures

1 INTRODUCTION

Arcus Consultancy Services Ltd. (Arcus) were appointed by Phezukomoya Wind Power (Pty) Ltd. to conduct the Environmental Impact Assessment (EIA) process as required by the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), as amended, for the proposed establishment of the Phezukomoya 315 MW Wind Energy Facility (WEF) and its associated infrastructure, including its grid connection.

The proposed development aims to generate and distribute electricity from renewable wind energy sources in order to supply electricity into the national grid by connecting the proposed WEF and its electrical infrastructure to the proposed Umsobomvu 132/400 KV Substation, which also forms part of Eskom's Transmission Development Plan 2016-2025.

The WEF would deliver electricity into the existing Eskom electricity grid via a high voltage grid connection. The proposed development is situated approximately 59 km south of Colesberg and 8 km south east of the town of Noupoort in the Northern Cape Province (Figure 1.1).

InnoWind (Pty) Ltd has established Phezukomoya Wind Power (Pty) Ltd, a Special Purpose Vehicle (SPV), in order to obtain an Environmental Authorisation and preferred bidder status for the proposed development. The project will apply for an operational lifespan of twenty years through the REIPPPP.

1.1 Aims and Purpose of this Report

The purpose of this report is to present baseline environmental and technical information on the proposed development. Information has been obtained from both specialists' investigations and through a public participation process:

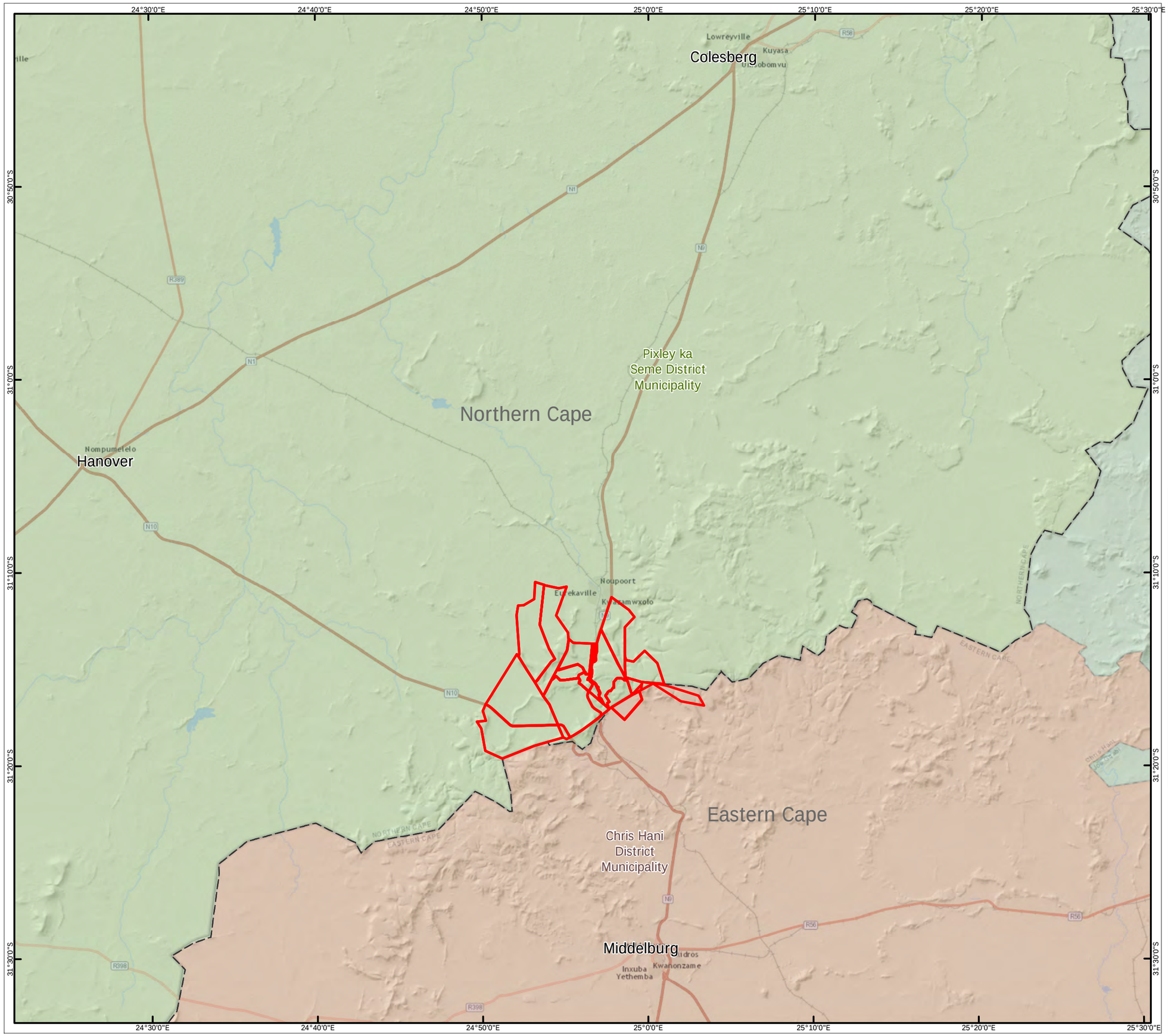
This report will therefore aim to:

- describe the technical details of the proposed development (project description);
- describe and assess the need and desirability of the proposed development;
- describe the EIA methodology and process followed to date;
- present, discuss and assess alternatives;
- describe the baseline environment within which the proposed development would be situated;
- document the public participation process undertaken as part of the EIA process;
- identify potential impacts and provide a preliminary assessment of the significance of these impacts;
- present initial mitigation measures for the design, construction, operation and decommissioning and closure phases of the proposed development; and
- identify and document issues and aspects which will require further specialist investigation and assessment in a Plan of Study for EIA Phase.

1.2 Overview of the Proposed Development

The proposed Phezukomoya WEF would consist of the following infrastructural components:

- Up to 63 wind turbines with a generation capacity between 3 – 5 MW and a rotor diameter of up to 150 m, a hub height of up to 150 m and blade length of up to 75 m;
- Foundations (up to 25 x 25 m) and hardstands associated with the wind turbines;
- Internal access roads of between 8 m (during operation) and 14 m (during construction) wide to each turbine;
- Medium voltage cabling between turbines and the switching station, to be laid underground where technically feasible;
- Overhead medium voltage cables between turbine rows where necessary;



Phezukomoya WEF Site Boundary

1:350 000 Scale @ A3

N

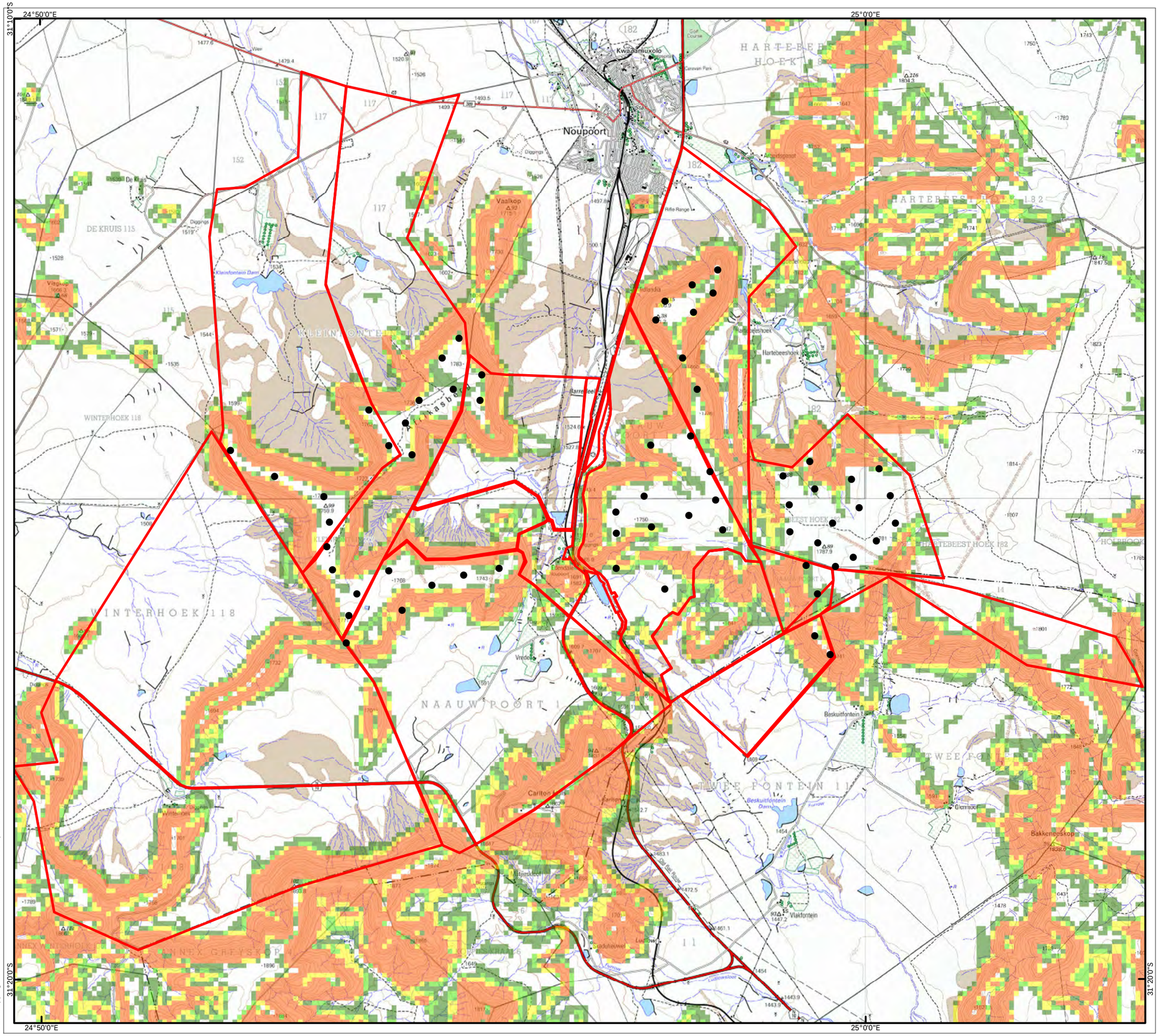
0 7 14 km

Produced: AA Reviewed: SC Approved: AB	Ref: 2245/REP/001
	Date: 06/04/2017

Site Location
Figure 1.1

Phezukomoya Wind Energy Facility
Draft Scoping Report

Mapping from the Chief Directorate: National Geo-Spatial Information



Basemapping from the Chief Directorate: National Geo-Spatial Information of South Africa

InnoWind

ARCUS

- Site Boundary
- Proposed Turbine Location

Slope Percentage Rise

- 8 - 12
- 12 - 14
- 14 - 18
- > 18

1:70 000 Scale @ A3

0 1 2 km

N

Produced: AA Reviewed: SC Approved: AB	Ref: 2245/REP/002 Date: 06/04/2017

Slope Analysis
Figure 1.2

Phezukomoya Wind Energy Facility
Draft Scoping Report

- An on-site switching-station complex (15 000 m^2) to facilitate stepping up the voltage from medium to high voltage (132 kV) to enable the connection of the WEF to the national grid;
- A 15 km 132 kV voltage overhead power line from the on-site switching station to the proposed Umsobomvu Substation to the national grid;
- A 7500 m^2 operations and services workshop area/office building for control, maintenance and storage;
- Temporary infrastructure including a site camp; and
- A laydown area approximately 7500 m^2 in extent, per turbine.

The total size of the land portions within which the proposed development will be located is 18 856 hectares (Figure 1.2). The footprint of the proposed development is estimated to be less than 1% of this area (Figure 3.2).

1.3 Project Proponent

Phezukomoya Wind Power (Pty) Ltd is a Special Purpose Vehicle (SPV) established under InnoWind (Pty) Ltd for the development of the Phezukomoya WEF and the associated grid connection.

InnoWind is a South African registered company dedicated to the development of wind energy projects which develops, finances, builds, owns and operates commercial wind-powered generation facilities to supply energy into the national power grid.

To date, InnoWind has been awarded four wind energy projects under the renewable energy independent power producer procurement (REIPPP) programme of the Department of Energy (DoE) amounting to 139 MW. These include the Chaba (Komga), Waainek (Grahamstown) Grassridge (Port Elizabeth) and Riverbank (Wesley-Ciskei) wind power projects, all located in the Eastern Cape.

In accordance with the REIPPPP bid requirements, InnoWind established Phezukomoya Wind Power (Pty) Ltd as the SPV that will be used to own all the authorisations, contracts, permits and licenses required to lawfully build and operate the proposed Phezukomoya Wind Energy Facility.

1.4 The Environmental Impact Assessment Project Team

1.4.1 Environmental Assessment Practitioner

The co-ordination and management of this EIA process is being conducted by Arcus Consultancy Services Ltd ('Arcus') with the lead EAP being Ashlin Bodasing. Refer to Appendix A for the EAP's Declaration of Interest and *Curriculum Vita*.

Ashlin Bodasing

Qualifications	Bachelor of Social Science (Geography and Environmental Management)
Experience in Years	11 years
Experience	Ashlin Bodasing is the Team Leader at Arcus Consulting, located in Cape Town. Having obtained her Bachelor of Social Science Degree from the University of Kwa-Zulu Natal; she has over 10 years' experience in the environmental consulting industry in southern Africa. She has gained extensive experience in the field of Integrated Environmental Management, environmental impact assessments and public participation. She has also been actively involved in a number of industrial and infrastructural projects, including electricity power lines and substations; road and water infrastructure upgrades and the installation of telecommunication equipment and as well green field coal mines, as well as renewable energy facilities, both wind and solar. Ashlin has major project experience in the development of Environmental Impact Assessments, Environmental Management Plans and the monitoring of construction activities. Her areas of expertise include project

	management, environmental scoping and impact assessments, environmental management plans, environmental compliance monitoring and environmental feasibility studies. Experience also includes International Finance Corporation Performance Standards and World Bank Environmental Guidelines environmental reviews. She has worked in Mozambique, Botswana, Lesotho and Zimbabwe.

Anja Albertyn

Qualifications	Master of Science (Zoology)
Experience in Years	8 years
Experience	Anja Albertyn has worked at Arcus Consultancy Services since November 2013. She is registered with SACNASP as a professional natural scientist in the field of ecological science. She has five years of experience as an environmental consultant, and eight years of work experience in ornithology. She has worked on six EIAs for wind energy facilities and conducted avifaunal studies on over fifteen renewable energy developments including acting as avifaunal specialist on several of these. Anja also functions as Arcus' GIS specialist in Cape Town. Anja started her professional career as an environmental consultant in 2009 after graduating with a Master of Science in Zoology (Ornithology) from the Percy FitzPatrick Institute of African Ornithology at the University of Cape Town. She oversaw a large-scale ballast water treatment testing project for an environmental consultancy for over two years. Thereafter she worked as an avifaunal observer on a variety of projects for over 2 years with the majority being pre-construction avifaunal monitoring projects on proposed wind energy developments. She is currently in the position of Avifauna Specialist and Environmental Assessment Practitioner.

Arcus is a specialist environmental consultancy providing environmental services to the renewable energy market. Arcus has advised on over 150 renewable energy projects in the United Kingdom and South Africa, with environmental management and in-house specialist services.

1.4.2 Specialists

The EAPs have assembled a team of technical specialists to undertake studies for the proposed Phezukomoya WEF.

The specialists' fields of investigation are listed in Table 1.1 below. The areas of investigation have been identified as relevant to the proposed development as per the experience of the EAP, consultation with the listed specialists who are familiar with the locality and nature of development. Should further topics be identified in the scoping process through consultation, these will be considered for inclusion in the scope of the EIA.

These specialists have been selected based on their experience in the field of EIA and of renewable energy projects, and the locality of the proposed development.

Table 1.1: EIA Project Team

Name	Organisation	Role
Ashlin Bodasing	Arcus Consultancy Services	Project Leader (Environmental Assessment Practitioner)
Anja Albertyn	Arcus Consultancy Services	Environmental Assessment Practitioner
Chris Van Rooyen	Chris van Rooyen Consulting	Bird Impact Assessment and Monitoring
Werner Marais	Animalia	Bat Impact Assessment and Monitoring
Simon Todd	Simon Todd Consulting	Terrestrial Ecological Impact Assessment (Flora and Fauna)
Dr Tim Hart	ACO Associates	Heritage Impact Assessment
Dr Almond	via ACO Associates	Palaeontology Impact Assessment

Name	Organisation	Role
Dr Brian Colloty	Scherman Colloty and Associates	Aquatic/ Wetland Impact Assessment
Momé de Jager	Enviro-Acoustic Research	Noise Impact Assessment
Andrea Gibb	SiVest Environmental	Visual Impact Assessment
Garry Patterson	ARC	Soil and Agriculture Impact Assessment
Tony Barbour	Tony Barbour Environmental Consulting and Research	Socio-economic Impact Assessment

1.5 Assumptions and Limitations

- The assumption is made that the information on which this report is based (baseline studies and project information, as well as existing information) is accurate and correct.
- The project description information provided is preliminary and will require further detailed investigation, which would form part of the subsequent stages of this EIA. Statements or indicators of significance in this report must be considered in light of the uncertainty regarding the exact extent and significance of resources on the site at this stage of the process.
- The general location of the proposed wind turbines, maximum extent of access roads, and the connection of routings have been indicated. The actual position of each wind turbine is not known at this stage, nor is the exact location of the proposed operations and maintenance buildings. It is therefore difficult to determine precisely the level of potential impacts, and only a preliminary assessment can be made.
- With respect to specialist assessments, most have assumed that the issues identified are likely to be similar to other proposed WEF projects in the area, and desktop surveys have been carried out for the Scoping Phase of this EIA. Site visits, and modelling where necessary, will be undertaken in the EIA Phase.

1.6 Structure of this Report

The Draft Scoping Report is set out in two volumes:

- Volume 1: Draft Scoping Report; and
- Volume 2: Specialists' Studies.

Table 1.2: Structure of this Report

Section	Title	Containing
1	Introduction	Introduction and background to the proposed project. Project proponents and the EIA project team.
2	Scope of Work and Methodology	Scoping and EIA Process Methodology, including a description of specialist studies and survey methodologies conducted for this study. Description of Public Participation Process methodology, and the Plan of Study for Scoping.
3	Description of the Proposed Development	Project description, including an overview of the site location, the proposed WEF.
4	Need and Desirability of the Proposed Development	Documents the assessment of the proposal in terms of its need and desirability, including a review of policies in support of renewable energy developments.

Section	Title	Containing
5	Relevant Environmental Legislation	Environmental Legislative Context and Planning and National Legislation and Policy on Renewable Energy
6	Assessment of Alternatives	Describes project alternatives, including the preferred option.
7 - 15	Description of the Baseline Environment and Preliminary Impact Assessment	Specialist assessments including visual, terrestrial ecology (flora and fauna), bats, wetlands and freshwater ecology, avifauna, soils and agriculture, cultural heritage, archaeology and palaeontology, noise and social. For each field, the following is provided: • Methodology and limitations; • Baseline environment; • Potential impacts; • Mitigation measures; and • Preliminary assessments.
16	Public Participation	Summarises the PPP undertaken to date and includes the Issues and Response Trail.
17	Summary of Findings	Summarises the findings of the specialists' assessments. Presents the preliminary Constraints Map and conclusion.
18	Plan of Study for EIA Phase	Documents aspects requiring further assessment and the assessment methods proposed for the EIA Phase.

2 SCOPE OF WORK AND SCOPING PHASE METHODOLOGY

The EIA process formally commences with notifying the competent authority (in this case the DEA) of the proposed development through the submission of an application form. Following this notification, the EAP, along with a project team of technical specialists, commence the Scoping Phase, in order to inform decision regarding the appropriate "scope" of the EIA phase.

The existing environmental baseline of the site proposed for development is established during this phase through a desktop assessment and site visits. The type of development is considered and its anticipated impacts on the existing environment informs the specialist's studies to be undertaken. The methodology of how these impacts should be assessed within the EIA phase is determined.

A Draft Scoping Report (DSR) and Plan of Study for Environmental Impact Assessment (this document) is compiled which is made available for public review for a legislated period of 30 days. All comments received in response to the DSR are considered, responded to in an Issues Trail and incorporated into a Final Scoping Report (FSR). The FSR is submitted to the DEA, as the competent authority, for approval.

Interested and Affected Parties (I&APs) are provided with the opportunity to comment on the FSR and submit their comments directly to the DEA.

Should the FSR be approved by the DEA, the EIA Phase is initiated, which includes further detailed specialist assessments. A Draft EIA Report (Draft EIR) is compiled and incorporates these findings. The DEIR is made available for stakeholder review for a period of 30 days. Comments are again considered and responded to in a Final EIA Report (Final EIR).

I&APs are then notified of the submission of the Final EIR to DEA, and any comments on the final report can be submitted directly to the DEA.

Once a Final EIR has been submitted, the competent authority (the DEA) will make a decision within 107 days on whether to grant or refuse Environmental Authorisation for the application.

Based on environmental requirements and the experience of the developer and the project team, the following issues are assessed for the proposed Phezukomoya WEF EIA process:

- Fauna and Flora (Terrestrial Ecology);
- Avifauna (Birds);
- Bats;
- Freshwater and Wetland Ecology;
- Noise;
- Landscape and Visual;
- Archaeology, Palaeontology and Cultural Heritage;
- Access, Traffic and Transportation;
- Socio-economics including recreation and tourism; and
- Other related issues including existing infrastructure and shadow flicker.

The Scoping Phase of the EIA process refers to the process of determining spatial and temporal boundaries for the study, along with determining those potential impacts that should be assessed in further detail during the EIA Phase. In broad terms, this involves three activities:

- Agreement of process to be followed including stakeholder engagement opportunities;
- Clarification of the scope of the project that is to be assessed; and
- Identification of key issues/impacts to be addressed during the EIA phase and the methodology that is to be followed in order to address those issues.

The above activities are completed through consultation with:

- The lead authorities involved in the decision-making for the EIA application (in this case, the DEA);
- The public, I&APs and other relevant organisations to ensure that local issues are well understood; and
- The EIA specialist team to ensure that all technical issues are identified.

The existing environment within which a proposed development is to be located is investigated, through a review of relevant background literature, as well as a site visit where necessary.

A primary objective during this phase is to present key stakeholders with an overview of the elements of the proposal that will require further assessment in the EIA Phase.

2.1 Scoping Phase Public Participation Process (PPP)

Public participation is an essential component of the EIA process. The process of public involvement encourages Interested and Affected Parties (I&APs) to contribute their comments and concerns regarding the proposed development during the entire EIA process.

In general the public participation process ensures that:

- The general public is notified of the proposed project and afforded the opportunity to register as I&APs;
- Key I&APs are identified as directed by legislation and informed about the proposed development and its implications;
- All issues, underlying concerns and suggestions raised by I&APs are understood, documented and addressed; and
- Areas that require further specialist investigation are identified and feedback is provided to I&APs.

The PPP for this Scoping & EIA process takes cognisance of the IEM Guideline Series (Series 3): Stakeholder engagement (2002) and the IEM Guideline Series (Guideline 7): Public Participation in the EIA process (October 2012).

Throughout the process, stakeholders will be encouraged to communicate with the PPP team to raise issues, ask questions or make suggestions. Communication will be through telephonic means or in written form. All issues will be included in the Issues and Responses Trail, and responded to and addressed by the project team.

Registration of I&APs will continue throughout the Scoping & EIA process, however comments on the draft reports will need to be received within the specified time periods to ensure they can be taken into account in the final documents, and submitted to the DEA within the legislated timeframes.

The sections below describe the tasks that were undertaken as part of the public engagement process during the Scoping Phase.

2.1.1 Pre-Scoping

- Advertisements were placed in the relevant local and provincial newspapers (in English and Afrikaans);
- Site notices were erected on the site boundary and alternative sites visible to the public;
- Written notices to the affected land owners and occupiers of the site, municipal councillor(s), ratepayers in the area, affected district and local municipalities, and organs of state were delivered;
- Relevant stakeholders were identified and a project database was compiled; and

- A Background Information Document (BID) was compiled and distributed to all I&APs, stakeholders, and organs of state informing them about the proposed project.

Proof of the above can be found in Appendix B.

2.1.2 Scoping Phase

- Notification letters are to be sent out to registered I&APs, key stakeholders, and organs of state to inform them of the availability of the Draft Scoping Report (30 day review period);
- An Issues Trail/Comments and Responses Report shall be compiled, recording comments and/or queries received and recording the responses provided; and
- A public event shall be held in order to explain the findings of the Scoping Report, and present to the public the issues shall be investigated during the EIA Phase.

2.2 Specialist Scoping Assessments

Each technical/specialist assessment follows a systematic approach, with the principal steps being:

- Description of baseline conditions;
- Prediction of potential impacts including cumulative impacts;
- Assessment of potential impacts;
- Identification of appropriate mitigation measures; and
- Assessment of residual (potential) environmental impacts.

Each technical/specialist chapter is broadly structured as follows:

- Introduction;
- Assessment methodology and significance criteria;
- Baseline conditions;
- Development design mitigation;
- Assessment of potential effects;
- Mitigation measures and residual effects;
- Cumulative effects assessment;
- Summary of potential effects; and
- Statement of significance.

2.2.1 Baseline Description

In order to evaluate the potential environmental impacts, information relating to the existing environmental conditions was collected through field and desktop research. This is known as the baseline environment. The baseline environment also extends into the future, although predictions of any changes can involve a high number of variables and be subject to potentially large uncertainties. As a result, in most cases the baseline is assumed to remain unchanged throughout the operation of the development. Where this is not the case, this is stated.

The baseline environment has been used to assess the sensitivity of receptors on and near the site, and it is used to assess what changes may take place during the construction, operation, decommissioning and closure phases of the development and the effects, if any, that these changes may have on these receptors.

Within each technical assessment, the methods of data collection were discussed with the relevant consultees. Data is also collected from public records and other archive sources and where appropriate extensive field surveys carried out. The timing of the work and the study area are also outlined within each assessment.

2.2.2 Prediction of Potential Impacts

The prediction of potential impacts covers the phases of construction, operation, decommissioning and closure. During each phase of the development, different environmental effects are likely to arise. For example, during the construction phase, traffic volumes are far greater than during the operational life of a WEF.

Each specialist assessment covers:

- Direct and indirect effects;
- Short, medium and long term effects;
- Permanent and temporary effects;
- Likelihood of an effect occurring (i.e., very likely, likely, or unlikely); and
- Cumulative effects.

Following identification of potential environmental impacts, baseline information is used to predict changes to existing conditions, and undertake an assessment of these changes.

2.2.3 Assessment of Potential Impacts

The potential impact that the proposed development may have on each environmental receptor is influenced by a combination of the sensitivity or importance of the receptor and the predicted degree of alteration from the baseline state (either beneficial or adverse).

Environmental sensitivity (or importance) may be categorised by a multitude of factors, such as threat to rare or endangered species, transformation of natural landscapes, or changes to soil quality and land use. The initial assessment, consultation and scoping phases identify these factors along with the implications of the predicted changes. Unless stated otherwise in each specialist chapter, the sensitivity or importance of each identified receptor is defined as high, medium, low or negligible. Likewise, the degree of alteration from the baseline state is defined as high, medium, low or negligible.

The overall significance of a potential environmental impact is determined by the interaction of the above two factors (i.e., sensitivity/importance and predicted degree of alteration from the baseline). In order to evaluate the potential environmental impact each specialist has used the same methodology to evaluate and assess potential impacts in their reports in line with the definitions described above, unless otherwise stated (e.g., the definition of what constitutes a receptor of 'high' sensitivity).

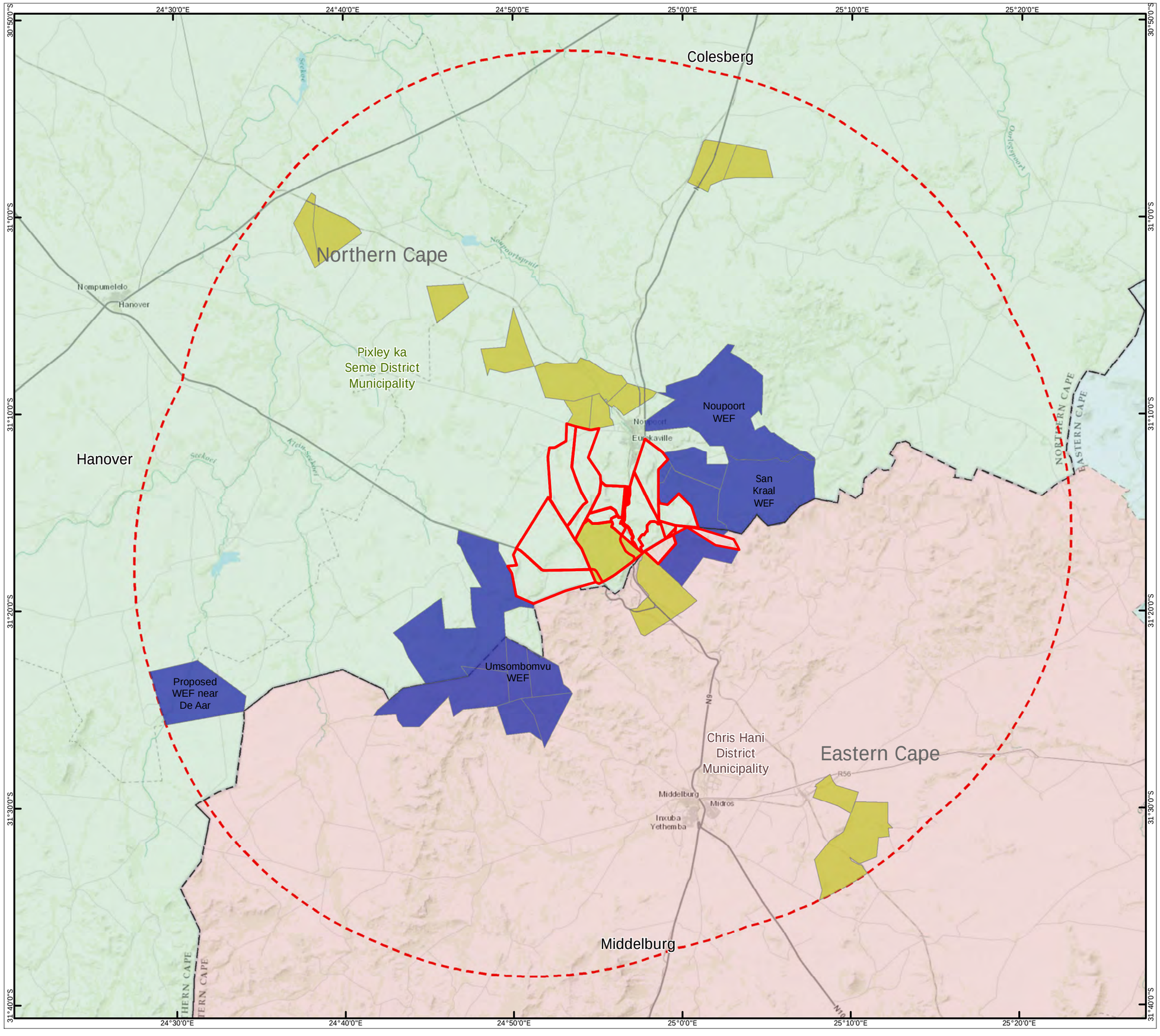
2.2.4 Mitigation

Specialists shall also propose measures to avoid, reduce or remedy potential significant adverse impacts. These are mitigation measures. Where the assessment process has identified any significant adverse impacts, mitigation measures are proposed to reduce these impacts. Such measures include the consideration of alternatives, physical design evolution, such as movement or loss of turbines, and management and operational measures.

This strategy of avoidance, reduction and remediation is a hierarchical one which seeks:

- First to avoid potential effects;
- Then to reduce those which remain; and
- Lastly, where no other measures are possible, to propose compensatory measures.

Each specialist consultant has identified appropriate mitigation measures (where relevant). These measures will largely be embedded into the overall design strategy rather than "added on". By being flexible with design, the EIA team and the applicant/developer will be able to respond to the findings of consultation and EIA work, and mitigate accordingly, as the project progresses.



InnoWind

ARCUS

- Phezukomoya WEF Site Boundary
- Onshore Wind Application
- Solar PV Application

1:341 496 Scale @ A3

0 4.5 9 km

N

Produced: AA Reviewed: SC Approved: AB	Ref: 2245/REP/006
	Date: 06/04/2017

Renewable Energy Applications with the **P**otential for **C**umulative **I**mpacts within a 35 km Radius
Figure 2.1

Phezukomoya Wind Energy Facility
Draft Scoping Report

Mapping from the Chief Directorate: National Geo-Spatial Information

2.2.5 Residual Impacts

The assessment process concludes with an examination of residual effects after mitigation has been applied, i.e., the overall predicted (potential) impacts of the development.

2.2.6 Cumulative Impact Assessment

In accordance with the EIA Regulations, consideration is also given to 'cumulative impacts'. For the purpose of this assessment cumulative impacts is defined and assessed in the future baseline scenario, i.e. Cumulative impact of the proposed development = change caused by proposed development when added to the cumulative baseline (The cumulative baseline includes all other identified developments. In the cumulative assessment the effect of adding the proposed development to the cumulative baseline is assessed.).

In line with best practice, the scope of this assessment will include all operational, approved or current and planned renewable energy applications (including those sites under appeal), within a 35 km radius of the site (as a minimum) (Figure 2.1). Therefore, all potential projects are included, even though it is unknown how many of these will actually be constructed.

WEF sites included here are based on the knowledge and status of the surrounding areas at the time of finalising the DSR and include three wind energy facilities (Figure 2.1), as well as fourteen solar PV applications. One of the WEFs is operational (Noupoort WEF), one is under application (Umsobomvu WEF) and one is in the process of submitting an application (San Kraal WEF). Eleven of the thirteen solar PV plants in a 35 km radius of the proposed San Kraal WEF have been approved, with only one being a preferred bidder.

A preliminary assessment of cumulative impacts has been made in the Scoping Phase and will be assesses further in the EIA Phase as detailed in the Plan of Study for EIA (Section 18).

2.3 Contents of the Scoping Report

The initial results from the Scoping Phase public participation and specialist investigations are collated into a concise Scoping Report. The Scoping Report contains the following information:

- Nature of the activity;
- Description of the receiving environment;
- Identification of potential feasible alternatives;
- Identification of potential positive and negative impacts;
- Identification of knowledge gaps; and
- A Plan of Study for the EIA phase.
- Legislative requirements for the content of a Draft Scoping Report are presented in Table E at the beginning of this report.

The Scoping Report must contain a Plan of Study for the EIA Phase. This plan (Section 18) sets out the proposed approach to the EIA Phase study including the:

- tasks that will be undertaken, including specialist reports and the manner in which such tasks will be completed;
- stages at which the competent authority will be consulted; and
- description of the methods of assessment and the details of the public participation process.

Once the DEA has reviewed the FSR and Plan of Study for EIA and should the DEA accept it, the EIA Phase may commence. Should the DEA reject the application, the applicant would need to re-initiate the process.

3 DESCRIPTION OF THE PROPOSED DEVELOPMENT

The proposed development will consist of up to 63 three-bladed horizontal-axis wind turbines with a maximum hub height of 150 m and blade length of 75 m (Figure 3.1). The maximum generating capacity of the development will be 315 MW. The final choice of turbine will be dependent on the technology available at the time of construction, project economics and the desired output from the development.

The blades will be manufactured from fibre-reinforced epoxy or equivalent performance materials and the towers will be of tapering or cylindrical tubular steel or steel/concrete construction. The nacelle, which is located at the top of the tower, houses the gearbox and generator (Plate 3-1).

The turbines are computer-controlled to ensure that each turbine faces directly into the wind during operation to ensure optimum efficiency. When not in operation the turbine may turn away from the wind if it is too strong to protect the drive train.

An overhead 132 kV power line will be constructed over a distance of approximately 15 km to connect the WEF to the proposed Umsobomvu Substation to the west of the site (Figure 3.2). This substation is part of Eskom's transmission plan (Eskom Transmission Development Plan (TDP) 2016-2025).

The purpose of a wind energy facility is to harness energy from the wind. It is important that wind turbines are sited in the optimum position to maximise the wind yield whilst minimising environmental impacts.

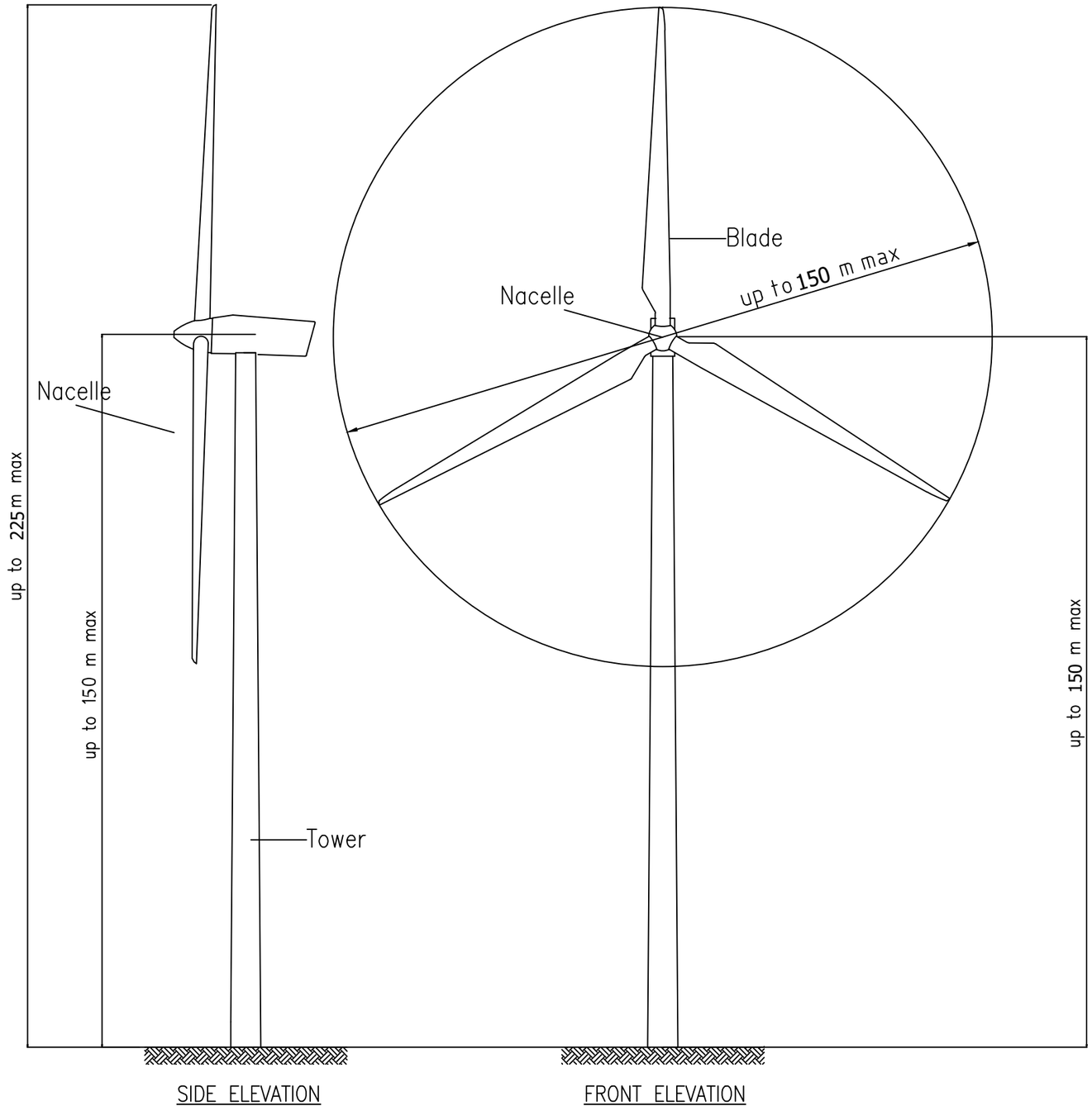
The optimum layout of a wind energy facility depends on a range of criteria. These vary depending on the type and size of turbine as well as the local topography and the turbulence which may be created by surface features. Turbine manufacturers generally recommend that turbines should be spaced between three and six rotor diameters apart depending on the prevailing wind direction, turbine type and site characteristics.

3.1 How Does Wind Energy Generation Work

Wind turbines are used to harness kinetic energy and convert this into a useable form, electricity. WEFs consume no fuel during operation and have no direct emissions as a result of electricity production. The economies of a WEF depend upon the wind resource available at a site and as such detailed information on speed, flow, direction and regularity of wind are vital when identifying locations and layouts for WEFs.

Wind turbines are mounted on a tower to elevate the generators above the ground where wind speeds are higher and the wind resource is more consistent and less turbulent. The kinetic energy of the wind is then used to turn the turbine blades, three of which are joined together to form a rotor. This movement produces mechanical power which is transmitted to the generator within a nacelle (on the top of the tower) either via a gearbox or through a direct drive design of turbine.

A diagram of a typical wind turbine is presented in Plate 3-1, and identifies the key components of a wind turbine.



NOTES:

1. Figure for Illustrative purposes only

2. Depending on the final selected turbine, the transformer will either be housed in a small kiosk beside the turbine, or within the tower, or within the nacelle.

NOT FOR CONSTRUCTION

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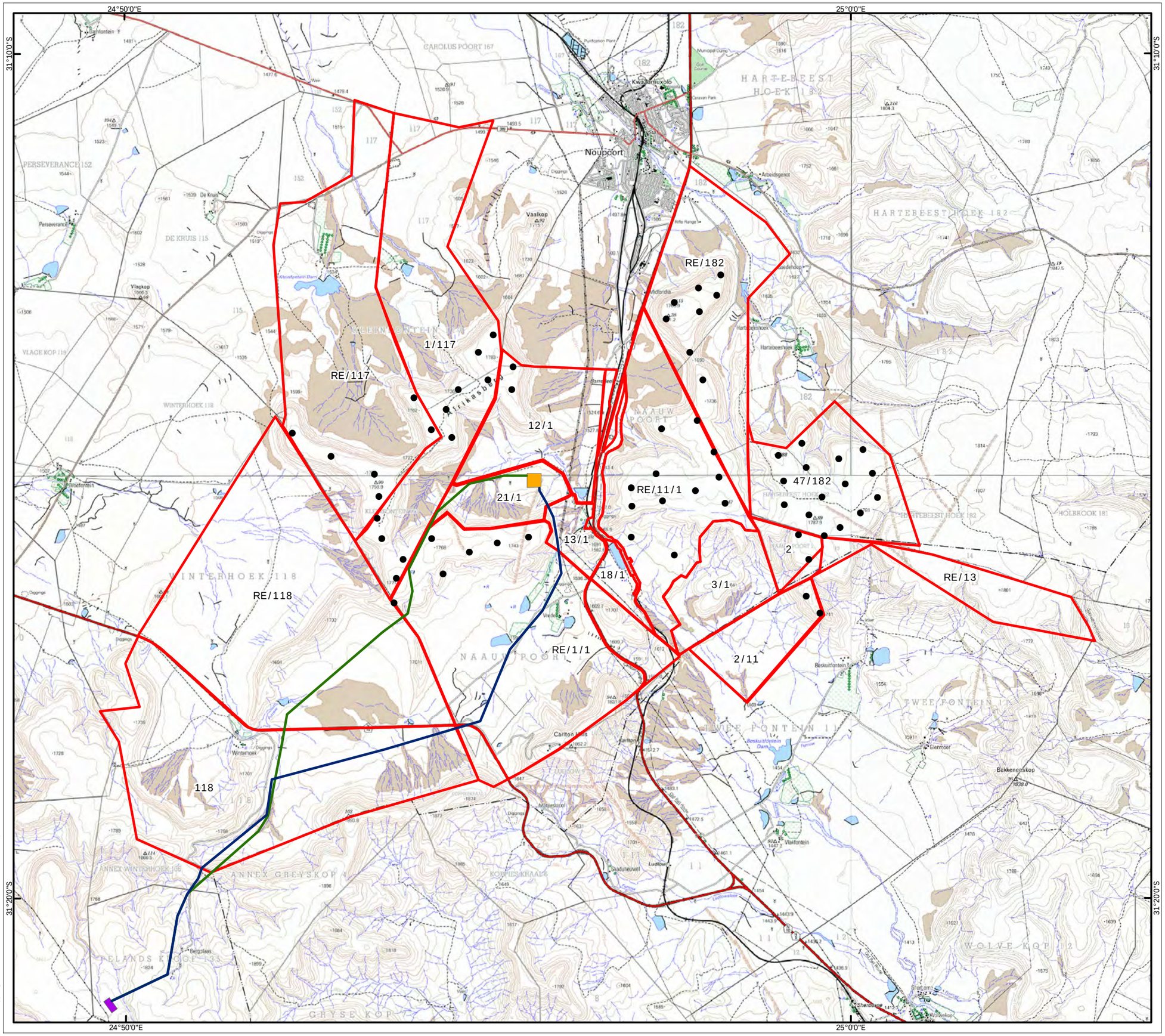
	Date: 10/05/2016

Maximum Turbine Dimensions
Figure 3.1

Phezukomoya WEF
Draft Scoping Report



Basemapping from the Chief Directorate: National Geo-Spatial Information of South Africa

InnoWind

ARCUS

- Site Boundary
- Proposed Turbine Location
- Preferred Grid Route
- Alternative Grid Route
- Umsobomvu 132/400 kV Substation
- Phezukomoya Switching Station

1:80,000 Scale @ A3

N

0 1.5 3 km

Produced: AA Reviewed: SC Approved: AB	Ref: 2245/REP/003
	Date: 05/06/2017

Proposed Site Development Plan
Figure 3.2

Phezukomoya Wind Energy Facility
Draft Scoping Report

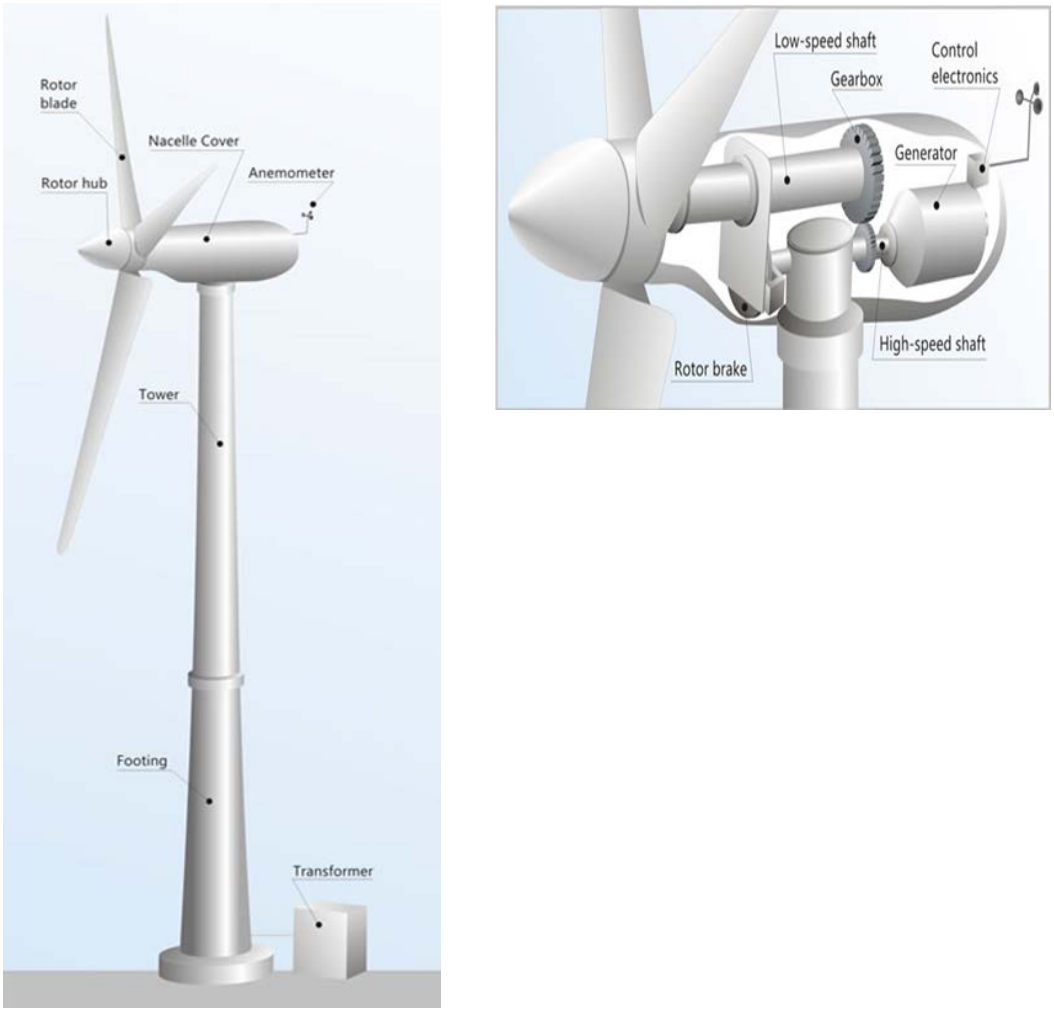


Plate 3-1: Typical example of wind turbine structure and components

A typical wind turbine consists of four primary components:

- The foundation unit upon which the turbine is anchored to the ground;
- The tower which will have a hub height of up to 150 m. The tower is a hollow structure allowing access to the nacelle. The height of the tower is a key factor in determining the amount of electricity a turbine can generate. The tower houses the transformer which converts the electricity to the correct voltage for transmission into the grid. The transformer can also be placed in a small housing outside the tower depending on the design;
- The nacelle (generator/turbine housing). The nacelle houses the gearbox and generator as well as a wind sensor to identify wind direction. The nacelle turns automatically ensuring the blades always face into the wind to maximise the amount of electricity generated; and
- The rotor which is comprised of three rotor blades with a diameter of up to 150 m. 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.

3.2 Site Description and Location of the Proposed Development

The proposed Phezukomoya WEF would be situated eight kilometres south of the town of Noupoort, on the edge of the escarpment of a high lying area known locally as the Kikvorsberge (Figure 1.1). The proposed facility would be built on high lying ground at the

edge of the Kikvorsberge Escarpment (Figure 1.2). Details of the land parcels that make up the development site are presented in Table 3.1.

Table 3.1 Property Details of the Proposed Development Site

	WEF Property Owner	Farm Portion	SG number	Size (ha)
1.	Vivian van der Merwe	RE/118	C03000000000011800000	4518.5
2.	Pieter Willem Jordaan (Jnr) Trust	RE/1/1	C04800000000000100001	3949.2
3.	Gillroy Trust	18/1	C04800000000000100018	3.1
4.	Gillroy Trust	RE/11/1	C04800000000000100011	1141.6
5.	Gillroy Trust	3/1	C04800000000000100003	413.0
6.	Gillroy Trust	2/11	C04800000000001100002	348.3
7.	Gillroy Trust	2	C04800000000000200000	123.1
8.	Isle of Eden farming and Eco-Tourism CC	12/1	C04800000000000100012	623.4
9.	Isle of Eden farming and Eco-Tourism CC	21/1	C04800000000000100021	278.2
10.	Isle of Eden farming and Eco-Tourism CC	RE/13/1	C04800000000000100013	141.93
11.	Jim de Villers	RE/117	C03000000000011700000	1877.8
12.	Jim de Villers	RE/1/117	C03000000000011700001	1635.5
13.	Umsobomvu Municipality	47/182	C02100000000018200047	752.6
14.	Umsobomvu Municipality	RE/182	C02100000000018200000	1113.9
15.	Umsobomvu Municipality	15/182	C02100000000018200015	1812.4
16.	Beskuitfontein Trust	RE/13	C04800000000001300000	141.9
17.	Gerhard Taljaard	RE/181	C02100000000018100000	5008.6
Preferred Grid Route Land Parcels				
1.	Isle of Eden Farming and Eco- Tourism cc	21/1	C04800000000000100021	278.2
2.	Pieter Jordaan	RE/ 1/1	C04800000000000100001	2100.1
3.	Vivian van der Merwe	RE/118	C03000000000011800000	4518.5
4.	Vivian van der Merwe	RE/135	C03000000000013500000	1155.9
5.	Vivian van der Merwe	RE/136	C03000000000013600000	355.4
Alternative Grid Route Land Parcels				
1.	Isle of Eden Farming and Eco- Tourism cc	21/1	C04800000000000100021	278.2
2.	Isle of Eden Farming and Eco- Tourism cc	RE/13/1	C04800000000000100013	141.9
3.	Pieter Jordaan	RE/ 1/1	C04800000000000100001	2100.1
4.	Vivian van der Merwe	RE/118	C03000000000011800000	4518.5
5.	Vivian van der Merwe	RE/135	C03000000000013500000	1155.9
6.	Vivian van der Merwe	RE/136	C03000000000013600000	355.4

The escarpment breaks up into a series of flat topped ridges and hills which provide expanses of flat elevated areas suitable for wind energy development (Figure 1.2). The N9 between Noupoort and Middelburg and the railway system transect the project area south of the town of Noupoort.

The area is characterised by often arid conditions, large dolerite sills, ridges and outcrops and deep valleys. It is sparsely populated and generally rural, with grazing of sheep and cattle being the primary occupation of local famers.

The town of Middelburg and Colesberg are located approximately 28 km and 59 km to the south and north-east of the site respectively and are linked by the N9, which also essentially bisects the development area. The N10, which links up with the N9 to the south of Noupoort, links up with the town of Hanover on the N1, approximately 60 km northwest of the study area.

3.3 Wind Energy Facility (WEF) Components

The WEF will comprise components described below. It should be noted as the design of the proposed development is not yet finalised, all dimensions are maximums as is required by the EIA process. The final design may include infrastructure which is of equal or less than dimensions to those stated below but not more than.

3.3.1 Turbines

The proposed WEF will comprise of up to 63 turbines.

At this stage, it is envisaged that the turbines will each have a capacity to generate between 3 – 5 MW of power. Each turbine will have a maximum height to blade tip of 225 m. The turbines will be three-bladed horizontal-axis design with a hub height of up to 150 m and a rotor diameter of up to 150 m and a blade length of up to 75 m (Figure 3.2). The exact turbine model has not yet been selected and will be subject to competitive tendering after further wind analysis has been completed. The turbine model will depend upon the technical, commercial and site specific requirements.

The turbine rotor speed will vary according to the energy available in the wind, the wind speed. The turbines will generate power in wind speeds between approximately 3 metres per second (m/s) and 28 m/s (depending on the model of turbine) with maximum power output usually achieved at wind speeds of around 10 - 12 m/s. On average, wind speeds greater than approximately 28 m/s the turbines will automatically turn the angle of the blade to reduce energy capture (this is known as 'pitching') and stop turning to prevent damage.

Each turbine will require a transformer and, depending on the selected model of turbine, this will be either located within the turbine tower or adjacent to the turbine on a concrete plinth.

The turbines would be placed on steel and concrete foundations, each foundation area occupying an area of up to 25 m by 25 m in total (which includes the maximum total area that may need to be disturbed during construction of the foundation). The foundation areas are typically up to 5 m deep and will include concrete and steel plinths depending upon local ground conditions.

The precise location of the turbines within the WEF site has not yet been finalised and will be confirmed during the EIA process, following the assessment of technical and environmental constraints.

3.3.2 Turbine Power Output and Transformers

When operating, the rotational speed of the rotor is multiplied through the gearbox, which drives the generator. This produces a three-phase power output which is transferred from the generator to a transformer located either within the turbine or externally at ground level adjacent to each tower.

The turbine transformer converts the electrical output from the turbine to a higher voltage, 33 kilo volts (kV), for grid connection purposes. Stepping up the voltage helps to reduce electrical losses and in this case match the electrical system voltage for transmission to the grid. Power generated from the turbines is transmitted back to the site switching station via the underground site cables.

3.3.3 Electric Cabling and On-site Switching Station

The electricity from the turbines will be transferred via a 33 kV electrical network to 2 x 80 MVA on-site switching station. Where possible this will be underground but the feasibility of this will be confirmed as the design progresses and geotechnical studies are conducted. The on-site switching station will house electrical infrastructure such as transformers and switch gear to enable the energy to be transferred into the existing national grid. Operations and maintenance building including parking will be approximately 7500 m^2.

Underground cabling will link the turbines to each other and to the on-site transformer/ control building. Detailed construction and trenching specifications will depend on the ground conditions encountered. Typically cables would be laid in a trench approximately 1 m deep and 0.5 m wide. To minimise ground disturbance, cables will be routed along the side of the access tracks where practicable.

3.3.4 Hard Stand Areas

Each turbine requires an area of hard-standing to be built adjacent to the turbine foundation. This provides a flat, stable base on which to lay down the turbine components ready for assembly and erection and to site the two cranes necessary to lift the tower sections, nacelle and rotor into place.

A hardstanding area of up to 7500 m^2 will be established adjacent to each turbine location. This will be used to provide a platform for cranes to operate during construction (and unscheduled maintenance), as well as a clear area to lay out turbine components prior to erection.

The crane hard-standing will be left in place following construction in order to allow for use of similar plant should major components need replacing during the operational phase of the proposed development.

3.3.5 Laydown Areas

Additional temporary laydown areas will be required for equipment and component storage during construction across the site. These areas will be levelled and compacted and used for component storage. Temporary infrastructure would include a site camp, laydown areas and a batching plant.

3.3.6 Access

The turbine locations will be accessed through a network of unsealed tracks which will be established across the WEF Site. These access roads will be between 8 m and 14 m wide. A width of 14 m is required for curves in order to allow trucks to turn. Such roads are required to facilitate access for the cranes and abnormal load deliveries of turbine components.

Existing farm access roads will be upgraded and utilised where possible, as will existing watercourse crossings. Some of the aggregate required for the construction of the on-site tracks may be sourced from cut and fill operations during construction from within the proposed development site with additional material imported from permitted quarries as required. The need for this will be assessed during the EIA process.

If borrow pits are required, a separate application will be lodged with the Department of Mineral Resources in regard to this activity.

3.3.7 Ancillary Equipment

In addition to the key components outlined above, the WEF will also require:

- Meteorological masts
- Security fencing; and
- CCTV monitoring equipment.

3.4 Transportation of Equipment to Site

Wind turbine components can be transported in a number of ways with different truck / trailer combinations and configurations. These issues which will be investigated at a later stage when the transporting contractor and the plant hire companies apply for the necessary permits from the permit issuing authorities.

The heaviest component of a wind turbine is the nacelle (approximately 67 to 85 tons depending on manufacturer and design of the unit). Combined with road-based transport, it has a total vehicle mass of approximately 130 000 kg (for the 85 ton unit). Thus route clearances and permits will be required for transporting the nacelle by road based transport.

Blades are the longest component, ranging between 45 – 75 m, and need to be transported on a specially imported extendible blade transport trailer or in a rigid container with rear steerable dollies. The blades can be transported individually, in pairs or in three's although different manufacturers have different methods of packaging and transporting the blades.

Where required, existing public roads may need to be upgraded along the proposed equipment transport route to allow for the transportation and delivery of wind turbine components and other associated infrastructure components.

The national roads on the potential national access routes are generally of high standard and many of the structures have been assessed for load bearing capacity and height clearance in the past.

Turbine supplier/s or the contractor selected for implementation would be responsible for the transportation of wind turbine components to site.

A complete transportation management plan will be undertaken prior to construction, should the project be awarded preferred bidder status.

3.5 Description of the Construction Phase of the WEF

It is estimated that construction will take approximately 18 - 24 months subject to the final design of the WEF, weather and ground conditions, including time for testing and commissioning. The construction process will consist of the following principal activities:

- Site survey and preparation;
- Construction of site entrance, access roads and passing places;
- Enabling works to sections of the public roads to the WEF site (if required) to facilitate turbine delivery;
- Construction of the contractors' compound;
- Construction of crane pads;
- Construction of turbine foundations;
- Construction of substation building;
- Excavation of the cable trenches and cable laying;
- Delivery and erection of wind turbines;
- Erection of electricity distribution line;

- Testing and commissioning of the wind turbines; and
- Rehabilitation.

It is possible for certain operations to be carried out concurrently, although predominantly in the order mentioned above. This would minimise the overall length of the construction programme. Construction would be phased such that the civil engineering works would be continuing on some parts of the site, whilst wind turbines are being erected elsewhere. Site rehabilitation will be programmed and carried out in order to allow the rehabilitation of disturbed areas as early as possible and in a progressive manner.

Based on the developers experience from other WEF developments, the construction phase is likely to create approximately 300 to 400 employment opportunities, at its peak. Of this total, approximately 25% will be available to skilled personnel (engineers, technicians, management and supervisory), 15% to semi-skilled personnel (drivers, equipment operators) and 60% to low skilled personnel (construction labourers, security staff). The number and nature of employment opportunities will be refined as the development process progresses. These figures are based on other WEF developments, the exact number and nature of the employment opportunities will be defined during the bidding process, should the project be selected as a preferred bidder. These are requirements of the bidding process as defined by the DoE.

Water for construction purposes (e.g. mass earthworks and roads) will be transferred from the source to the point of use on the site via tanker. All storage of water will be below Water Use License Application (WULA) authorisation limits, i.e. 10 000 m^3. If this goes beyond this limit a WULA will be submitted to the Department of Water Affairs.

3.6 Description of the Operational Phase of the WEF

The proposed development will be designed to have an operational life of 20 years as set out in the current REIPPPP by the DoE. There is the possibility to further expand the lifetime by an additional 20 years. The only development related activities on-site will be routine servicing and unscheduled maintenance, as detailed in the sections below.

Based on experience from other WEFs by the developer the operational phase is likely to create approximately 75 permanent employment opportunities. Of this total approximately 80% (60) will be low and medium-skilled and 20% (15) will be high skilled positions. The number and nature of employment opportunities will be refined as the development process progresses and these figures provided are early estimates.

3.6.1 Routine Servicing

Wind turbine operations will be overseen by suitably qualified local contractors who will visit the site regularly to carry out maintenance. The following turbine maintenance will be carried out along with any other maintenance required by the manufacturer's specifications:

- Initial service;
- Routine maintenance and servicing;
- Gearbox oil changes; and
- Blade inspections.

Routine scheduled servicing will likely take place twice per year with a main service likely to occur at twelve-monthly intervals. Servicing will include the performance of tasks such as maintaining bolts to the required torque, adjustment of blades, inspection of blade tip brakes and inspection of welds in the tower. In addition, oil sampling and testing from the main gearbox will be required once every year and oil and other consumables replaced at regular intervals. Technicians are on site daily to ensure that the turbines are operating safely and at their maximum efficiency.

Site tracks will be maintained in good order. Safe access will be maintained all year round.

The turbines are monitored 24 hours a day real-time via a supervisory control and data acquisition (SCADA) system.

3.6.2 Unscheduled Maintenance

Unscheduled maintenance associated with unforeseen events will be dealt with on an individual basis. In the unlikely event of a main component failure cranes may be mobilised to site to carry out repairs and/or replacement works.

3.7 Description of the Decommissioning Phase of the WEF

At the end of the operation phase, the proposed development will be decommissioned, or may be repowered i.e. redesigned and refitted so as to operate for a longer period. Repowering would not be undertaken under this application or resulting Environmental Authorization, and would be subject to a new application at the time. In the event of decommissioning, typically, all above ground equipment will be dismantled and removed from the site. Cables and the turbine foundations will be cut off below ground level and covered with topsoil. Access tracks will be left for use by the landowners, or if appropriate, covered with topsoil or reduced in width.

This approach is considered to be best practice environmentally and less damaging than seeking to remove all foundations, underground cables in their entirety. Decommissioning will take account of the environmental legislation and technology available at the time of decommissioning.

3.8 The Grid Connection Associated with the WEF

The electricity generated from the WEF will need to be transferred from the on-site switching station to the proposed 132/400 kV Umsobomvu Substation, then to the existing national grid. Eskom has an existing grid network in the area and it is proposed that the electricity will be transferred from the WEF to the proposed 132/400 kV Umsobomvu substation via a system of 132 kV overhead power lines. From the proposed Umsobomvu substation the energy will be transferred via a loop in loop out connection to the existing high-voltage lines of the national grid.

The type of structures which will support the overhead lines is yet to be determined and may include:

- Concrete, steel or wood monopoles;
- Guy line supported steel structures;
- Free standing metal lattice towers; or
- Multi-pole structures such as H-towers or K-towers.

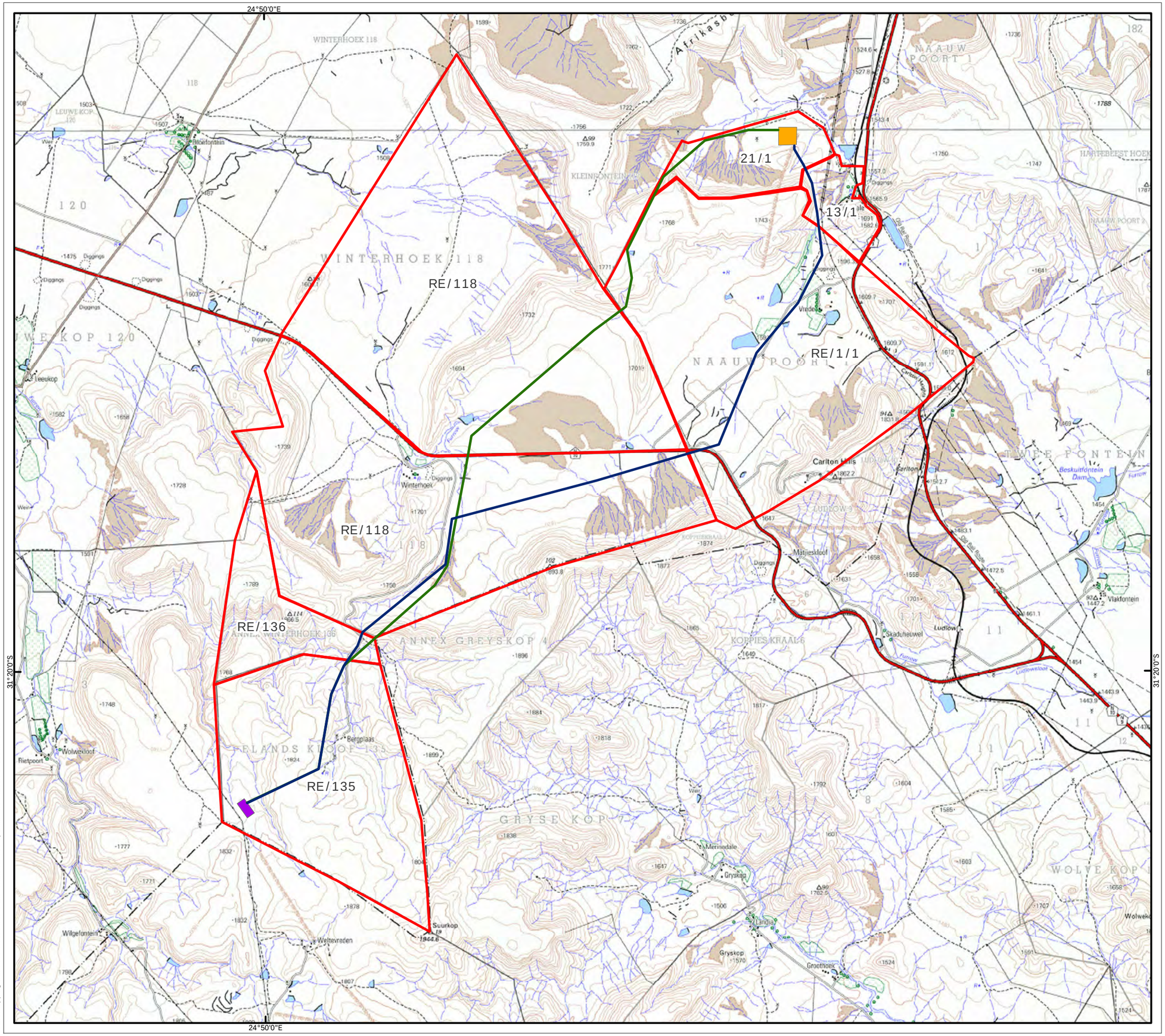
The exact route of the power lines and grid connection has not yet been determined and will again be informed by the EIA process and assessment of technical and environmental constraints. Two alternative alignments that have been considered in this Draft Scoping Report are presented in Figure 3.3. These will be assessed further in the EIA report.

The route for the 132 kV power lines will include a servitude corridor of up to 500 m in width on either side. At this stage it is recommended that the proposed route of the overhead line follows existing linear infrastructure as far as possible as this will potentially reduce the impacts associated with its construction and operation however this will be determined during the EIA process.

At the proposed Umsobomvu Substation the distribution overhead lines will connect into a newly constructed 132/400 kV substation yard which will be located on a concrete foundation covering up to 600 m by 600 m. This will include transformers and switch gear

required to connect the energy into the existing national grid network. A 400 kV transmission line turn-in intended to connect the substation with the nearby 400 kV transmission lines will require a servitude corridor of up to 55 m in width.

Given the uncertainties at this stage of the EIA process, the scope of the grid connection will be defined further with Eskom as the project progresses.



Basemapping from the Chief Directorate: National Geo-Spatial Information of South Africa

InnoWind

ARCUS

- Affected Land Parcel
- Preferred Grid Route
- Alternative Grid Route
- Umsobomvu 132/400 kV Substation
- Phezukomoya Switching Station

1:62,500 Scale @ A3

0 1 2 km

N

Produced: AA Reviewed: SC Approved: AB	Ref: 2245/REP/005 Date: 28/04/2017

Grid Connection Route Alternatives and Land Parcels
Figure 3.3

Phezukomoya Wind Energy Facility
Draft Scoping Report

4 NEED AND DESIRABILITY OF THE PROPOSED DEVELOPMENT

Wind energy facilities can play a role in mitigating or reducing climate change, addressing South Africa's energy resource constraints and producing low-cost energy. In addition, operating wind energy facilities in South Africa contribute significantly to the economic development of the areas in which they are located through the requirements of the REIPPPP adjudication process. This section of the report highlights the national, provincial and local plans and policies that are in support of renewable energy facilities. Through this documentation, it is demonstrated that at all levels of governance, policy supports the development of renewable energy in order to address energy supply issues, and to promote economic growth in South Africa.

Reference is made to the Western Cape Department of Environmental Affairs and Development Planning's 2010 Guideline on Need and Desirability[4] which states that while the "concept of need and desirability relates to the type of development being proposed, essentially, the concept of need and desirability can be explained in terms of the general meaning of its two components in which need refers to time and desirability to place – i.e. is this the right time and is it the right place for locating the type of land-use/activity being proposed? Need and desirability can be equated to wise use of land – i.e. the question of what is the most sustainable use of land." It should be noted that even though this development is located in the Northern and Eastern Cape, the relevance of this Guideline is still applicable, as it deals with Need and Desirability and its assessment in the EIA process.

The need and desirability assessment answers the question of whether the activity or development is being proposed at the right time in the right place. The guidelines pose a number of questions that should be considered in this investigation, which are addressed below.

The proposed development's land use is in line with the relevant Spatial Development Framework and projects and programmes identified as priorities by the credible IDP.

- The National Development Plan (NDP) – Vision for 2030 (National Planning Commission, 2011) identifies 'energy' as a key area for investment in infrastructure, with an objective of at least 20 000 MW of capacity to come from renewable sources.
- The Northern Cape Provincial Spatial Development Framework (SDF) names energy supply schemes as an objective to be promoted. It states that energy supply schemes must be developed with the aim to contribute to the achievement of the targets set by the White Paper on Renewable Energy (2003).
- The proposed WEF supports a number of development objectives listed in the Pixley ka Seme District Municipality IDP, including:
    - Promotion of economic development and the creation of sustainable job opportunities;
    - Poverty reduction;
    - Development of human and social capital; and
    - Provision of adequate infrastructure for economic and social development.

Development of this type of land use should occur here at this point in time.

- The proposed development itself will not cause a significant change in land use, as the development site is primarily low intensity agriculture (grazing), which can still proceed once the development is constructed.

[4] DEA&DP's (2010) Guideline on Need and Desirability, EIA Guideline and Information Document Series. Western Cape Department of Environmental Affairs & Development Planning (DEA&DP).

- The proposed Phezukomoya WEF will contribute positively towards the creation of employment and local economic development, in an area with high levels of unemployment and low levels of economic growth. The area is not suitable for alternative more profitable types of land use.
- The cumulative impact of the proposed development and other developments in the area on land use is expected to be small.
- The NDP, SDF and IDP call for the promotion of energy infrastructure and renewable energy in particular.

The community and area need the activity, which is a societal priority.

- The NDP identifies energy infrastructure as a key investment area and the country is facing a national energy crisis.
- The region suffers from a stagnating economy with low levels of economic growth and high unemployment rates. The proposed development of the Phezukomoya WEF will create jobs and contribute towards socio-economic development in an area with otherwise few opportunities.
- The cumulative effect of the proposed development and other developments in the area has the potential to result in significant positive socio-economic opportunities for the region.

There is adequate capacity for the required services currently available and no additional capacity must be created to cater for the development.

- The proposed Umsobomvu substation will have the capacity to support this development, any additional infrastructure required will be constructed by the developer.
- Any water required during construction will be delivered in by tankers.
- Waste removal will be in accordance with best practice as per the EMPr by qualified waste removal contractors to the nearest registered landfill.
- Portable sanitation facilities will be utilised during construction, so that no connection to the local sewerage system will be required.
- The municipalities have been identified as key stakeholders as part of the PPP, and comments in this regard have been sought from them. It is anticipated that no additional services from the municipality will be required during the construction or operational phases of the proposed development. It should be noted that the municipality owns two of the properties that the WEF is proposed to be developed on.

The proposed development is not provided for in municipal planning, however the overall effect will be beneficial to the municipality.

- Any additional infrastructure required will be provided and maintained by the applicant. There is therefore no cost involved to the municipality.
- The land has low agricultural potential and the economic yield is currently low. The construction of the proposed Phezukomoya WEF will lead to an increased income for the property owners of the land that the servitude and WEF are on, and this includes the local Umsobomvu Municipality.

The proposed development is part of a national programme to address an issue of national concern.

- The National Integrated Resource Plan for Electricity (IRP2) (2011) states that 42% of the national electricity supply should come from renewable energy sources by 2030. The proposed development will contribute towards this goal.
- The proposed development of Phezukomoya WEF falls under the National Infrastructure Plan.

The proposed development is the best practicable environmental option for this site.

- The proposed development of Phezukomoya WEF will contribute towards lower carbon emission goals to combat climate change and provide cleaner energy than coal which currently makes up the large majority of the national energy mix.
- In general, the soils on site are suited for extensive grazing at best and the grazing capacity of the area is relatively low, at around 20-30 ha/large stock unit and the prevailing potential of the soils for rain-fed cultivation throughout most of the area is low to very low.

The approval of this application will not compromise the integrity of the existing approved and credible municipal IDP and SDF as agreed to by the relevant authorities.

- The Pixley ka Seme District Municipality West IDP makes specific reference to the Pixley Renewable Energy Hub. The establishment of the hub was initiated at the Pixley ka Seme District 2010 Investment and Renewable Energy Conference. A key objective of the hub is to diversify the economy by attracting foreign direct investments into solar, wind, hydro and biomass projects.

The approval of this application will not compromise the integrity of the existing environmental management priorities for the area.

- Throughout the EIA process Critical Biodiversity Areas (CBAs), ecological priority areas as well as sensitive areas and no-go areas in the proposed development site will be identified through specialist input. The presented alternatives (turbine locations, and grid connections) will seek to avoid these areas. These will also be considered these in the design of the proposed grid connection as well as the design of the Phezukomoya WEF turbine layout. Therefore any negative environmental impacts will aimed to be minimised. Mitigation measures will be identified to further minimise negative impacts.

Location factors favour this land use in this area.

- The region was identified through a wind mapping process as being extremely favourable for wind energy facilities in terms of wind resources. This is further supported as a neighbouring wind farm has recently (July 2016) become operational, bordering the proposed development site. In addition good road access, favourable terrain and landowner support were factors contributing to site selection.
- Land use will not change significantly as low intensity grazing can continue in the area post-construction.

The predicted impacts on sensitive natural and cultural areas will be of overall low-medium significance with the implementation of mitigation measures.

- Preliminary impact assessments during this scoping phase have been conducted which result in an overall low to medium significance. Detailed specialist impact assessments will be conducted during the EIA phase which identify potential impacts and predict their significance. No-go and sensitive areas will be identified and the design of the facility shall take these findings into consideration. Any future layout changes will also adhere to these identified no-go areas.
- Mitigation measures shall be identified by the specialists that will minimise environmental impacts and lower the significance rating of these impacts.

The proposed development will have an impact of low negative significance on people's well-being and a medium negative impact on visual receptors.

- The SIA anticipated that any health risks (noise, shadow, flicker and electro-magnetic radiation) from the proposed WEF would be of low negative significance.
- The anticipated impact of noise associated with the WEF may be of low negative significance, as documented in the noise impact specialist study.

- The visual impact of the proposed development is anticipated to be of medium negative significance with mitigation measures as determined by a specialist study on visual impacts.
- The significance of the above-listed impacts on the preferred layout will be confirmed during the EIA Phase.

Positive social impacts of the proposed development will outweigh negative social impacts.

- The social impact assessment (SIA) found the construction phase to have a high positive impact with enhancements on creation of employment and business opportunities, and the operational phase to have a medium positive significance.
- The establishment of a community trust funded by the proposed development would be of high positive significance with enhancements.
- The promotion of clean, renewable energy will have a medium positive impact on the region.
- The impact of a benefit from technical advice for local farmers associated with the proposed development was assessed as of low positive significance in the SIA.
- Improved cell phone reception resulting from the proposed development would be of low positive significance.
- The presence of construction workers and an influx of job seekers associated with the construction phase of the proposed development would both be of low negative significance to local communities with mitigation.
- The risk to safety, livestock and farm infrastructure would be of very low negative significance with mitigation, and the risk of grass fires would be of low negative significance with mitigation.
- Impacts associated with construction vehicles would be of low negative significance.
- The impact on farmland and loss of productive land would be of very low negative significance with mitigation.
- The impact on tourism by the proposed development will be of low negative significance.

The proposed development infrastructure will not result in unacceptable opportunity costs.

- The current land use is low-intensity grazing and the land is not suitable for other agricultural uses. The yield per m2 is very low.
- The proposed development will increase the yield per m2 as the landowners will be paid for the use of their land. This could increase other agricultural investments in the area. As the municipality is a landowner, this additional income benefit will be realised for the local community, through further investment.
- The opportunity cost of not proceeding with the proposed development is therefore high.

It is likely that the proposed development will have negative and positive cumulative impacts.

- Preliminary cumulative impacts are assessed in this report. Should mitigation recommendations supplied by each specialists not be applied appropriately the proposed development combined with other facilities proposed in a 35 km radius has the potential to have high combined negative cumulative impacts on biodiversity.
- The cumulative visual impact associated with the establishment of WEFs on the areas sense of place and character of the landscape is potentially of medium negative significance.
- The establishment of a number of renewable energy facilities in the area will place pressure on local services. The significance of this impact is expected to be low negative.

- The establishment of a number of renewable energy facilities in the region will create employment, skills development and training opportunities, and create downstream business opportunities of a high positive significance.

The proposed development will impact on the sense of place.

- The social impact assessment, the visual impact assessment as well as the heritage impact assessment have all taken this into account in their assessment report.
- The area in and around Noupoort has already been altered by previous industrial activity including railway marshalling yards and powerlines, while the outlying areas have a distinctly rural character. A WEF currently operational borders the development site.
- The visual impact and the significance thereof associated with a 315 MW WEF on the area's sense of place is likely to vary from individual to individual, and decrease over time.
- The visual impact is restricted to the lifespan of the proposed development.

The proposed land use will not set a precedent for further WEFs to be developed in the region if EIAs are conducted and authorised effectively.

- The proposed development will not lead to a change in the current agricultural land use in the area. The zoning, should the development be constructed, would be amended from Agriculture to "Special Zone (wind power generating facility and agriculture)".
- The nearby Noupoort Wind Farm has been granted environmental authorisation and awarded preferred bidder. Noupoort Wind Farm is currently operational. This farm may set a precedent for the development of further wind farms in the area due to it demonstrating a feasible wind resource in this area and hence the area would be attractive to wind energy developers. Should the relevant environmental approval processes be effectively managed, a negative precedent should not be a concern for the Phezukomoya WEF.

The proposed development infrastructure will not affect any person's rights.

- Section 24 of Chapter 2 (The Bill of Rights) of The Constitution of South Africa states that everyone has the right to an environment that is not harmful to their wellbeing, and to have the environment protected for the benefit of present and future generations through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development, and use of natural resources while promoting justifiable economic and social developments.
- The proposed Phezukomoya WEF will contribute towards the prevention of pollution and ecological degradation as well as the promotion of sustainable development and use of natural resources through the development. Wind energy has a much smaller carbon footprint than coal, which is currently the dominant form of electricity generated in South Africa.

The proposed development will not compromise the 'urban edge'.

- The proposed development is outside of any urban areas. The closest town is Noupoort, which is approximately eight km away.

The Department of Environmental Affairs recently published Integrated Environmental Management Guidelines. The Guideline on Need and Desirability[5] has been taken into consideration and will be addressed in more detail in the EIA Phase of the project.

The new DEA Guideline on Need and Desirability (2017) poses a series of questions and discussion points about "securing ecological sustainable development and use of natural resources" and "promoting justifiable economic and social development".

A number these points are discussed in this section above, as well as in Sections 7-15, and Volume II of this report. If a specific point has not been addressed, or further investigation is required this will be included in the EIA Report and addressed in the phase of the project.

4.1 Wind Resource at Phezukomoya WEF

Wind energy projects are characterised by a number of additional factors, besides the wind resource, that make a particular site a viable alternative. These include topography, proximity to and capacity of the national electricity grid, site accessibility, availability of land and land use, as well as possible environmental and permitting constraints. The site selection process undertaken took into account a high-level assessment of various opportunities and constraints which may be applicable at a regional level before narrowing its focus on potential individual wind energy facilities at a local and site specific level.

The wind resource in the area and on this site specifically is competitive by national and international comparison. This is evidenced by the awarding of projects by the DoE on neighbouring properties (and one currently operational WEF) as well as data collected by on-site meteorological masts. InnoWind has monitored the wind speeds at the site with the WASA M09 Noupoort 59, a 60 m met mast, 1.82 km away from the boundary of Phezukomoya WEF and has a reading of 7.59 m/s at 60m, this mast has been recording since 2015.

This is well above the wind speeds recorded at many projects that are currently in operation or construction in South Africa. It is therefore considered that the Phezukomoya WEF is ideally located for energy generation.

Based on their preliminary assessment of the wind resource from these measurements, Phezukomoya Wind Power (Pty) Ltd has determined that the proposed development would generate sufficient energy to support an economically viable wind energy project.

4.2 Wind Energy Facilities Contribution to Climate Change

The scientific consensus is that climate is changing and that these changes are in large part caused by human activities[6]. Of these human activities, increase in carbon dioxide (CO_2) levels due to emissions from fossil fuel combustion is regarded as a significant contributor to anthropogenic climate change.

South Africa is one of the world's largest emitters of CO_2 in absolute and per capita terms.

The following climate change impacts have been predicted in relation specifically to South Africa[7]:

- South Africa's coastal regions will warm by around 1-2°C by about 2050 and around 3-4°C by about 2100;
- South Africa's interior regions will warm by around 3-4°C by about 2050 and around 6-7°C by about 2100;

[5] DEA (2017) Guideline on Need and Desirability, Department of Environmental Affairs, Pretoria, South Africa.

[6] http://adsabs.harvard.edu/abs/2013ERL.....8b4024C

[7] http://www.cop17-cmp7durban.com/en/south-africa-on-climate-change/effects-of-climate-change-on-south-africa.html

- There will be significant changes in rainfall patterns and this, coupled with increased evaporation, will result in significant changes in respect of water availability;
- Our biodiversity will be severely impacted, especially the grasslands, fynbos and succulent Karoo where a high level of extinction is predicted;
- Small scale and homestead farmers in dry lands are most vulnerable to climate change and although intensive irrigated agriculture is better off than these farmers, irrigated lands remain vulnerable to reductions in available water;
- Some predictions suggest that maize production in summer rainfall areas and fruit and cereal production in winter rainfall areas may be badly affected;
- Commercial forestry is vulnerable to an increased frequency of wildfires and changes in available water in south-western regions;
- Rangelands are vulnerable to bush encroachment which reduces grazing lands;
- Alien invasive plant species are likely to spread more and have an ever-increasing negative impact on water resources;
- Although strong trends have already been detected in our seas, including rising sea levels and the warming of the Agulhas current and parts of the Benguela current, we are not yet sure what impacts these could have on our seas, the creatures living in the seas or on the communities dependant on the sea;
- Because of our already poor health profile, South Africans are specifically vulnerable to new or exacerbated health threats resulting from climate change. For example, some effects of climate change may already be occurring due to changes in rainfall (droughts and floods) and temperature extremes and Cholera outbreaks have been associated with extreme weather events, especially in poor, high density settlements; and
- There will be an increase in the frequency and severity of extreme weather events. Damage costs due to extreme weather-related events (flooding, fire, storms and drought) have already been conservatively estimated at being roughly 1 billion rand per year between 2000 and 2009.

As explained in National Treasury's Carbon Tax Policy Paper (May, 2013)[8], addressing the challenges of climate change through facilitating a viable and fair transition to a low-carbon economy is essential to ensure an environmentally sustainable economic development and growth path for South Africa. Further the Policy Paper states that the South African government is of the view that South Africa needs to reduce its greenhouse gas emissions while working to ensure economic growth, increase employment, and reduce poverty and inequality[9].

Under the Copenhagen Accord[10], South Africa pledged in 2009 to ensure that its greenhouse gas emissions deviate from the business-as-usual growth trajectory by around 34 per cent by 2020 and 42 per cent by 2025.

Renewable energy projects will play a significant role in assisting the transition to a low-carbon economy.

4.3 Energy Constraint

South Africa faces major energy constraints, with the country's energy operating reserve margin i.e., the amount of electric generation resources planned to be available in the electricity generation system, as compared to the systems expected maximum demand for the year, of currently between 0% - 5%. Internationally, reserve margin requirements are usually kept at about 15% of total demand. To ensure that South Africa's economy can

[8] National Treasury Carbon Tax Policy Paper. Available online http://www.treasury.gov.za/public%20comments/Carbon%20Tax%20Policy%20Paper%202013.pdf

[9] http://www.treasury.gov.za/public%20comments/Carbon%20Tax%20Policy%20Paper%202013.pdf

[10] Copenhagen Accord https://unfccc.int/meetings/copenhagen_dec_2009/items/5262.php

continue to grow, the energy constraint can be addressed by constructing additional electricity generators.

WEFs in particular have a relatively short construction period when compared to other conventional generation technologies of the same scale, meaning that much-needed power can be added to the grid from WEFs in the short term.

4.4 Diversification and Decentralisation of Supply

With its abundant coal supplies, approximately 85% of South Africa's energy needs are currently met through coal-fired generators, with nuclear energy contributing 5% and the balance by renewable energy (5%), pumped storage (1.2%), hydroelectric (0.5%) and gas turbines (0.1%). Electricity generation is dominated by state-owned power company Eskom, which currently produces over 96.7% of the power used in the country.[11][12]

A diversification of energy supplies, particularly with respect to renewable energy sources, would lead to greater energy security and economic and environmental benefits.

The deployment of various renewable technologies increases the diversity of electricity sources and, through local decentralised generation, contributes to the flexibility of the system and its resistance to central shocks.

According to the International Energy Agency, "*renewable energy resources ... exist virtually everywhere, in contrast to other energy sources, which are concentrated in a limited number of countries. Reduced energy intensity, as well as geographical and technological diversification of energy sources, would result in far-reaching energy security and economic benefits.*"[13]

Progress in this regard has been made under the DoE REIPPPP, with 79 approved wind, solar, small hydro and bioenergy projects at various stages of development in the first four bidding windows of the REIPPPP, including 5243 MW of wind power. According to the DoE's Integrated Resource Plan for Electricity 2010-2030, South Africa is aiming to procure 9200 MW of wind power by 2030.

4.5 Reduced Cost of Energy

In terms of cost, wind energy is globally one of the cheapest forms of new generation capacity available[14]. Under the REIPPPP, the fully-indexed tariffs for wind energy projects have dropped from R1.15/kilowatt hour (kWh) to as low as 66.4 c/kWh, representing globally very competitive prices for energy generation. With Eskom currently producing power at 60 c/kWh and with electricity from the coal-fired power stations currently under construction expected to cost more than 97 c/kWh[15], wind energy is one of the lowest cost forms of new generation capacity in South Africa.

In addition to the levelled cost of developing, financing, constructing, operating and decommissioning energy generating facilities, all energy generators produce an external cost (or externality) such as the additional indirect costs incurred by society and the environment, including health, climate change, environmental, mining and water costs.

[11] http://www.usea.org/sites/default/files/event-file/497/South_Africa_Country_Presentation.pdf

[12] http://www.energy.gov.za/files/electricity_frame.html. Accessed 26-04-2016.

[13] www.iea.org/textbase/npsum/ETP2012SUM.pdf

[14] https://about.bnef.com/press-releases/renewable-energy-now-cheaper-than-new-fossil-fuels-in-australia/
http://www.bloomberg.com/news/2013-02-06/australia-wind-energy-cheaper-than-coal-natural-gas-bnef-says.html
http://www.eia.gov/forecasts/aeo/electricity_generation.cfm

[15] http://mg.co.za/article/2012-08-24-00-eskom-grilled-on-power-price

WEFs produce relatively small external costs when compared to other energy generation technologies. Any externalities can be considered positive in the form of local ownership of the project, local job creation and zero pollution resulting from wind facilities.

4.6 Economic Development and Job Creation

The REIPPPP requires Economic Development ("ED") commitments from onshore wind energy projects and projects are adjudicated according to their ED commitments. The main ED beneficiaries of approved projects are currently communities living within a 50 km radius of renewable energy facilities. Projects are bid and thereafter adjudicated according to tariff (70%) and Economic Development (30%). There is therefore an incentive for projects to focus on Economic Development of the Local Community and to assign as much revenue, jobs, procurement etc. to local people as well as South African companies and people as possible in order to stand a chance of having a successful project.

Projects are adjudicated according to the following points:

Economic Development Elements	Weighting
Job Creation	25%
Local Content	25%
Ownership	15%
Management Control	5%
Preferential Procurement	10%
Enterprise Development	5%
Socio-Economic Development	15%
Total	**100%**
Total points	**30 points**

A number of these elements will have a significant and positive impact on the Local Community.

In terms of job creation, bidders are required to indicate the actual number of jobs that will be created for South African citizens, Skilled People, Black People, Skilled Black People and Citizens from the Local Communities. Significant skilled and unskilled job opportunities will be created in the Local Communities, particularly during the construction period.

For Ownership, bidders are required to indicate the total shareholding of the Project Company in the hands of Black People and Local Communities. The minimum ownership percentage for Local Community is 2.5% but projects have committed up to 40% Local Community Ownership in order to have a competitive project. Broad-based community trusts are established as a vehicle for Local Community Ownership to received dividend revenue from an operating project that will be invested in socio-economic development imperatives as determined by trustees. The ownership stake is funded either through debt or through equity partners ("a free-carry").

The Socio-Economic Development and Enterprise Development commitments require a percentage of gross revenue from the operating wind farm to be invested in education, health, small business development etc. Projects are required to commit at least 1% of gross revenue towards socio-economic development. As an indication, 1% of gross revenue of a 140 MW wind farm, with a capacity factor of 35% and a tariff of 80 c/kWh would equal approximately R3.5 m/year (and R68 million over the 20 year operation period of a project). Projects in the REIPPPP receive additional points if the socio-economic and enterprise development investments are committed to be invested in the Local Community.

WEFs in South Africa will create skilled and unskilled jobs, particularly during the construction period. Under the REIPPPP, projects are incentivised to maximise the direct job creation opportunities, particularly for people in the communities surrounding the project.

WEFs tend to be constructed in rural areas with small communities and limited infrastructure and social amenities. A wind farm would create indirect jobs in accommodation, catering and other services that would support a wind farm and cater for the material and social needs of wind farm workers.

Localisation is considered one of the major contributors to job creation and general improvement of the economy of South Africa. Localisation through the construction of new manufacturing facilities to build wind turbine towers and other turbine components in South Africa is currently progressing.

Wind energy can provide technical skills to South Africans and thus improve the technical skills profile of the country and the regions where wind energy facilities are located. Through the REIPPPP, developers' own initiatives and through support from international donor agencies, a number of young South Africans are being trained on various aspects of wind farm construction and operation.

These projects, if successfully implemented, have the potential to transform for the better key development areas of South Africa and would assist South Africa meet its development goals while meeting its carbon emission reduction targets as per international protocols.

4.7 Review of Policies in Support of Renewable Energy

4.7.1 Renewable Energy Independent Power Producer Procurement Programme (REIPPPP)

The REIPPPP is the mechanism which the Department of Energy (DoE) has provided for Independent Power Producers (IPPs), that is, private companies, to develop, construct and operate renewable energy facilities in South Africa.

Renewable energy in terms of the REIPPPP includes projects making use of any onshore wind, solar thermal, solar photovoltaic, biomass, biogas, landfill gas, or small hydro technologies.

The REIPPPP is a selection process which enables the DoE to evaluate potential renewable energy developments proposed by the IPP's through a competitive bidding process.

The bid is first evaluated to confirm that it is compliant with the bidding requirements. Bidding requirements include a completed EIA process and Environmental Authorisation from the competent authority. Compliant bids are then evaluated against two main criteria; price of electricity from the project and its economic development commitments.

In terms of the project's economic development commitments, bidders must demonstrate how a project would contribute towards elements such as job creation, local content and local manufacturing, rural development and community involvement, education and development of skills, enterprise development, socio-economic development and participation by historically disadvantaged individuals (HDIs). Reporting to demonstrate compliance with commitments made by the project over the life of the project is a strict requirement of the REIPPPP.

The most competitive compliant projects are awarded "Preferred Bidder Status" based on 70/30 split between the price and project's economic development commitments.

If awarded Preferred Bidder Status, the IPP would enter into an implementation agreement with the DoE and a Power Purchase Agreement (PPA) with Eskom. Once operational, the electricity would be sold to Eskom under the PPA at the agreed bid price. Eskom then distributes the energy through the national grid to energy users.

4.7.2 National Energy Act (Act 34 of 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).

4.7.3 White Paper on the Energy Policy of South Africa

Investment in renewable energy initiatives, such as the proposed WEF, is supported by the White Paper on Energy Policy for South Africa (December 1998). In this regard the document notes:

"Government policy is based on an understanding that renewables are energy sources in their own right, are not limited to small-scale and remote applications, and have significant medium and long-term commercial potential".

"Renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future".

The support for renewable energy policy is guided by a rationale that South Africa has a very attractive range of renewable resources, particularly solar and ***wind*** and that renewable applications are in fact the least cost energy service in many cases; more so when social and environmental costs are taken into account.

Government policy on renewable energy is thus 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.

The White Paper also acknowledges that South Africa has neglected the development and implementation of renewable energy applications, despite the fact that the country's renewable energy resource base is extensive and many appropriate applications exist.

The White Paper also notes that renewable energy applications have specific characteristics that need to be considered. Advantages include:

- Minimal environmental impacts in operation in comparison with traditional supply technologies; and
- Generally lower running costs, and high labour intensities.

Disadvantages include:

- Higher capital costs in some cases;
- Lower energy densities; and
- Lower levels of availability, depending on specific conditions, especially with sun and wind based systems.

The IRP 2010 aims to allocate 43% of new energy generation facilities in South Africa to renewables.

4.7.4 White Paper on Renewable Energy

The White Paper on Renewable Energy (November, 2003) (further referred to as the White Paper) supplements the *White Paper on Energy Policy*, which recognizes that the medium and long-term potential of renewable energy is significant. This Paper sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa.

The White Paper notes that while South Africa is well endowed with renewable energy resources that have the potential to become sustainable alternatives to fossil fuels, these have thus far remained largely untapped. As signatory to the Kyoto Protocol[16], Government is determined to make good the country's commitment to reducing greenhouse gas emissions. To this purpose, Government has committed itself to the development of a framework in which a national renewable energy framework can be established and operate.

South Africa is also a signatory of the Copenhagen Accord, a document that delegates at the 15th session of the Conference of Parties (COP 15) to the United Nations Framework Convention on Climate Change agreed to "take note of" at the final plenary on 18 December 2009. The accord endorses the continuation of the Kyoto Protocol and confirms that climate change is one of the greatest challenges facing the world. In terms of the accord South Africa committed itself to a reduction target of 34% compared to business as usual.

Apart from the reduction of greenhouse gas emissions, the promotion of renewable energy sources is aimed at ensuring energy security through the diversification of supply (in this regard, also refer to the objectives of the National Energy Act).

The target set in the above is 10 000 GWh (0.8 Mtoe) (Million tonnes of oil equivalent) renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro.

4.7.5 National Integrated Resource Plan for Electricity (2010 – 2030)

The current iteration of the Integrated Resource Plan (IRP) for South Africa, initiated by the Department of Energy (DoE) after a first round of public participation in June 2010, led to the Revised Balanced Scenario (RBS) that was published in October 2010 and later updated in November 2013. The document 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. In addition to all existing and committed power plants, the RBS included a nuclear fleet of 9,6 GW; 6,3 GW of coal; 11,4 GW of renewables; and 11,0 GW of other generation sources.

A second round of public participation was conducted in November/December 2010, which led to several changes to the IRP model assumptions. The main changes were the disaggregation of renewable energy technologies to explicitly display solar photovoltaic (PV), concentrated solar power (CSP) and wind options; the inclusion of learning rates, which mainly affected renewables; and the adjustment of investment costs for nuclear

[16] The Kyoto Protocol is a protocol to the United Nations Framework Convention on Climate Change (UNFCCC), aimed at fighting global warming. The UNFCCC is an international environmental treaty with the goal of achieving "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system". The Protocol was initially adopted on 11 December 1997 in Kyoto, Japan and entered into force on 16 February 2005. As of November 2009, 187 states have signed and ratified the protocol (Wikipedia).

units, which until then represented the costs of a traditional technology reactor and were too low for a newer technology reactor (a possible increase of 40%).

Additional cost-optimal scenarios were generated based on the changes. The outcomes of these scenarios, in conjunction with the following policy considerations, led to the Policy-Adjusted IRP:

- The installation of renewables (solar PV, CSP and wind) were brought forward in order to accelerate a local industry;
- To account for the uncertainties associated with the costs of renewables and fuels, a nuclear fleet of 9,6 GW was included in the IRP;
- The emission constraint of the RBS (2140 million tons of carbon dioxide per year after 2024) was maintained; and
- Energy efficiency demand-side management (EEDSM) measures were maintained at the level of the RBS.

In terms of allocation, wind was allocated between 600 and 800 MW per year and solar between 500 and 700 MW. With Round 4 announcement in April 2015 the allocation for wind and solar was doubled in the so called Round 4b and even an expedited Round 4c with an additional 1 800 MW was introduced for bidding in October 2015. Furthermore the department announced that the current REIPPPP will be extended with an additional 6300 MW for the upcoming years. To date, there have been four (4) volumes or bidding windows under the REIPPPP. In April 2015, the DoE announced additional preferred bidders for the REIPPPP Bid Window 4 contributing 1 121 MW and 4b contributing 1084.2 MW to the national grid.[17]

4.7.6 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.

4.7.7 The New Growth Path Framework

Government released the New Economic Growth Path Framework on 23 November 2010. The aim of the framework is to enhance growth, employment creation and equity. The policy's principal target is to create five million jobs over the next 10 years and reflects government's commitment to prioritising employment creation in all economic policies. The framework identifies strategies that will enable South Africa to grow in a more equitable and inclusive manner while attaining South Africa's developmental agenda. Central to the New Growth Path is a massive investment in infrastructure as a critical driver of jobs across the economy. In this regard the framework identifies investments in five key areas namely: energy, transport, communication, water and housing.

The New Growth Path also identifies five other priority areas as part of the programme to create jobs, through a series of partnerships between the State and the private sector. The Green Economy is one of the five priority areas, including expansions in construction and the production of technologies for solar, wind and biofuels. In this regard clean manufacturing and environmental services are projected to create 300 000 jobs over the next decade.

[17] http://www.globalenergyblog.com/ipp-procurement-programme-framework-in-south-africa. Accessed 26-04-2016.

4.7.8 National Infrastructure Plan

The South African Government adopted a National Infrastructure Plan in 2012. The aim of the plan is to transform the economic landscape while simultaneously creating significant numbers of new jobs and strengthen the delivery of basic services. The plan also supports the integration of African economies. In terms of the plan Government will invest R827 billion over the next three years to build new and upgrade existing infrastructure. The aim of the investments is to improve access by South Africans to healthcare facilities, schools, water, sanitation, housing and electrification. The plan also notes that investment in the construction of ports, roads, railway systems, electricity plants, hospitals, schools and dams will contribute to improved economic growth.

As part of the National Infrastructure Plan, Cabinet established the Presidential Infrastructure Coordinating Committee (PICC). The Committee identified and developed 18 strategic integrated projects (SIPS). The SIPs cover social and economic infrastructure across all nine provinces (with an emphasis on lagging regions) and consist of:

- Five geographically-focussed SIPs;
- Three spatial SIPs;
- Three energy SIPs;
- Three social infrastructure SIPs;
- Two knowledge SIPs;
- One regional integration SIP; and
- One water and sanitation SIP.

The three energy SIPS are SIP 8, 9 and 10.

4.7.8.1 SIP 8 Green Energy in Support of the South African Economy

- Support 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); and
- Support bio-fuel production facilities.

4.7.8.2 SIP 9 Electricity Generation to Support Socio-Economic Development

- Accelerate the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy and address historical imbalances; and
- Monitor implementation of major projects such as new power stations: Medupi, Kusile and Ingula.

4.7.8.3 SIP 10 Electricity Transmission and Distribution

- Expand the transmission and distribution network to address historical imbalances, provide access to electricity for all and support economic development; and
- Align the 10-year transmission plan, the services backlog, the national broadband roll-out and the freight rail line development to leverage off regulatory approvals, supply chain and project development capacity.

4.7.9 Northern Cape 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. 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. 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 levels of private sector development and investment in the Northern Cape are low. In addition, the province also lags in the key policy priority areas of SMME Development and Black Economic Empowerment. 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.

Care will need to be taken to ensure that the proposed development and other renewable energy facilities do not negatively impact on the region's natural environment. The NCPGDS notes that the sustainable utilisation of the natural resource base on which agriculture depends is critical in the Northern Cape with its fragile eco-systems and vulnerability to climatic variation. The document also indicates that due to the province's exceptional natural and cultural attributes, it has the potential to become the preferred adventure and ecotourism destination in South Africa. The development of large renewable energy projects, such as the proposed wind energy facility, should not affect the tourism potential of the province. Noupoort is not known as a tourist town and impacts to local tourism are anticipated to be of low negative significance.

4.7.10 Northern Cape Provincial Spatial Development Framework

Northern Cape Provincial Spatial Development Framework (NCSDF) (2012) lists a number of sectoral strategies and plans are to be read and treated as key components of the PSDF. Of these there are a number that are relevant to the proposed development. These include:

- Sectoral Strategy 1: Provincial Growth and Development Strategy of the Provincial Government;
- Sectoral Strategy 2: Comprehensive Growth and Development Programme of the Department of Agriculture, Land Reform and Rural Development;
- Sectoral Strategy 5: Local Economic Development (LED) Strategy of the Department of Economic Development and Tourism;
- Sectoral Strategy 11: Small Micro Medium Enterprises (SMME) Development Strategy of the Department of Economic Development and Tourism;
- Sectoral Strategy 12: Tourism Strategy of the Department of Economic Development and Tourism; and
- Sectoral Strategy 19: Provincial renewable energy strategy (to be facilitated by the Department of Economic Development and Tourism).

Section C8.2.3, Energy Objectives, sets out the energy objectives for the Northern Cape Province. The section makes specific reference to renewable energy. The objectives are listed below:

- 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 minimizing detrimental environmental impacts;
- Enhance the efficiency of Eskom's power station at the Vanderkloof power station;
- In order to reinforce the existing transmission network and to ensure a reliable electricity supply in the Northern Cape, construct a 400 kV transmission power line from Ferrum Substation (near Kathu/Sishen) to Garona Substation (near Groblershoop). There is a national electricity supply shortage and the country is now in a position where it needs to commission additional plants urgently. Consequently, renewable energy projects are a high priority;
- Develop and institute innovative new energy technologies to improve access to reliable, sustainable and affordable energy services with the objective to realize sustainable economic growth and development. The goals of securing supply, providing energy services, tackling climate change, avoiding air pollution and reaching sustainable development in the province offer both opportunities and synergies which require joint planning between local and provincial government as well as the private sector; and
- Develop and institute energy supply schemes with the aim to contribute to the achievement of the targets set by the White Paper on Renewable Energy (2003). This target relates to the delivery of 10 000 GWh of energy from renewable energy sources (mainly biomass, wind, solar, and small-scale hydro) by 2013.

Section C8.3.3, Energy Policy, sets out the policy guidelines for the development of the energy sector, with specific reference to the renewable energy sector.

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;

The following key policy principles for renewable energy apply:

- Full cost accounting: Pricing policies will be based on an assessment of the full economic, social and environmental costs and benefits of energy production and utilisation;
- Equity: There should be equitable access to basic services to meet human needs and ensure human well-being. Each generation has a duty to avoid impairing the ability of future generations to ensure their own well-being;
- Global and international cooperation and responsibilities: Government recognises its shared responsibility for global and regional issues and act with due regard to the

principles contained in relevant policies and applicable regional and international agreements;
- Allocation of functions: Government will allocate functions within the framework of the Constitution to competent institutions and spheres of government that can most effectively achieve the objectives of the energy policy;
- The implementation of sustainable renewable energy is to be promoted through appropriate financial and fiscal instruments;
- An effective legislative system to promote the implementation of renewable energy is to be developed, implemented, and continuously improved;
- Public awareness of the benefits and opportunities of renewable energy must be promoted;
- The development of renewable energy systems is to be harnessed as a mechanism for economic development throughout the province in accordance with the Sustainable Development Initiative (SDI) approach (refer to Toolkit D10) or any comparable approach;
- Renewable energy must, first, and foremost, be used to address the needs of the province before being exported.

4.7.11 Northern Cape Provincial Climate Change Response Strategy (PCCRS)

The key aspects of the PCCRS Report are summarised in the MEC's (NCPG: Environment and Nature Conservation) 2011 budget speech: *"The Provincial Climate Change Response Strategy will be underpinned by specific critical sector climate change adaptation and mitigation strategies that include the Water, Agriculture and Human Health sectors as the 3 key Adaptation Sectors, the Industry and Transport alongside the Energy sector as the 3 key Mitigation Sectors with the Disaster Management, Natural Resources and Human Society, livelihoods and Services sectors as 3 remaining key Sectors to ensure proactive long term responses to the frequency and intensity of extreme weather events such as flooding and wild fire, with heightened requirements for effective disaster management*".

Key points from MEC's address include the NCPG's commitment to develop and implement policy in accord with the National Green Paper for the National Climate Change Response Strategy (2010), and an acknowledgement of the NCP's extreme vulnerability to climate-change driven desertification. The development and promotion of a provincial green economy, including green jobs, and environmental learnership is indented as an important provincial intervention in addressing climate change. The renewable energy sector, including solar and wind energy (but also biofuels and energy from waste), is explicitly indicated as an important element of the Provincial Climate Change Response Strategy. The MEC also indicated that the NCP was involved in the processing a number of WEF and Solar Energy Facility EIA applications.

4.7.12 Pixley ka Seme District Municipality Integrated Development Plan

The vision for the Pixley ka Seme District Municipality (PKSDM) as set out in the IDP is "Pixley Ka Seme DM, Pioneers of Development, a Home and Future for All". In terms of the mission statement, the PKSDM sets out to achieve the vision in the following ways:

- Using the integrated development planning process to create a home for all in our towns, settlements and rural areas through rendering efficient and effective, excellent and dedicated services;
- Providing political and administrative leadership in the development planning process;
- Promoting economic growth that is shared across and within communities;
- Assisting local municipalities to provide a sustainable delivery of services to local communities;
- Mainstream integrated planning in the operations of our municipalities; and

- Ensuring that all development initiatives in the district are aligned to the National Development Plan.

The IDP lists a number of developmental challenges facing the area including poverty, economic stagnation, unemployment and geographically imbalanced settlement structure. However, the IDP indicates that the most critical challenge facing the district is the reduction of poverty. Other key challenges identified that are relevant to the proposed development include:

- Lack of diversification of the district economy;
- Lack of investment in the region;
- Lack of employment opportunities;
- Lack of skills;
- Lack of entrepreneurship;
- Small number of SMME's active in the region;
- Underutilization of the regions natural resources and economic opportunities; and
- Lack of water for irrigation farming.

The IDP also lists a number of strengths, weaknesses, opportunities and threats. The following opportunities and threats are relevant to the proposed development.

Opportunities

- Participation in green economic activities-solar power;
- Revitalization of the rail network- cargo hub;
- Tourism opportunities – N1, N9, N10 and N12 and Vanderkloof resort; and
- Revamped Railway line

Threats

- Diminishing income that inhibits service delivery;
- Low levels of graduates in the district;
- Impact of HIV/ Aids;
- Unemployment;
- Poverty;
- Climatic conditions e.g. drought;
- Alcohol/Drug abuse; and
- Teenage pregnancy.

The Key Performance Areas (KPAs) listed in the IDP relevant to the proposed development includes Key Performance Area 3: Local Economic Development. The promotion of a green economy linked to renewable energy is identified as a key opportunity. In this regard the IDP notes that the PKSDM is actively promoting a green that seeks to promote economic activities that preserve and enhance environmental quality while using natural resources more efficiently.

In this regard the IDP makes specific reference to the Pixley Renewable Energy Hub. The establishment of the hub was initiated at the Pixley ka Seme District 2010 Investment and Renewable Energy Conference. A key objective of the hub is to diversify the economy by attracting foreign direct investments into solar, wind, hydro and Biomass projects. To date a number of renewable energy projects have been awarded in the PKSDM.

Tourism is also identified as a key sector. The potential projects / areas identified include:

- Adding value and local incomes from game hunting;
- Enhanced promotion and site development of the district's Anglo Boer war battlefields; and
- Development of water sports facilities at Xhariep Dam.

The proposed WEF supports a number of development objectives listed in the IDP, including:

- Promotion of economic development and the creation of sustainable job opportunities;
- Poverty reduction;
- Development of human and social capital; and
- Provision of adequate infrastructure for economic and social development.

Key interventions would include promoting SMMEs; attracting and retaining investors in the region; development of identified development corridors; value-adding to/ beneficiation of local produce; and the promotion of tourism development. Local Economic Development (LED) Policies/ targets aimed at addressing these challenges include:

- LED 1: Promote Local Economic Development in the region;
- LED 2: Increase SMME promotion;
- LED 4: Increased tourism promotion; and
- LED 6: Poverty Reduction.

Through the REIPPPP the proposed development will be able to assist the achieving the above.

4.7.13 Umsobomvu Local Municipality Integrated Development Plan

The vision for the Umsobomvu Municipality as set out in the IDP is "to be the Fastest Economically Developing Municipality in South Africa". The mission statement linked to the vision is "to serve our community by delivering quality services and customer care through dedicated staff for the upliftment of our community socially and economically".

The IDP notes that the ULM's economic activities are largely dominated by agriculture, followed by financial services, trade, hospitality industry, tourism and transport. The main agricultural activities are linked to merino sheep and horses, with irrigation along the Orange River. The status of the municipality's economy reflects the legacy of apartheid through its skewed development among former white areas and townships. Upliftment of the local economy is therefore a key focus area for the Municipality. Of relevance to the proposed development the IDP notes that the local economy is characterised by:

- High levels of poverty and unemployment, and low levels of education;
- A declining economy that is largely based on sheep farming;
- An economy that was too dependent on Spoornet in Noupoort, which has since declined because of the withdrawal of Spoornet;
- Promising growth in tourism in Colesberg Area;
- Rapid population growth in Colesberg because of the migration from other parts of the municipal area, which puts a heavy burden on the infrastructure. This has resulted in housing shortages and increase in number of informal dwellings;
- Increase of HIV infections amongst the youth;
- Alcohol and substance abuse;
- Increase in teenage pregnancies; and
- Abuse of social grants.

The IDP identifies a number of challenges and opportunities facing the UM. The key challenge identified is poverty. Other challenges of relevance to the proposed development include:

- Ensuring all citizens have access to basic services such as water, sanitation, electricity and housing;
- Increasing access to services in education, health and social services;
- Stabilizing and decreasing the rate of HIV and AIDS infection and TB;
- Economic empowerment;

- Shortage of critical skills;
- Targeting special groups e.g. women, disabled and youth; and
- Sustainable job creation.

A Strengths, Weakness, Opportunities and Threats (SWOT) analysis was undertaken as part of the IDP review process. The strengths and opportunities of potential relevance to the proposed development include:

- Tourism potential;
- Infrastructure – conducive to development;
- Low crime rates;
- Existing physical infrastructure.
- Good infrastructure;
- Industrial and economic potential; and
- Tourism development.

Potential weaknesses and threats include:

- Lack of capacity to environment service;
- Inadequate social and economic conditions;
- Scarce skills backlog;
- Depopulation of district;
- Sustainable Income for Municipality;
- Alcohol and drug abuse;
- Illiteracy;
- Migration to urban centres;
- TB and impact of HIV/Aids;
- Unemployment;
- High levels of poverty;
- Disinvestment; and
- Lack of training in technology.

The IDP also identifies a number of opportunities for growth and development, including agriculture and agro-processing, manufacturing and tourism. Though development of renewable energy is not specifically identified as an opportunity. A number of development nodes aimed at stimulating economic growth and attracting investment to the area are listed in the IDP, namely:

- Colesberg, which is located along the N1 national road that links Gauteng and Western Cape, and the N9 that links the district with Port Elizabeth and the Eastern Cape;
- The Orange River, which not only plays an important role in agriculture but also in tourism;
- The Gariep Dam, which is located on the Orange River on the border of the Free State and Eastern Cape Provinces. The dam is one of the main tourist attractions of the region and forms part of the development corridor that runs in a north-south direction and links Bloemfontein, Trompsburg, Gariep Dam and Colesberg with one another along the N1 route.

In terms of key services the IDP lists a number of key issues. These are listed below:

- Low population growth in rural areas;
- Demand for services, such as education, shelter, recreational facilities;
- Limited employment opportunities;
- Crime as a result of unemployment;
- Shortage of skilled workers;
- High poverty levels, with majority of the households in the municipality living below the Minimum Living Level (MLL) of Poverty Datum Line (PDL);

The priorities identified in the IDP that are of relevance to the proposed development include:

- Local economic development (LED), tourism and poverty alleviation;
- Social upliftment ;
- Education and development;
- Youth development; and
- Sport and recreation.

At a local ward level the proposed development is located in Ward 1 and 2, Noupoort. The needs identified in the IDP based on an extensive consultation process that could benefit from the establishment of a Community Trust associated with the proposed WEF include:

- Building of houses;
- Street lights;
- Library in Kwazamuxolo; and
- Public toilets in Noupoort.

In terms of social and community facilities the IDP notes that there is a lack schools especially in the rural areas, which results in many young people having to travel long distances to areas where the schools exist. The majority of schools do not have libraries and resources at those schools that do have libraries are limited. In addition there is tertiary institution in the LM. School leavers therefore leave the area and seldom return. The health centres in urban areas are poorly equipped and under-staffed; while there is a general lack health centres are available in the rural areas. There is also lack of aftercare facilities and support services for out-patients. In terms of recreational facilities, there is a dire shortage of such facilities in the historically disadvantaged communities. In addition the existing recreational facilities in the townships do not have basic services and infrastructure.

4.7.14 Need and Desirability Conclusion

The need for the proposed development is supported in terms of meeting the country's climate change goals, and in terms of reducing the country's dependence on fossil fuels as the main source of meeting the country's electricity requirements. Both national and provincial spheres of government support the development of renewable energy facilities, as well as the need for these types of developments in such areas are required so as to assist in the upliftment of the local economy.

A requirement of the REIPPPP is that in the development of any WEF, the local economy must benefit through employment opportunities, skills development, and the development or enhancement of community infrastructure. The cumulative effect of the proposed development and other developments in the area has the potential to result in significant positive socio-economic opportunities for the region.

5 ENVIRONMENTAL LEGISLATION

5.1 The National Environment Management Act, 1998 (Act 107 of 1998)

Section 2 of the National Environment Management Act, 1998 (NEMA) as amended, lists environmental principles that are to be applied by all organs of state regarding proposals that may significantly affect the environment. Included amongst the key principles is the principle that all development must be socially, economically and environmentally sustainable, environmental management must place people and their needs at the forefront of its concern, to serve their physical, psychological, developmental, cultural and social interests equitably.

NEMA also provides for the participation of Interested and Affected Parties (I&APs) and it stipulates that decisions must take the interests, needs and values of all I&APs into account.

Chapter 5 of NEMA outlines the general objectives and implementation of Integrated Environmental Management (IEM), the latter providing a framework for the integration of environmental issues into the planning, design, decision-making and implementation of plans and development proposals. Section 24 provides a framework for the granting of environmental authorisations.

In order to give effect to the general objectives of IEM, the potential impacts on the environment of listed activities must be considered, investigated, assessed and reported to the competent authority. Section 24(4) outlines the minimum requirements for procedures for the investigation, assessment and communication of the potential impact of activities.

On 4 December 2014, the Minister of Environmental Affairs promulgated new regulations in terms of Chapter 5 of the NEMA, *viz*, EIA Regulations 2014 (Government Notices (GN) No. R. 982, R. 983, R. 984 and R. 985 in Government Gazette No. 38282 of 4 December 2014). These regulations came into effect on 8 December 2014.

The EIA Regulations 2014 published in Government Notice (GN) No. R982, provide for the control of certain Listed Activities. These activities are listed in GN No. R983 (Listing Notice 1 – Basic Assessment), R984 (Listing Notice 2 – Scoping & EIA Process) and R985 (Listing Notice 3 – Basic Assessment) of 4 December 2014, and are prohibited to commence until environmental authorisation has been obtained from the competent authority, in this case, the Department of Environmental Affairs (DEA).

The DEA is the competent authority for all renewable energy proposals, as NEMA states that:

"24C. (2) The Minister must be identified as the competent authority in terms of subsection (1) if the activity- (a) has implications for international environmental commitments or Relations; ….(c) has a development footprint that falls within the boundaries of more than one province or traverses international boundaries."

This project has implications for international environmental commitments that South Africa has made in terms of climate change and the proposed development site is located in two provinces – the Northern and Eastern Cape Provinces.

Environmental authorisation, which may be granted subject to conditions, will only be considered upon compliance with GN R982, as amended GN R326 of 7 April 2017.

The Listed Activities applicable to this proposed project are presented in Table 5.1 below. All potential impacts associated with these Listed Activities will be considered and adequately assessed in this EIA process.

As this proposal triggers Listed Activities in Listing Notices 1 – 3, a full Scoping and EIA process is to be followed for this application (and the related applications).

Any Environmental Authorisation obtained from the DEA applies only to those specific listed activities for which the application was made. To ensure that all Listed Activities that could potentially be applicable to this proposal are covered by the Environmental Authorisation, a precautionary approach is followed when identifying listed activities, that is, if an activity could potentially be part of the proposed development, it is listed.

On 7 April 2017 in Government Gazette 40772 the Minister of Environmental Affairs published amendments to the Environmental Impact Assessment (EIA) Regulations of 2014 (in Notice Number 326), Listing Notice 1 (in Notice Number 327), Listing Notice 2 (in Notice Number 325) and Listing Notice 3 (in Notice Number 324). The table below indicates, the listing notices, as amended in 2017.

Table 5.1: NEMA Listed Activities in Relation to the Proposed Development

Listing Notices 1 - 3[18] 07 April 2017	**Listed Activity**	**Project Description**
Listing Notice 1 GN R 327 Activity 11	*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; or*	The WEF will require transmission lines in order to connect to the grid. Electrical reticulation will be installed to transfer electricity from the turbines to an on-site substation. Cables will be installed underground where feasible.
Listing Notice 1 GN R327 Activity 12	*The development of—* *(ii) infrastructure or structures with a physical footprint of 100 square metres or more;* *where such development occurs—* *(a) within a watercourse;* *(b) in front of a development setback; or* *(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;*	The development of the WEF may include construction of buildings and infrastructure within 32 m of a watercourse(s). Bridges may be required to cross watercourses for access tracks. The location and extent of these water crossings will be determined during the EIA Phase by the freshwater ecologist. The footprint of the buildings is not yet known and will be confirmed during the EIA Phase. The footprint of the turbines and associated infrastructure may exceed 100 m² in total. The exact position of the WEF and all associated infrastructure and activities will be ascertained during the EIA Phase. Considering the extent of the development area, it is anticipated that this Listed Activity will be triggered.

[18] Listing Notice 1 of the EIA Regulations, promulgated under Government Notice R983 of 4 December 2014, as amended by Government Notice R327 of 7 April 2017; Listing Notice 2 of the EIA Regulations, promulgated under Government Notice R984 of 4 December 2014, as amended by Government Notice R325 of 7 April 2017; Listing Notice 3 of the EIA Regulations, promulgated under Government Notice R985 of 4 December 2014, as amended by Government Notice R324 of 7 April 2017.

Listing Notices 1 - 3[18] 07 April 2017	Listed Activity	Project Description
Listing Notice 1 GN R 327 Activity 19	*The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;*	The construction of the WEF would likely include the excavation of soil in watercourses/drainage line areas, and infilling/deposition may exceed 5 cubic metres and in some instances may exceed 10 cubic metres. Borrow pits for the sourcing of aggregate material may be required. The location of these in relation to watercourses will be determined during the EIA Phase. The construction of associated infrastructure, such as access tracks crossing watercourses may require excavation and/or infilling of watercourse areas. The extent and location of this activity will be clarified during the EIA Phase.
Listing Notice 1 GN R 327 Activity 24	*The development of a road— (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;*	Access roads will be required between turbines. These roads will be unsealed and will likely be between 8 - 14 m in width. The roads will be up to 14 m wide during construction, but will be reduced during operation. This will be confirmed during the EIA Phase.
Listing Notice 1 GN R 327 Activity 27	*The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation*	The infrastructure and building area of the proposed WEF may require clearing of at least 1 hectare of indigenous vegetation in total. The volume of vegetation to be removed, and the nature of this vegetation will be determined during the EIA Phase, through the required specialist studies.

Listing Notices 1 - 3[18] 07 April 2017	Listed Activity	Project Description
Listing Notice 1 GN R 327 Activity 48	*The expansion of—* *(i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more;* *where such expansion occurs—* *(a) within a watercourse;* *(b) in front of a development setback; or* *(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;*	Existing bridges over watercourses may need to be expanded widened.
Listing Notice 1 GN R 327 Activity 56	*The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre-* *(i) where the existing reserve is wider than 13,5 meters; or* *(ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas.*	Existing farm access roads may need to be widened or lengthened. These roads would currently have no road reserve and may be wider than 8 meters in some areas.
Listing Notice 2 GN R 325 Activity 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 Phezukomoya WEF will consist of a number of wind turbines for electricity generation of more than 20 megawatts (up to 315 MW).
Listing Notice 2 GN R 325 Activity 6	*The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent,*	The construction of the WEF may require a Water Use License in terms of the National Water Act, 1998 (Act No. 36 of 1998).
Listing Notice 2 GN R325 Activity 9	*The development of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kilovolts or more, outside an urban area or industrial complex.*	The construction of a 132/400kV substation yard at the proposed Umsobomvu substation.
Listing Notice 2 GN R 325 Activity 15	*The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for-* *(i) the undertaking of a linear activity;*	The construction of the WEF may require the clearance of more than 20 hectares of vegetation in total across the site.
Listing Notice 3 GN R 324 Activity 4	*The development of a road wider than 4 metres with a reserve less than 13,5 metres.* *a. Eastern Cape* *i. Outside urban areas:*	Internal and external access roads will be constructed, which are wider than 4 m. The site falls outside of an urban

Listing Notices 1 - 3[18] 07 April 2017	Listed Activity	Project Description
	(aa) A protected area identified in terms of NEMPAA, excluding disturbed areas; *(bb) National Protected Area Expansion Strategy Focus areas;* *(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;* *(dd) Sites or areas identified in terms of an international convention;* *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;* *(ff) Core areas in biosphere reserves;* *(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas;* *g. Northern Cape* *Outside urban areas:* *(aa) A protected area identified in terms of NEMPAA, excluding disturbed areas;* *(bb) National Protected Area Expansion Strategy Focus areas;* *(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;* *(dd) Sites or areas identified in terms of an international convention;* *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;* *(ff) Core areas in biosphere reserves;* *(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas;*	area and parts of the site fall within a National Protected Area Expansion Strategy Focus area.
Listing Notice 3 **GN R324** **Activity 10**	*The development and related operation 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. Eastern Cape*	Fuel storage during construction is likely to exceed 30 m^3. The proposed on-site switching station is likely to require the use of transformer oils/other hazardous substances

Listing Notices 1 - 3[18] 07 April 2017	Listed Activity	Project Description
	i. Outside urban areas: *(aa) A protected area identified in terms of NEMPAA, excluding conservancies;* *(bb) National Protected Area Expansion Strategy Focus areas;* *(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;* *(dd) Sites or areas identified in terms of an international convention;* *ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;* *(ff) Core areas in biosphere reserves;* *(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve;* *(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;* *(jj) Within 500 metres of an estuarine functional zone, excluding areas falling behind the development setback line;* *(ll) Within a watercourse; or*	during the operational phase. The site falls outside of an urban area and parts of the site fall within a National Protected Area Expansion Strategy Focus area.
Listing Notice 3 **GN R324** **Activity 12**	*The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.* *a. Eastern Cape* *i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;* *ii. Within critical biodiversity areas identified in bioregional plans;* *iv. Outside urban areas, within 100 metres inland from an estuarine functional zone; or* *v. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.* *g. Northern Cape*	The proposed development will require the clearance of natural vegetation in excess of 300 m^2 in areas of natural vegetation. The area has not yet been mapped for Critical Biodiversity Areas.

Listing Notices 1 - 3[18] 07 April 2017	Listed Activity	Project Description
	i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; *ii. Within critical biodiversity areas identified in bioregional plans;* *iii. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuary, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas; or* *iv. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.*	
Listing Notice 3 **GN R324** **Activity 14**	*The development of—* *(i) dams or weirs, wherethe dam or weir, including infrastructure and water surface area exceeds 10 square metres; or* *(ii) infrastructure or structures with a physical footprint of 10 square metres or more;* *where such development occurs—* *(a) within a watercourse;* *(b) in front of a development setback; or* *(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;* *a. Eastern Cape* *i. Outside urban areas:* *(aa) A protected area identified in terms of NEMPAA, excluding conservancies;* *(bb) National Protected Area Expansion Strategy Focus areas;* *(cc) World Heritage Sites;* *(dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;* *(ee) Sites or areas identified in terms of an international convention;* *(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;*	Bridges and infrastructure may be constructed within 32 m of watercourse(s). The site lies outside of an urban area.

Listing Notices 1 - 3[18] 07 April 2017	Listed Activity	Project Description
	gg) Core areas in biosphere reserves; *(hh) Areas within 10 kilometres from national parks or world heritage sites or 5* *kilometres from any other protected area identified in terms of NEMPAA or* *from the core area of a biosphere reserve;* *(jj) In an estuarine functional zone, excluding areas falling behind the development setback line;* *g. Northern Cape* *ii. Outside urban areas:* *(aa) A protected area identified in terms of NEMPAA, excluding conservancies;* *(bb) National Protected Area Expansion Strategy Focus areas;* *(cc) World Heritage Sites;* *(dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;* *(ee) Sites or areas identified in terms of an international convention;* *(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;* *(gg) Core areas in biosphere reserves;* *(hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve;*	
Listing Notice 3 **GN R324** **Activity 18**	*The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.* *a. Eastern Cape* *i. Outside urban areas:* *(aa) A protected area identified in terms of NEMPAA, excluding conservancies;* *(bb) National Protected Area Expansion Strategy Focus areas;* *(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;* *(dd) Sites or areas identified in terms of an international convention;* *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;* *(ff) Core areas in biosphere reserves;*	Existing farm roads may need to be widened or lengthened. The site lies outside urban areas, and contains indigenous vegetation.

Listing Notices 1 - 3[18] 07 April 2017	Listed Activity	Project Description
	(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; *(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;* *(jj) An estuarine functional zone, excluding areas falling behind the development setback line; or* *(kk) A watercourse;*	
Listing Notice 3 **GN R324** **Activity 23**	*The expansion of—* *(ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more;* *where such expansion occurs—* *(a) within a watercourse;* *(b) in front of a development setback adopted in the prescribed manner; or* *(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;* *a. Eastern Cape* *i. Outside urban areas:* *(aa) A protected area identified in terms of NEMPAA, excluding conservancies;* *(bb) National Protected Area Expansion Strategy Focus areas;* *(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;* *(dd) Sites or areas identified in terms of an international convention;* *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;* *(ff) Core areas in biosphere reserves;* *(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve;* *g. Northern Cape* *ii. Outside urban areas:* *(aa) A protected area identified in terms of NEMPAA, excluding conservancies;* *(bb) National Protected Area Expansion Strategy Focus areas;*	The construction of the WEF may include the expansion of existing bridges over watercourses. The site lies outside of any urban area, and parts of the site fall within a National Protected Area Expansion Strategy Focus area.

Listing Notices 1 - 3[18] **07 April 2017**	**Listed Activity**	**Project Description**
	(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; *(dd) Sites or areas identified in terms of an international convention;* *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;* *(ff) Core areas in biosphere reserves;* *(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve;*	

5.2 The National Heritage Resources Act, 1990 (Act 25 of 1999)

Section 38 (1) of the National Heritage Resources Act, 1990 (NHRA) lists development activities that would require authorisation by the responsible heritage resources authority. Activities considered applicable to the proposed project include the following:

"*(a) The construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;*
(c) any development or other activity which will change the character of a site; and
(i) exceeding 5000 m² in extent."

The NHRA requires that a person intending to undertake such an activity must notify the relevant national and provincial heritage authorities at the earliest stages of initiating such a development.

The relevant heritage authority would then in turn, notify the person whether a Heritage Impact Assessment Report should be submitted. According to Section 38(8) of the NHRA, a separate report would not be necessary if an evaluation of the impact of such development on heritage resources is required in terms of the Environment Conservation Act, 1989 (No. 73 of 1989) (ECA) (now replaced by NEMA) or any other applicable legislation. The decision-making authority must ensure that the heritage evaluation fulfils the requirements of the NHRA and take into account any comments and recommendations made by the relevant heritage resources authority. As such, a Heritage Impact Assessment (HIA) will form part of this EIA process.

In South Africa, the law is directed towards the protection of human made heritage, although places and objects of scientific importance are covered. The NHRA also protects intangible heritage such as traditional activities, oral histories and places where significant events happened. Generally protected heritage, which must be considered in any heritage assessment, includes:

- Any place of cultural significance (described below);
- Buildings and structures (greater than 60 years of age);
- Archaeological sites (greater than 100 years of age);
- Palaeontological sites and specimens;
- Shipwrecks and aircraft wrecks; and
- Graves and grave yards.

Section 3(3) of the NHRA defines the cultural significance of a place or objects with regard to the following criteria:

(a) its importance in the community or pattern of South Africa's history;
(b) its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
(c) its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
(d) its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
(e) its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
(f) its importance in demonstrating a high degree of creative or technical achievement at a particular period;
(g) its strong or special association with a particular community or cultural group for social cultural or spiritual reasons;
(h) its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
(i) sites of significance relating to the history of slavery in South Africa.

While not specifically mentioned in the NHRA, Scenic Routes are recognised as a category of heritage resources which requires grading as the Act protects area of aesthetic significance (clause "e" above).

During the Scoping Phase of this process, the heritage impact assessment will be submitted to the SAHRA for comment.

5.3 Subdivision of Agricultural Land Act, 1970 (Act 70 of 1970)

In terms of the Subdivision of Agricultural Land Act, 1970, any application for change of land use must be approved by the Minister of Agriculture.

5.4 Conservation of Agricultural Resources, 1983 (Act 43 of 1983)

The Conservation of Agricultural Resources Act (CARA), 1983 states that no degradation of natural land is permitted. The Act requires the protection of land against soil erosion and the prevention of water logging and salinization of soils by means of suitable soil conservation works to be constructed and maintained. The utilisation of marshes, water sponges and watercourses are also addressed.

5.5 The Environment Conservation Act, 1989 (Act No.73 of 1989), the National Noise Control Regulations: GN R154 of 1992

The Environment Conservation Act, 1989 (ECA) allows the Minister of Environmental Affairs and Tourism ("now the Minister of Environmental Affairs") to make regulations regarding noise, amongst other concerns. The Minister has made noise control regulations under the ECA.

In terms of section 25 of the ECA, the national noise-control regulations (NCR) were promulgated (GN R154 in *Government Gazette* No. 13717 dated 10 January 1992). The NCRs were revised under Government Notice Number R. 55 of 14 January 1994 to make it obligatory for all authorities to apply the regulations.

Subsequently, in terms of Schedule 5 of the Constitution of South Africa of 1996 legislative responsibility for administering the NCR was devolved to provincial and local authorities.

These regulations define "**disturbing noise**" as:

"*noise level which exceeds the zone sound level or, if no zone sound level has been designated, a noise level which exceeds the ambient sound level at the same measuring point by 7 dBA or more*".

These Regulations prohibits anyone for causing a disturbing noise.

No provincial noise control regulations have been promulgated in the Northern nor in the Eastern Cape Provinces and thus the National Noise Control Regulations be relevant here.

5.6 National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)

Section 34 of the Air Quality Act, 2004 (AQA) makes provision for:

(1) the Minister to prescribe essential national noise standards -
- (a) for the control of noise, either in general or by specified machinery or activities or in specified places or areas; or
- (b) for determining –
  - (i) a definition of noise; and
  - (ii) the maximum levels of noise.

(2) When controlling noise the provincial and local spheres of government are bound by any prescribed national standards.

This section of the Act is in force but no such standards have yet been promulgated.

An atmospheric emission license issued in terms of Section 22 may contain conditions in respect of noise. This however will not be relevant to the WEF.

5.7 National Water Act, 1998 (Act 36 of 1998)

The National Water Act, 1998 (NWA) provides for constitutional requirements including pollution prevention, ecological and resource conservation and sustainable utilisation. In terms of this Act, all water resources are the property of the State.

A water resource includes any watercourse, surface water, estuary or aquifer, and, where relevant, its bed and banks. A watercourse is interpreted as a river or spring; a natural channel in which water flows regularly or intermittently; a wetland lake or dam into which or from which water flows; and any collection of water that the Minister may declare to be a watercourse.

Relevant water uses for the proposed construction of WEF, which will require access roads over watercourses and drainage channels, in terms of Section 21 of the Act include, but are not limited to, the following:

Section 21(c): Impeding or diverting the flow of water in a watercourse; and
Section 21(i): Altering the bed, banks, course or characteristics of a watercourse.

GN 1199 of 18 December 2009 grants general authorisation for the above water uses based on certain conditions. It is also stipulates that these water uses must be registered with the responsible authority.

Pollution of river water is a contravention of the NWA. Chapter 3, Part 4 of the NWA deals with pollution prevention and in particular the situation where pollution of a water resource occurs or might occur as a result of activities on land. The person who owns, controls, occupies or uses the land in question is responsible for taking measures to prevent pollution of water resources.

Chapter 3, Part 5 of the NWA deals with pollution of water resources following an emergency incident, such as an accident involving the spilling of a harmful substance that finds or may find its way into a water resource. The responsibility for remedying the situation rests with the person responsible for the incident or the substance involved.

The EIA Phase shall determine whether any general authorisations or Water Use License Applications (WULAs) will be required in terms of the NWA for the proposed development.

5.8 National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) – Threatened or Protected Species List

Amendments to the Threatened or Protected Species (TOPS) list were published on 31 March 2015 in Government Gazette No. 38600 and Notice 256 of 2015. Certain bird species that occur on the site may be threatened or protected.

5.9 The Nature and Environmental Conservation Ordinance No 19 of 1974; and Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009)

These were developed to protect both animal and plant species within the various provinces of the country which warrant protection. These may be species which are under threat or which are already considered to be endangered and species are listed in the relevant documents. The provincial environmental authorities are responsible for the issuing of permits in terms of this legislation.

5.10 Additional Relevant Legislation

The applicant must also comply with the provisions of other relevant national legislation. Additional relevant legislation that has informed the scope and content of this Draft Scoping Report includes the following:

- Constitution of the Republic of South Africa, 1996 (Act No. 108, 1996);
- Aviation Act, 1962 (Act No. 74, 1962);
- National Environmental Management: Waste Act, 2008 (Act No. 59, 2008);
- National Forest Act, 1998 (Act No. 84, 1998);
- National Environmental Management: Protected Areas Act, 2003(Act No. 57, 2003);
- National Roads Act, 1998 (Act No. 7, 1998)
- Occupational Health and Safety Act, 1993 (Act No. 85 of 1993);
- National Veld and Forest Fire Bill of 10 July 1998;
- Fertiliser, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947;
- Astronomy Geographic Advantage Act, 2007 (Act No. 21 of 2007);
- Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002); and
- Independent Communications Authority of South Africa Act, 2000 (Act No. 13 of 2000; as amended).

5.11 Conventions and Treaties

5.11.1 The Convention on Biological Diversity (CBD) (1993)

This is a multilateral treaty for the international conservation of biodiversity, the sustainable use of its components and fair and equitable sharing of benefits arising from natural resources. Signatories have the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.

The convention prescribes that signatories identify components of biological diversity important or conservation and monitor these components in light of any activities that have been identified which are likely to have adverse impacts on biodiversity. The CBD is based on the precautionary principle which states that where there is a threat of significant reduction or loss of biological diversity, lack of full scientific certainty should not be used as a reason for postponing measures to avoid or minimize such a threat and that in the absence of scientific consensus the burden of proof that the action or policy is not harmful falls on those proposing or taking the action.

5.11.2 The Convention on the Conservation of Migratory Species of Wild Animals (CMS or Bonn Convention) (1983)

An intergovernmental treaty, concluded under the sponsorship of the United Nations Environment Programme, concerned with the conservation of wildlife and habitats on a global scale. The fundamental principles listed in Article II of this treaty state that signatories acknowledge the importance of migratory species being conserved and agree to take action to this end "*whenever possible and appropriate*", "*paying special attention to migratory species the conservation status of which is unfavourable and taking individually or in cooperation appropriate and necessary steps to conserve such species and their habitat*".

5.11.3 The Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) (1999)

An intergovernmental treaty developed under the framework of the Convention on Migratory Species (CMS), concerned the coordinated conservation and management of migratory waterbirds throughout their entire migratory range. Signatories of the Agreement have expressed their commitment to work towards the conservation and sustainable management of migratory waterbirds, paying special attention to endangered species as well as to those with an unfavourable conservation status. The assessment of the ecology and identification of sites and habitats for migratory waterbirds is required to coordinate efforts that ensure that networks of suitable habitats is maintained and investigate problems likely posed by human activities.

5.12 Policies and Guidelines

5.12.1 Environmental Impact Assessment Guidelines

Relevant guidelines and policies as applicable to the management of the EIA process and to this application have also been taken into account, as indicated below:

- Integrated Environmental Management (IEM) Guideline Series (Series 2): Scoping in the EIA process (2002);
- IEM Guideline Series (Series 3): Stakeholder engagement (2002);
- IEM Guideline Series (Series 4): Specialist studies (2002);
- IEM Guideline Series (Series 5): Impact Significance (2002);
- IEM Guideline Series (Guideline 5): Companion to the EIA Regulations 2010 (October 2012);
- IEM Guideline Series (Series 7): Cumulative Effects Assessment (2002);
- IEM Guideline Series (Guideline 7): Public Participation in the EIA process (October 2012);
- IEM Guideline Series (Series 7): Alternatives in the EIA process (2002);
- IEM Guideline Series (Guideline 9): Draft guideline on need and desirability in terms of the EIA Regulations 2010 (October 2012);
- DEA (2017) Guideline on Need and Desirability, Department of Environmental Affairs (DEA) Pretoria, South Africa;
- IEM Guideline Series (Series 12): Environmental Management Plans (EMP) (2002); and
- IEM Guideline Series (Series 15): Environmental impact reporting (2002).

5.12.2 Noise Standards

5.12.2.1 National

Four South African Bureau of Standards (SABS) scientific standards are considered relevant to noises from a Wind Energy Facility. They are:

- SANS 10103:2008. 'The measurement and rating of environmental noise with respect to annoyance and to speech communication';
- SANS 10210:2004. 'Calculating and predicting road traffic noise';
- SANS 10328:2008. 'Methods for environmental noise impact assessments'; and
- SANS 10357:2004. 'The calculation of sound propagation by the Concave method'.

The relevant standards use the equivalent continuous rating level as a basis for determining what is acceptable. The levels may take single event noise into account, but single event noise by itself does not determine whether noise levels are acceptable for land use purposes. The recommendations that the standards make are likely to inform decisions by authorities, but non-compliance with the standards will not necessarily render an activity unlawful *per se.*

5.12.2.2 International

There exists a number of international guidelines and the three described below are selected as they are used by different countries in the subject of environmental noise management, with the last two documents specifically focussing on the noises associated by wind energy facilities. Due to the lack of local regulations specifically relevant to WEF, these guidelines will also be considered during the determination of the significance of noise impacts.

Guidelines for Community Noise (Word Health Organisation, 1999)

The World Health Organization's (WHO) document on the Guidelines for Community Noise is the outcome of the WHO- expert task force meeting held in London, United Kingdom, in April 1999. It is based on the document entitled "Community Noise" that was prepared for the World Health Organization and published in 1995 by the Stockholm University and Karolinska Institute.

The scope of WHO's effort to derive guidelines for community noise is to consolidate actual scientific knowledge on the health impacts of community noise and to provide guidance to environmental health authorities and professionals trying to protect people from the harmful effects of noise in non-industrial environments.

Guidance on the health effects of noise exposure of the population has already been given in an early publication of the series of Environmental Health Criteria. The health risk to humans from exposure to environmental noise was evaluated and guidelines values derived. The issue of noise control and health protection was briefly addressed.

The document uses the LAeq and LA,max descriptors to define noise levels with the instrument likely using the "Fast"-time weighting. This document was important in the development of the SANS 10103 standard.

The Assessment and Rating of Noise from Wind Farms (1997)

This report describes the findings of a Working Group on Wind Turbine Noise, facilitated by the United Kingdom Department of Trade and Industry. It was developed as an Energy Technology Support Unit[19] (ETSU) project. The aim of the project was to provide information and advice to developers and planners on noise from wind turbines. The report represents the consensus view of a number of experts (experienced in assessing and controlling the environmental impact of noise from wind farms). Their findings can be summarised as follows:

1. Absolute noise limits applied at all wind speeds are not suited to wind farms; limits set relative to the background noise (including wind) are more appropriate.
2. $L_{A90,10mins}$ is a much more accurate descriptor when monitoring ambient and turbine noise levels.
3. The effects of other wind turbines in a given area should be added to the effect of any proposed wind energy facility, to calculate the cumulative effect.
4. Noise from a wind energy facility should be restricted to no more than 5 dBA above the current ambient noise level at a NSD. Ambient noise levels is measured onsite in terms of the $L_{A90,10min}$ descriptor for a period sufficiently long enough for a set period
5. Wind farms should be limited to within the range of 35 dBA to 40 dBA (day-time) in a low noise environment. A fixed limit of 43 dBA should be implemented during all night time noise environments. This should increase to 45 dBA (day and night) if the NSD has financial investments in the wind energy facility.

[19] ETSU was set up in 1974 as an agency by the United Kingdom Atomic Energy Authority to manage research programmes on renewable energy and energy conservation. The majority of projects managed by ETSU were carried out by external organizations in academia and industry. In 1996, ETSU became part of AEA Technology plc which was separated from the UKAEA by privatisation.

6. A penalty system should be implemented for wind turbine/s that operates with a tonal characteristic

This is likely the guideline used in the most international countries to estimate the potential noise impact stemming from the operation of a Wind Energy Facility. It also recommends an improved methodology (compared to a fixed upper noise level) on determining ambient sound levels in periods of higher wind speeds, critical for the development of a wind energy facility. Because of its international importance, the methodologies used in the ETSU R97 document will be recommended in this Scoping Report for implementation during the Environmental Noise Impact Assessment phase should projected noise levels (from the proposed WEF at PSRs) exceed the zone sound levels as recommended by SANS 10103:2008.

The document uses the $L_{Aeq,f}$ and L_{A90} descriptors to define noise levels using the "Fast"-time weighting.

Noise Guidelines for Wind Farms (MoE, 2008)[20]

This document establishes the sound level limits for land-based wind power generation facilities and describes the information required for noise assessments and submissions under the Environmental Assessment Act and the Environmental Protection Act, Canada (Table 5:2).

The document defines:

- Sound Level Limits for different areas (similar to rural and urban areas), defining limits for different wind speeds at 10 m height; and
- The Noise Assessment Report, including:
    - Information that must be part of the report;
    - Full description of noise sources;
    - Adjustments, such as due to the wind speed profile (wind shear);
    - The identification and defining of potential sensitive receptors;
    - Prediction methods to be used (ISO 9613-2);
    - Cumulative impact assessment requirements;
    - It also defines specific model input parameters;
    - Methods on how the results must be presented; and
    - Assessment of Compliance (defining magnitude of noise levels).

Table 5.2: Summary of Sound Level Limits for Wind Farms (MoE)

Wind speed (m/s) at 10 m height	4	5	6	7	8	9	10
Wind Turbine Sound Level Limits, Class 3 Area, dBA	40	40	40	43	45	49	51
Wind Turbine Sound Level Limits, Class 1 & 2 Areas, dBA	45	45	45	45	45	49	51

The document used the $L_{Aeq,1h}$ noise descriptor to define noise levels. It is not clear whether the instrument must be set to the "Fast" or "Impulse" time weighing setting, but, as the "Fast" setting is used in most international countries it is assumed that the instrument will be set to the "Fast" setting.

It should be noted that these Sound Level Limits are included for the reader to illustrate the criteria used internationally. Due to the lack of local regulations specifically relevant to wind energy facilities this criteria will also be considered during the determination of the significance of the noise impact.

[20] Noise Guidelines for Wind Farms Interpretation for Applying MOE NPC Publications to Wind Power Generation Facilities Ministry of the Environment, Ontario, October 2008.

The Equator Principles (EPs) III, 2013

The principles applicable to the project are likely to include:

- Principle 2: Environmental and Social Assessment;
- Principle 3: Applicable Environmental and Social Standards;
- Principle 4: Environmental and Social Management System and Equator Principles Action Plan;
- Principle 5: Stakeholder Engagement;
- Principle 6: Grievance Mechanism;
- Principle 7: Independent Review;
- Principle 8: Covenants;
- Principle 9: Independent Monitoring and Reporting; and
- Principle 10: Reporting and Transparency.

These principles, among various requirements, include a requirement for an assessment process (e.g. EIA process), an Environmental and Social Management Plan (ESMP) to be prepared by the client to address issues raised in the Assessment process and incorporate actions required to comply with the applicable standards, and the appointment of an independent environmental expert to verify monitoring information.

5.12.3 South African Wind Energy Facility Guidelines

The following guidelines are relevant to the proposed WEF and the potential impacts they may have on bats/avifauna and habitat that support bats/avifauna:

- South African Good Practise Guidelines for Surveying Bats in Wind Energy Facility Developments – Pre-Construction (2014);
- South African Good Practise Guidelines for Operational Monitoring for Bats at Wind Energy Facilities (2014); and
- Best Practice Guidelines for Avian Monitoring and Impact Mitigation at Proposed Wind Energy Development Sites in Southern Africa. BirdLife South Africa/Endangered Wildlife Trust (2012).

6 ASSESSMENT OF ALTERNATIVES

Alternatives are different means of meeting the general purpose and need of a proposed development and may include alternative sites, alternative layouts or designs, alternative technologies and the "no development" or "no go" alternative. This section describes alternatives in relation to the proposed development. Table 6.1 provides a summary of the alternative assessed.

The EIA Regulations indicate that alternatives that are considered in an assessment process should be reasonable and feasible, and that I&APs should be provided with an opportunity to provide inputs into the process of formulating alternatives.

The assessment of alternatives should, as a minimum, include the following:

- The consideration of the no-development or "no-go option" alternative as a baseline scenario;
- A comparison of reasonable and feasible selected alternatives; and
- The provision of reasons for the elimination of an alternative.

6.1 The No Development Scenario or "No-Go Option"

This scenario assumes that the proposed development does not proceed. It is equivalent to the future baseline scenario in the absence of the proposed development.

Relative to the proposed development, the implications of this scenario include:

- The land-use remains agricultural, with no further benefits derived from the implementation of a complementary land use;
- There is no change to the current landscape or environmental baseline;
- No additional electricity will be generated onsite or supplied through means of renewable energy resources. This would have negative implications for the South African government in achieving its proposed renewable energy target, given the need for increased generation;
- There is no opportunity for additional employment (permanent or temporary) in the local area where job creation is identified as a key priority; and
- The national and local economic benefits associated with the proposed project's REIPPPP commitments and broader benefits would not be realised.

The purpose of the proposed development is to generate renewable electricity and export this to the national grid. Other socio-economic and environmental benefits will result from the proposed development such as:

- Reduced air pollution emissions - burning fossil fuels generates CO_2 emissions which contributes to global warming. Emissions of sulphurous and nitrous oxides are produced which are hazardous to human health and impact on ecosystem stability;
- Water resource saving – conventional coal fired power stations use large quantities of water during their cooling processes. WEFs require limited amounts of water during construction and a minimal amount of water during operation. As a water stressed country, South Africa needs to be conserving such resources wherever possible;
- Improved energy security – renewables can be deployed in a decentralised way close to consumers, improving grid strength while reducing expensive transmission and distribution losses. Renewable energy projects contribute to a diverse energy portfolio;
- Exploit significant natural renewable energy resources – biomass, solar and wind resources remain largely unexploited;
- Sustainable energy solutions – the uptake of renewable energy technology addresses the country's energy needs, generation of electricity to meet growing demands in a manner which is sustainable for future generations; and

- Employment creation and other local economic benefits associated with support for a new industry in the South African economy.

The 'No Development' alternative would not assist the government in addressing climate change, energy security and economic development. Implementing this option would also not allow for any beneficial socio-economic and environmental impacts as outlined above.

Addressing climate change is one of the benefits associated with the implementation of this proposed development. Climate change is widely considered by environmental professionals as one of the single largest threats to the environment on a local, national and global scale.

Based on the above, the 'No Development' alternative is not a preferred alternative.

6.2 Site Selection

Feasibility studies undertaken by InnoWind indicated that the Phezukomoya WEF site is suitable to develop and operate a wind farm as it satisfies the following criteria:

- Feasibility of access for wind turbine delivery, the site is easily accessible from the national road;
- Proximity to the Eskom grid with available evacuation capacity;
- Viable wind resource;
- The surrounding area is not densely populated and has very limited tourism related activities;
- The proposed site is transformed agricultural land and current land use is gazing;
- Willingness of landowners to host a wind farm on their properties; and
- Support received from the Umsobomvu Municipality which is a landowner of the project.

It was concluded, based on available information, that the Phezukomoya site is suitable for the development of wind turbines.

6.3 Design Evolution Alternatives

Following the selection of a suitable consideration is given to the design of the WEF and grid connection within that site. It is important that wind turbines are sited in the optimum position to maximise the wind energy yield whilst minimising environmental impacts as far as possible.

Information collated during the Scoping Phase will be used to inform the design of the WEF progressively. Best practice advises that the EIA should be an iterative process rather than a post design environmental appraisal. In this way, the findings of the technical environmental studies will be used to inform the design of a development.

This approach will be adopted with respect to this proposed development; and where potentially significant impacts are identified, efforts will be made to avoid these through evolving the design of the proposed development. This will be referred to within this report as mitigation to be embedded in the layout and design, or 'embedded mitigation'.

A preliminary layout was produced showing suggested locations of wind farm turbines on the site. This layout will be adjusted, based on the initial scoping assessment and specialists' findings. This adjusted layout will be called the 'preferred layout' and will be assessed in further detail during the EIA Phase.

There are two proposed alignments for the grid connection, namely 'the alternative' and 'the preferred'. As shown in Figure 3.2, the preferred grid alignment (16 km) runs west from the on-site switching station, travelling south to the Eskom Umsobomvu substation. The alternative alignment (17 km) runs south and then southwest to the Umsobomvu substation.

The preferred grid alignment is preferred as most of the specialists, particularly the visual specialist, noted that this proposed alignment would have less of an impact on the sensitive receptor locations.

The preferred grid alignment will be assessed in further detail by the specialists during the EIA Phase.

6.4 Technology Alternatives

Additional renewable energy technologies include hydro-electric power, photovoltaic solar or concentrated solar power. The site itself has no resource for hydro-electricity. The site topography is less suited to the construction of large scale ground mounted solar facilities. Solar electricity generation would also require a much greater infrastructure footprint to generate the equivalent energy of the proposed WEFs.

Wind energy is likely to present less of an impact on the continued use of the land for grazing, as it does not result in the shading that occurs from solar facilities which may affect vegetation and consequently farming practices. Whilst there are potential impacts associated with wind energy which are not associated with solar, such as collision risk with avifauna, there are different potential impacts for solar facilities such as loss of habitat and foraging areas for avifauna and other ecological receptors.

Based on the site's physical characteristics and existing land uses, the renewable energy technology best suited to the site, taking into account the potential environmental impacts, is a WEF, however the specific design at the site should be informed by the EIA process as outlined below.

Various wind turbine designs and layouts will be considered for the site in order to maximise the electricity generation capacity and efficiency, whilst taking into account environmental constraints. The turbine manufacturer and turbine model has not yet been determined and will not be decided upon until the completion of further wind analysis and competitive tendering.

Table 6.1: Assessed Alternatives Summary

Alternative Type	Alternative description	Advantages	Disadvantages	Result
No Development	The proposed development does not proceed	• No change in current landscape or environmental baseline • No risk of negative environmental and social impacts	• Land use remains agricultural, without benefits from complimentary land use • No additional electricity will be generated through renewable resources • No opportunity for additional employment (permanent or temporary) in an area where job creation is identified as a key priority • No socio-economic benefits for the community associated with the establishment of a renewable energy facility • The government will not be assisted in addressing climate change, energy security and economic development	Not reasonable
Location	The Proposed Development Site	• Good wind • Accessible for wind turbine delivery • Adjacent to existing WEF so that visually perceived as a cohesive cluster, not additional wind farm • Proximity to Eskom grid • Surrounding area not densely populated • Site is transformed agricultural land with current land use grazing	• Potential visual sensitive receptors. • Potential loss of sense of place. • Potential ecological sensitivities.	Reasonable and feasible
Location	Different location in the area	• Adjacent to proposed San Kraal WEF	• Landowner consent	Reasonable Not feasible
Technology	Wind Energy Facility	• Emits no CO_2 and has no fuel costs • Continued use of land for grazing • Small footprint (habitat loss) compared to solar power	• WEFs pose collision risk to birds and bats • Potential visual impact and impact on sense of place • Dependent on availability of wind	Feasible and reasonable
Technology	Photo-voltaic or concentrated solar	• Solar PV poses less risk to birds and bats	• Site topography less suitable for large scale ground mounted solar facilities	Not reasonable

Alternative Type	Alternative description	Advantages	Disadvantages	Result
			• Solar power has much larger footprint (habitat loss)	
Technology	Concentrated Solar Power	• No collision risk to bats	• Site topography less suitable for large scale ground mounted solar facilities • CSP poses collision risk to birds and loss of foraging habitat	Not reasonable
Technology	Hydro-electric	• Almost no emissions and no fuel costs • Large-scale and stable electricity generation • No risk of collision for birds & bats	• No hydro-electric resources in area • Significant impact on the landscape and river systems	Not feasible
Technology	Biomass	• Carbon neutral over time	• More expensive than other forms of energy • Biomass supply difficult to secure at present	Not feasible
Technology	Coal-fired power plant	• Cheapest form of energy and abundant resource • Most amount of long term employment opportunities • Stable and long-term electricity generation	• Emits high levels of CO_2, major pollutant and contributes to climate change • Coal mining impacts significantly on the environment	Not reasonable
Technology	Nuclear power	• Low carbon footprint with small amounts of raw material	• Most expensive form of energy; requires major investments • Safety concerns (highly radioactive raw and waste material) • Radioactive toxic waste product • Very long timelines until energy generation can start	Not reasonable or feasible
Design	Preferred Layout 315 MW - 63 turbines with a generation capacity between 3 – 5 MW and a rotor diameter of up to 150 m, a hub height of up to 150 m and blade length of up to 75 m.	• Maximises wind • Minimises negative impacts • Will be determined during EIA Phase	• Potential residual negative impacts	Reasonable and feasible

Alternative Type	Alternative description	Advantages	Disadvantages	Result
Design grid connection	Preferred route (Figure 3.3) The preferred grid alignment (16 km) runs west from the on-site switching station, travelling south to the Eskom Umsobomvu substation. The preferred grid alignment is preferred due its lower impact on sensitive receptors.	• Minimises negative impacts • Preferred by specialists • Less visually intrusive		Reasonable and feasible
Design grid connection	Alternative Grid Connection The alternative alignment (17 km) runs south and then south west to the Umsobomvu substation.	• Technically feasible	• Closer to the N9 Highway • More visually intrusive • Longer and therefore more impacts	Reasonable and feasible

7 GEOLOGY, SOILS AND AGRICULTURAL POTENTIAL ASSESSMENT

7.1 Baseline Environment

7.1.1 Terrain

The area consists of slightly undulating to steeply sloping topography, with slopes of less than 10% over much of the area, but becoming as steep as 80 – 100% on the escarpment zones of the upper mountain slopes (Figure 1.2). The altitude of the area is between 1600 m and 1700 m in most of the area, but the highest parts are at over 1850 m.

Current land use is dominantly natural vegetation (presumably used for extensive grazing), with a significant proportion of exposed rock.

7.1.2 Climate

The climate of the area has a mostly summer rainfall distribution, but the annual average is low, at around 345 mm per year, although this might be slightly higher in the higher parts of the landscape. Temperatures will be cool to cold in winter, with frequent frost, often heavy, between May and September.

7.1.3 Parent Material

The area is underlain by mudstone of the Beaufort and Tarkastad Groups, Karoo Sequence, along with small areas of dolerite intrusions (Figure 7.1).

7.2 Methodology

Existing information was obtained from the map sheet 3124 Middelburg from the national Land Type Survey. A land type is defined as an area with a uniform terrain type, macroclimate and broad soil pattern. The soils are classified according to MacVicar *et al*. (1977)[21].

7.3 Assumptions and Limitations

- Only the general dominance of the soils in the landscape is given, and not the actual areas of occurrence within a specific land type;
- Other soils that were not identified due to the scale of the survey may also occur; and
- The site was not visited during the course of this study, and so the detailed soil composition of the specific land types has not been groundtruthed. However, this is not seen as a limiting factor for the intent of this study, due to the prevailing shallow soils and steep terrain which is restricting regarding agricultural activities.

7.4 Preliminary Assessment

The area under investigation is covered by five land types (Figure 7.2), namely:

- Da14, Da77 (Duplex soils22, mostly red);
- Fb174, Fb373 (Shallow soils, occasionally calcareous); and
- Ib316 (Shallow soils with much rock).

[21] MacVicar, C.N., de Villiers, J.M., Loxton, R.F, Verster, E., Lambrechts, J.J.N., Merryweather, F.R., le Roux, J., van Rooyen, T.H. & Harmse, H.J. von M., 1977. Soil classification. A binomial system for South Africa. ARC-Institute for Soil, Climate & Water, Pretoria.

[22] Soils with a relatively sandy topsoil horizon abruptly overlying a structured, clayey subsoil horizon

7.4.1 Soils

A summary of the dominant soil characteristics of each land type is given in Table 7.1. The far right column shows the distribution of dryland agricultural potential within each land type, with the dominant class shown in bold. These figures will always add up to 100%, so that the relative proportions of each potential class within every land type can be determined and easily compared with other land types.

7.4.2 Agricultural Potential

There are a minimum of high potential soils in the study area and very few medium potential soils. Every land type is dominated by either (in the west) structured, clayey duplex soils (Swartland and Valsrivier forms) or rock and shallow lithosols (Mispah and Glenrosa soil forms), which have low to very low arable potential.

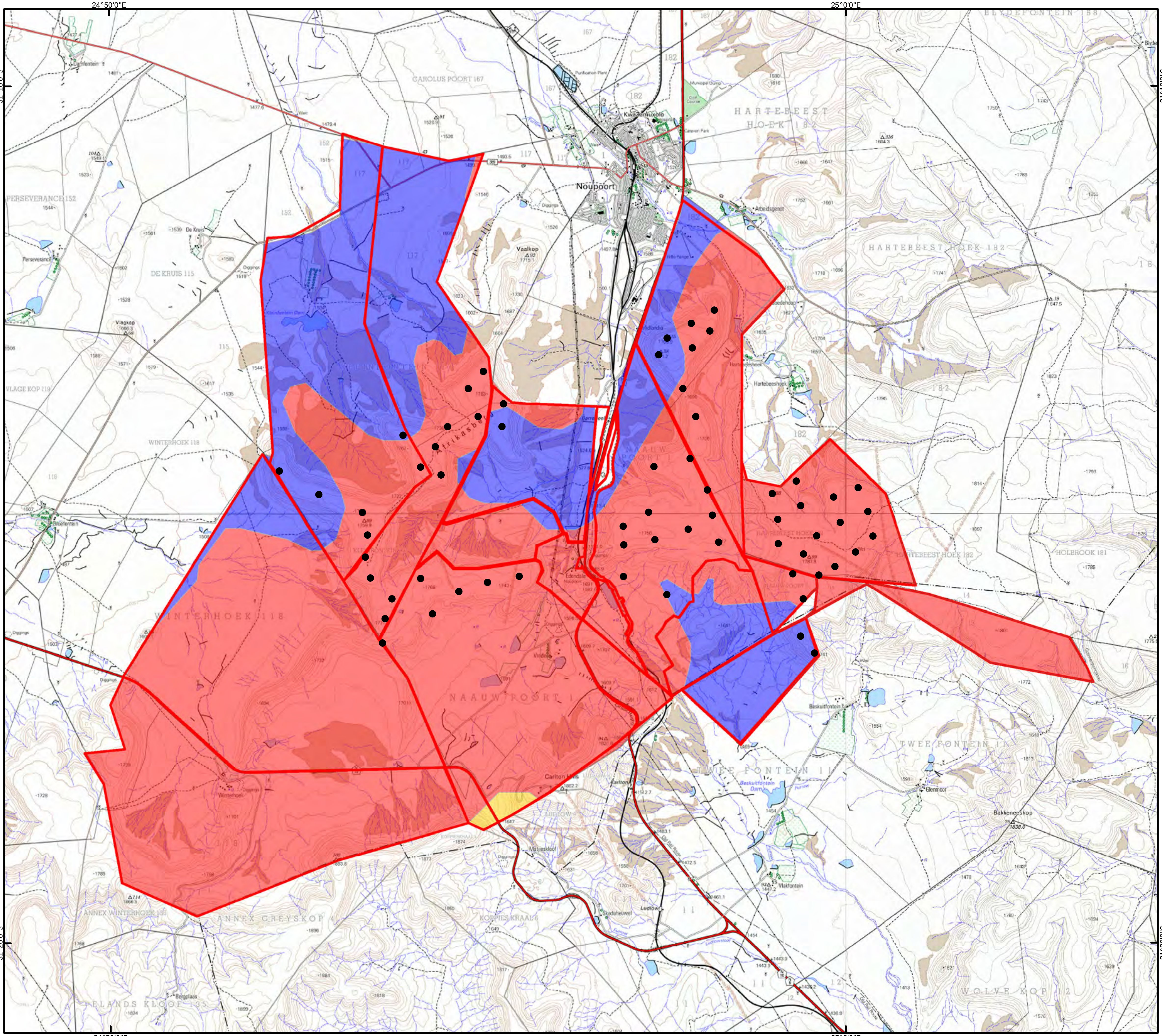
The low rainfall in the area means that there is little potential for rain-fed arable agriculture in the area. Arable production would therefore be problematic without irrigation. Currently, only a few small cultivated lands can be identified, and these occur in the west of the area on the farms Hartebeeshoek and Beskuitfontein (land type Da77).

In general, the soils are suited for extensive grazing at best and the grazing capacity of the area is relatively low, at around 20-30 ha/large stock unit[23].

7.4.3 Recommendations

The prevailing potential of the soils for rain-fed cultivation throughout most of the area is low to very low. It is unlikely that any further detailed investigation will be required.

[23] ARC-ISCW, 2004. Overview of the status of the agricultural natural resources of South Africa (First Edition). ARC-Institute for Soil, Climate and Water, Pretoria.



Basemapping from the Chief Directorate: National Geo-Spatial Information of South Africa

InnoWind

ARCUS

- Site Boundary
- Proposed Turbine Location
- Beaufort Mudstone
- Karoo Dolerite
- Tarkastad Mudstone

1:80 000 Scale @ A3

0 1.5 3 km

N

Produced: AA
Reviewed: SC
Approved: AB

Ref: 2245/REP/007

Date: 06/04/2017

Geological Formations
Figure 7.1

Phezukomoya Wind Energy Facility
Draft Scoping Report

24°50'0"E

25°0'0"E

31°10'0"S

31°20'0"S

Noupoort

Kwazamuxolo

Vaalkop

Site Boundary

Proposed Turbine Location

LANDTYPE

Da14

Da77

Fb174

Fb373

Ib316

1:80 000 Scale @ A3

N

0 1.5 3 km

Produced: AA Reviewed: SC Approved: AB	Ref: 2245/REP/008
	Date: 06/04/2017

Land Types
Figure 7.2

Phezukomoya Wind Energy Facility
Draft Scoping Report

Table 7.1: Land Types occurring (with Soils in Order of Dominance)

Land Type	Dominant soils	Depth (mm)	Percent of land type	Characteristics	Agric. Potential (%)
Da14	Swartland 10/11/12	50-200	44%	Red-brown, sandy topsoils on structured, sandy clay loam to sandy clay subsoils on weathering rock	High: 0.0 Mod: 7.7
	Swartland 31/41	50-200	19%	Grey-brown, sandy topsoils on structured, sandy clay loam to sandy clay subsoils on weathering rock	**Low: 93.3**
Da77	Swartland 10/11 + Valsrivier 21/41	200-800	30%	Red-brown, sandy topsoils on structured, sandy clay loam to sandy clay subsoils on weathering rock	High: 0.0 Mod: 12.2
	Lithosols + rock	50-150	22%	Grey-brown, sandy/loamy topsoils on hard rock, with rock outcrops	**Low: 87.8**
Fb174	Mispah 10/20	20-100	30%	Grey-brown, sandy/loamy topsoils on hard rock/calcrete	High: 0.0 Mod: 12.3
	Glenrosa 13/16	50-150	23%	Grey-brown, sandy/loamy topsoils on weathering rock	**Low: 87.7**
Fb373	Mispah 10/22	50-150	27%	Grey-brown, sandy/loamy topsoils on hard rock/calcrete	High: 0.0 Mod: 7.1
	Swartland 11/12 + Valsrivier 21/41	200-900	16%	Red-brown, sandy topsoils on structured, sandy clay loam to sandy clay subsoils on weathering rock	**Low: 92.9**
Ib316	Rock	-	62%	Surface rock outcrops	High: 0.0 Mod: 3.4
	Mispah 10	50-100	18%	Grey-brown, sandy/loamy topsoils on hard rock	**Low: 96.6**

7.4.4 Preliminary Assessments

Impact Phase: All phases							
Potential impact description: Loss of agricultural land In most environmental investigations, the major impact on the natural resources of the study area would be the loss of potentially agricultural land due to the construction of the turbines and associated infrastructure. However, this impact would be of extremely limited significance and would be local in extent.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	L	L	L	Negative	M	H	H
With Mitigation	L	L	L	Neutral	M	H	H
Can the impact be reversed?	YES – very little land will be affected and soil can be replaced						
Will impact cause irreplaceable loss or resources?	NO – soil potential in vicinity is low, so no agricultural soils will be affected						
Can impact be avoided, managed or mitigated?	YES						
Mitigation measures: • Avoid any areas under cultivation (if any).							
Impact to be addressed/ further investigated and assessed in Impact Assessment Phase?	NO – considered to be insignificant due to very restricted occurrence of agricultural soils						

Impact Phase: Construction Phase							
Potential impact description: Increased soil erosion hazard. In this area, the steep topography in many parts, coupled with the shallow soils, relatively sandy topsoil and dry climate, means that a possible impact would be the increased danger of erosion of the topsoil when vegetation cover is removed. This would be especially relevant for the construction of access roads, turbine sites and other associated infrastructure.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	L	M	M	Negative	M	H	H
With Mitigation	L	L	L	Neutral	M	H	H
Can the impact be reversed?	YES – topsoil coverage can be replaced and affected sites re-vegetated and stabilized						
Will impact cause irreplaceable loss or resources?	NO – soil potential in vicinity is low, so no agricultural soils will be affected						
Can impact be avoided, managed or mitigated?	YES – soil conservation measures should be implemented						
Mitigation measures: • Minimize vegetation removal to smallest possible footprint • Control possible runoff by using soil conservation and soil retention measures, especially on steep slopes • Store any removed topsoil for later use (contains indigenous seeds etc) and re-vegetate as soon as possible • Once specific infrastructure sites are known, site-specific measures can be devised for implementation and any potentially high risk sites can be identified.							
Impact to be addressed/ further investigated and assessed in EIA Phase?	NO						

7.4.5 Cumulative Impacts

The likelihood of cumulative impacts is small. Only if other developments (whether wind farms or not) were to occur, using the same access roads and thereby increasing potential soil erosion aspects, would cumulative impacts need to be considered.

8 FLORA AND FAUNA (TERRESTRIAL ECOLOGY) ASSESSMENT

8.1 Methodology

8.1.1 Desktop study

A desktop review of the available ecological information for the area was conducted in order to identify and characterize the ecological features of the site. This information is used to derive a draft ecological sensitivity map that presents the presumed ecological constraints and opportunities for development at the site, which will then be verified and refined during the EIA process. The information and sensitivity map presented provides an ecological baseline that can be used in the planning phase of the development to ensure that the potential negative ecological impacts associated with the development can be minimized.

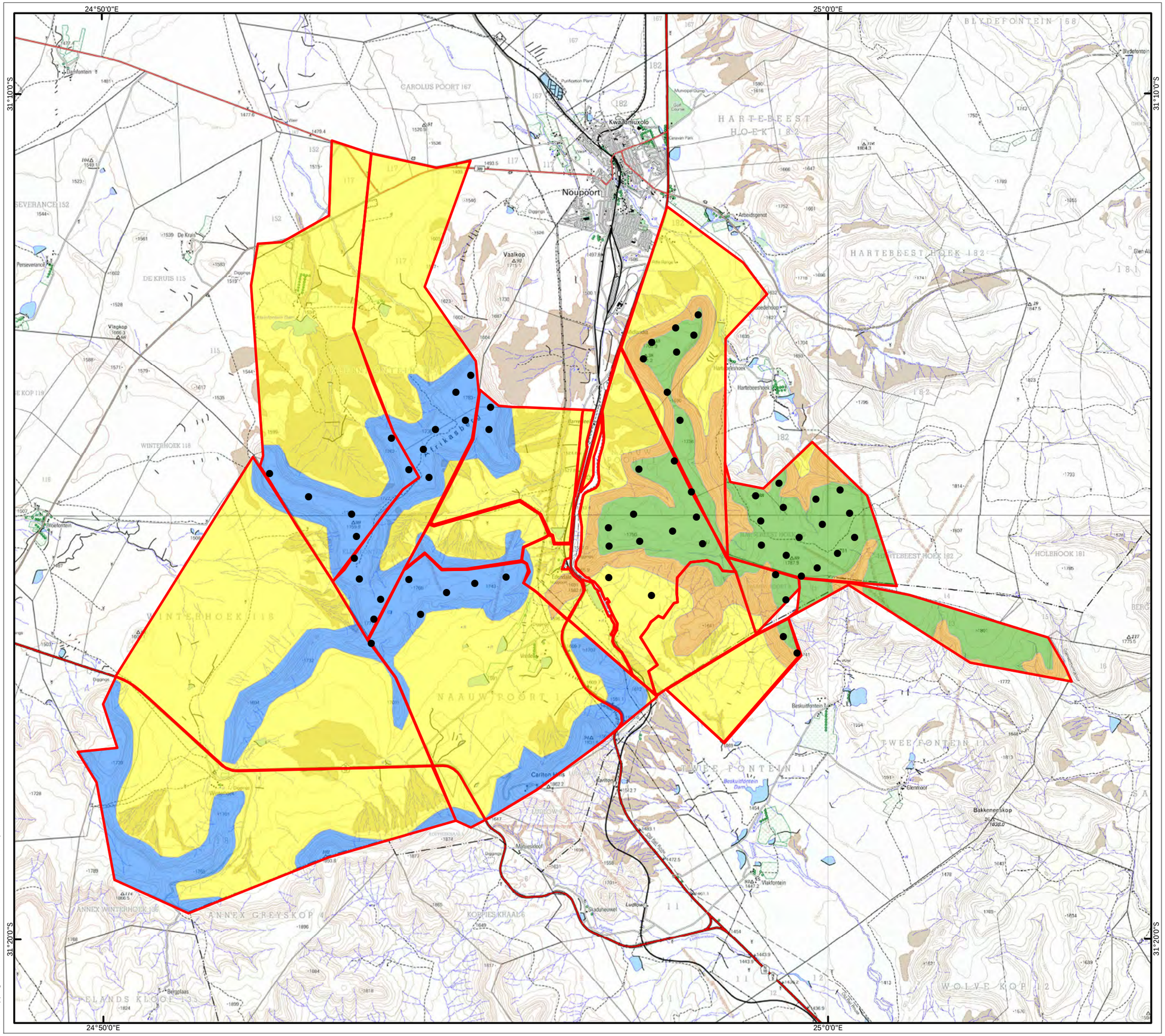
Data sources from the literature consulted and used where necessary in the study includes the following:

8.1.1.1 Vegetation:

- Vegetation types (Figure 8.1) and their conservation status were extracted from the South African National Vegetation Map by Mucina and Rutherford (2006) as well as the National List of Threatened Ecosystems (2011), where relevant;
- No Critical Biodiversity Area or fine scale conservation planning has been conducted for the area but biodiversity priority areas and protected areas expansion areas were extracted from the National Protected Areas Expansion Strategy 2008;
- Information on plant species recorded for the Quarter or Half Degree Squares (QDS) 3124B and 3125A was extracted from the SABIF/SIBIS and POSA database hosted by SANBI. This is a considerably larger area than the study area, but this is necessary to ensure a conservative approach as well as counter the fact that the site itself has probably not been well sampled in the past;
- The IUCN conservation status of the species in the list was also extracted from the database and is based on the Threatened Species Programme, Red List of South African Plants (2013); and
- Freshwater and wetland information was extracted from the National Freshwater Ecosystem Priority Areas assessment, NFEPA. This includes rivers, wetlands and catchments defined under the study.

8.1.1.2 Fauna

- Lists of mammals, reptiles and amphibians which are likely to occur at the site were derived based on distribution records from the literature and the Animal Demography Unit databases;
- Literature consulted includes Branch (1988) and Alexander and Marais (2007) for reptiles, Du Preez and Carruthers (2009) for amphibians, Friedmann and Daly (2004) and Skinner and Chimimba (2005) for mammals;
- The faunal species lists provided are based on species which are known to occur in the broad geographical area, as well as a preliminary assessment of the availability and quality of suitable habitat at the site;
- The conservation status of each species is also listed, based on the IUCN Red List Categories and Criteria 2014 and where species have not been assessed under these criteria, the CITES status is reported where possible. These lists are adequate for mammals and amphibians, the majority of which have been assessed, however the majority of reptiles have not been assessed and therefore, it is not adequate to assess the potential impact of the development on reptiles, based on those with a listed



Basemapping from the Chief Directorate: National Geo-Spatial Information of South Africa

InnoWind

ARCUS

- Site Boundary
- Proposed Turbine Location
- Besemkaree Koppies Shrubland
- Eastern Upper Karoo
- Karoo Escarpment Grassland
- Tarkastad Montane Shrubland

1:80 000 Scale @ A3

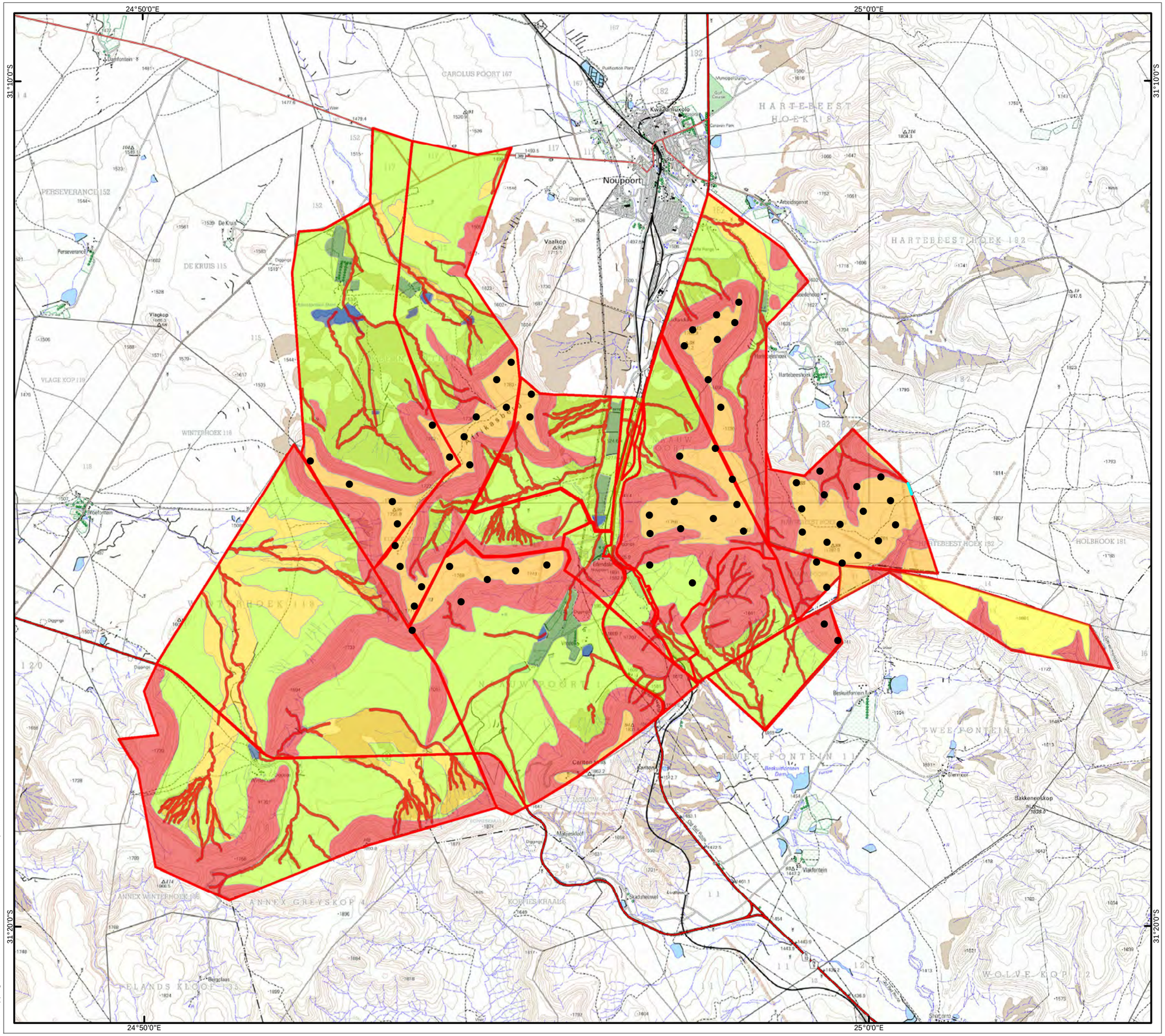
0 1.5 3 km

N

Produced: AA Reviewed: SC Approved: AB	Ref: 2245/REP/009 Date: 06/04/2017

Vegetation Types
Figure 8.1

Phezukomoya Wind Energy Facility
Draft Scoping Report



InnoWind

ARCUS

Site Boundary

Proposed Turbine Location

Ecological Sensitivity

- Dam - High
- Slopes - High
- Plateau - Medium-High
- Wash - Medium-High
- Plateau - Medium
- Lowlands - Medium-Low
- Croplands - Low

1:80,000 Scale @ A3

0 1.5 3 km

N

Produced: AA Reviewed: SC Approved: AB	Ref: 2245/REP/010 Date: 28/04/2017

Broad-scale Ecological Sensitivity Map
Figure 8.2

Phezukomoya Wind Energy Facility
Draft Scoping Report

conservation status alone. In order to address this shortcoming, the distribution of reptiles was also taken into account such that any narrow endemics or species with highly specialized habitat requirements occurring at the site were noted.

8.1.2 Site Visit

The site visit was conducted on the 13 April 2016. The purpose of the site visit was to obtain a broad understanding of the sensitive features and habitats of the site as well as validate and verify potentially features visible on satellite imagery of the site. Particular attention was paid to the high-lying areas that would be targeted for the placement of the turbines and any sensitive features that are present in these areas. In addition, the adjacent Mainstream wind energy facility has been sampled by the consultant in the past and information from this adjacent area is used to inform the current study where appropriate.

8.1.3 Ecological Sensitivity Mapping and Assessment

A draft ecological sensitivity map (Figure 8.2) of the site was produced by integrating the available ecological and biodiversity information in the literature and various spatial databases as described above. As a starting point, mapped sensitive features such as wetlands, drainage lines and water bodies were collated and buffered where appropriate to comply with legislative requirements or ecological considerations.

Additional sensitive areas were then identified from the satellite imagery of the site and delineated. All the different layers created were then merged to create a single coverage. Features that were specifically captured in the sensitivity map include drainage features, wetlands and dams, as well as rocky outcrops and steep slopes and other areas of high ecological sensitivity.

The ecological sensitivity of the different units identified in the mapping procedure was rated according to the following scale:

- Low – Units with a low sensitivity where there is likely to be a negligible impact on ecological processes and terrestrial biodiversity. This category is reserved specifically for areas where the natural vegetation has already been transformed, usually for agricultural purposes. These areas represent opportunities for development since they have low biodiversity value and the impact of development within these areas will generally be low.
- Medium- 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 low. These can be developed with relatively low ecological impact provided that suitable mitigation and amelioration measures are taken.
- High – Areas of natural or transformed land where a high impact is anticipated due to the high biodiversity value, sensitivity or important ecological role of the area. Development within these areas is undesirable and should proceed extremely cautiously. Extensive mitigation measures may be necessary to reduce the ecological impact of development within these areas to an acceptable level.
- Very High – Critical and unique habitats that serve as habitat for rare/endangered species or perform critical ecological roles. These are essentially no-go areas from a development perspective and any direct or indirect impacts to these areas should be avoided as much as possible.

8.1.4 Assumptions and Limitations

The current study is based on a desktop study and a site visit. The study relies to some extent 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. Such influences can have a large impact on the sensitivity and composition of the fauna and flora present. In order to counter the likelihood that the area has not been well sampled in the past and in order ensure a conservative approach, the species lists derived for the site were obtained from an area significantly larger (quarter and half) degree squares (3125A, 3124B) than the study area and are likely to include a much wider array of species than actually occur at the site. This is a cautious and conservative approach which takes the study limitations into account.

8.2 Baseline Environment

8.2.1 Broad-Scale Vegetation Patterns

Four vegetation types occur within the study area (Figure 8.1). The majority of the site falls within the Eastern Upper Karoo, but the central and southern areas of the site contain substantial areas of Besemkaree Koppies Shrubland and the eastern extent of the site contains Karoo Escarpment Grassland on the plateau areas vegetation bordered by Tarkastad Montane Shrubland associated with the steep slopes of this area.

Karoo Escarpment Grassland occurs in the Eastern, Western and Northern Cape on the Karoo escarpment, running in an east-west direction from Molteno in the south to Noupoort in the north, and from Somerset East in a northwesterly direction towards Nieu-Bethesda. It is associated with mountain summits, low mountains and hills with wiry, tussock grasslands, usually dominated by Merxmuellera disticha, but also contains an important low-shrub component (Mucina & Rutherford 2006). Although the vegetation type is listed as Least Threatened, it has very little area under formal protection (<4%) and contains many Camdebo endemic species. Levels of transformation are low.

The Tarkastad Montane Shrubland vegetation type occurs in the Eastern Cape and slightly into the Northern Cape, with Noupoort and Middelburg defining the western extent of this unit. The vegetation consist of low, semi-open, mixed shrubland with ‘white’ grasses and dwarf shrubs forming a large component. The unit’s soils are sedimentary rocks of the Beaufort Group, with dolerite intrusions and the vegetation type is considered Least Threatened although less than 2% is formally protected.

The Eastern Upper Karoo vegetation type is one of the largest vegetation types in the country and consists of flat and gently sloping plains vegetation dominated by dwarf microphyllous shrubs with ‘white’ grasses, especially Aristida, Eragrostis and Stipagrostis The Eastern Upper Karoo is classified as Least Threatened and less than 2 % has been transformed. The vegetation type is however poorly represented in formal protected areas although its target is 21%.

Besemkaree Koppies Shrubland occurs in the Northern Cape, Free State and Eastern Cape provinces on the plains of the Eastern Upper Karoo. The vegetation occurs on the slopes of koppies, butts and tafelbergs and consists of a two-layered karroid shrubland. The lower layer of the vegetation is dominated by dwarf small-leaved shrubs and the upper layer is dominated by tall shrubs. The geology consists of dolerite koppies and sills embedded within Karoo Super Group sediments. The vegetation is classified as Least Threatened and the target for conservation is 28%; with only 5% formally conserved at present.

8.2.2 Listed & Protected Plant Species

112 indigenous plant species have been recorded from the four degree squares around the site, which is clearly an underestimate and reflects the poor historical sampling of the area

rather than an indication of the species richness of the site. There are a relatively low number (13) of species of conservation concern known from the area, but given the low number of records there are likely to be additional species present as well. Species which can be confirmed present include Anacampseros subnuda subsp. lubbersii (Vulnerable), Boophone disticha (Declining) and Pelargonium sidoides, which is listed as Declining on account of heavy harvesting pressure for use in herbal and traditional medicine. This species is common in the higher lying grasslands of the site. Listed and protected species are usually confined to specific habitats such as wetlands and rock pavements which occur mostly around the edge of the plateau areas or other exposed ridges within the site. Some species such as Boophone and Pelargonium sidoides are however widespread and avoiding these would be more difficult.

8.2.3 Critical Biodiversity Areas & Broad Scale Ecological Processes

No Critical Biodiversity Areas mapping for the site was available at the time of writing the scoping report. A small portion of the site falls within a National Protected Area Expansion Strategy (2008) focus area. Priority areas are generally expansive tracts of currently intact habitat within areas of high climate and landscape variation which are likely to be resilient to climate change. Such areas are likely to be more climatically stable over time, providing refugia where plants and animals can persist. Given the limited extent of the NPAES focus area within the site, impacts on this area and future conservation options in the area would be low. The affected NPAES polygon forms part of the Karoo Escarpment Grassland Focus Area which has an overall extent of 158 539 ha but the affected polygon is 7450 ha, which represents less than 5% of the total extent of the Karoo Escarpment Grassland NPAES focus area and the proportion within the site is a small fraction of that. As such, the potential impact of the development on future conservation options within the Karoo Escarpment Grassland focus area, is considered very low and not likely to be of significance.

Several wetlands and seeps are present in the site, including a NFEPA (National Freshwater Ecosystems Priority Areas) ranked wetland consisting of a natural channelled valley-bottom wetland which is listed as a priority wetland due to the presence of Blue Crane. Apart from the potential issues with Blue Crane, the wetland is likely to be of general significance and specific avoidance of this feature may be required.

8.2.4 Mammals

At least 50 mammal species potentially occur at the site. Due to the diversity of habitats available the majority of species with a distribution that includes the site are likely to be present in at least part of the broader site. The mammalian community is therefore relatively rich and due to the remote and inaccessible nature of large parts of the area probably has not been highly impacted by human activities aside from livestock grazing, which is largely compatible with most biodiversity processes.

Medium sized carnivores such as jackal and caracal are relatively common in the area, despite widespread eradication efforts by livestock farmers in the region. The ridges, hills and uplands of the site, with rocky outcrops, rocky bluffs and cliffs provide suitable habitat for species which require or prefer rock cover such as Cape Rock Elephant Shrew, *Elephantulus edwardii*, Smith's Red Rock Hare *Pronolagus saundersiae*, Namaqua Rock Mouse *Micaelamys namaquensis* and Rock Hyrax, *Procavia capensis*. The lowlands are likely to contain an abundance of species associated with lowland habitats such as deeper soils, which includes the Bush Vlei Rat *Otomys unisulcatus*, Hairy-footed Gerbil *Gerbillurus paeba* and Common Duiker *Sylvicapra grimmia*.

A number of antelope are relatively common at the site and would potentially be impacted by the development. Springbuck are confined by fences and occur only where farmers have introduced them or allowed them to persist and should be considered as part of the farming

system rather than as wildlife per se. Both Duiker and Steenbok *Raphicerus campestris* are adaptable species that are able to tolerate moderate to high levels of human activity and are not likely to be highly sensitive to the disturbance associated with the development. Grey Rhebok *Pelea capreolus* and Mountain Rhebok *Redunca fulvorufula* are usually present on the higher-lying ground where turbines are more likely to be located.

8.2.5 Reptiles

There is a wide range of habitats for reptiles present at the site, including rocky uplands and cliffs, open flat and lowlands and densely vegetated areas. As a result the site is likely to have a relatively rich reptile fauna which is potentially composed of 2 tortoise species, 15 snakes, 16 lizards and skinks, one chameleon and 5 geckos. The rocky outcrops would be of above average sensitivity for reptiles due to the likely presence of a variety of associated species and general shelter and cover provided by these areas. Similarly, the more-densely vegetated wetlands and kloofs are also likely to be of significance for fauna.

In general, the major impact associated with the development would be habitat loss and fragmentation for reptiles, with the potential for increased levels of predation being a secondary impact which may occur as a result of vegetation clearing for roads and turbine pads. There are not likely to be any reptiles which are specifically restricted to the higher-lying ridges of the site and which would be particularly vulnerable to impact as a result.

8.2.6 Amphibians

The amphibian diversity at the site is likely to be relatively low as the site lies within the distribution range of only nine frog and toad species. No species of conservation concern are known from the area and all the species which may be present are quite widespread species of low conservation concern. There do not appear to be any range-restricted species which occur at the site which would be vulnerable to population-level impacts.

In general, the most important areas for amphibians at the site are the seeps and wetlands and the man-made earth dams which occur in the area. As these are widely recognized as sensitive habitats, impacts to these areas are avoided largely at the design phase of the development and a minimum amount of infrastructure has been located in the vicinity of these features. Consequently, direct impacts on amphibians at the site are likely to be fairly low. Amphibians are however highly sensitive to pollutants and the large amount of construction machinery and materials present at the site during the construction phase would pose a risk to amphibians should any spills occur.

8.2.7 Site Sensitivity Assessment

The steep slopes, higher-lying plateau areas and various wetlands and drainage systems are considered most sensitive (Figure 8.2). The steep slopes are vulnerable to erosion and are also usually very diverse, but are not likely to experience a large proportion of the development footprint and impact to these areas is expected to be low. There are no very high-elevation areas within the site, which is seen to reduce the overall sensitivity of the site in the local context as the affected areas do not offer the full range of climatic conditions and associated habitats present in the area. The abundance of wetlands and seeps at the site is of potential concern. Some of these have been identified as NFEPA priority wetlands, confirming that these are likely to of local and even regional significance. Although such wetlands are confined to the lower-lying parts of the site, these may be impacted by access roads and other associated infrastructure.

Apart from the wetlands and drainage systems, which should be avoided as much as possible, there are likely to be a variety of other locally sensitive features present. Any exposed rock sheets and shallow pavements which tend to be concentrated along the escarpment edges and ridges would also be considered sensitive due to the presence of

specialized geophytes and dwarf succulents which are usually present in these areas. Such areas are however of limited extent or concentrated within certain areas and impact on these features can be minimized. Although the wetlands are identified as being of specific importance for fauna in context of the site, in general, direct impacts on fauna would be fairly low during operation but some residual impact due to human disturbance and noise from turbines is likely. The proximity of the site to both the N9 and N10 would however decrease the impact of turbine noise on the site as it would already be exposed to traffic noise on a regular basis and the additional contribution would be likely to have a lower impact than of the site was in a more remote area.

8.3 Identification of Potential Impacts and Preliminary Assessment

8.3.1 Identified Construction Phase Impacts

- Vegetation clearing for access roads, turbine pads, electrical trenches etc. is likely to impact listed plant species as well as plant communities. Vegetation clearing will also lead to habitat loss for fauna and potentially the loss of sensitive faunal species, habitats and ecosystems;
- Increased erosion risk could occur due to the loss of plant cover and soil disturbance created during the construction phase. Parts of the site are steep and risk of erosion would be high. This may impact downstream riparian and wetland habitats if a lot of silt enters the drainage systems;
- Presence and operation of construction machinery on site. This will create a physical impact as well as generate noise, pollution and other forms of disturbance at the site; and
- Increased human presence can lead to poaching, illegal plant harvesting and other forms of disturbance such as fire.

8.3.2 Identified Operational Phase Impacts

- The operation of the facility will generate noise and disturbance which may deter some fauna from the area;
- The presence of the facility will disrupt the connectivity of the landscape for some species which will avoid traversing the cleared areas and may impact their ability to disperse or maintain gene flow between subpopulations; and
- The facility will require management and if this is not done appropriately, it could impact adjacent intact areas through impacts such as erosion, alien plant invasion and contamination from pollutants, herbicides or pesticides.

8.3.3 Identified Cumulative Impacts

- The cumulative loss of sensitive habitats may result in biodiversity loss and reduced future ability to meet conservation targets for these habitats; and
- Transformation of intact habitat could disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations.

8.4 Preliminary Impact Assessment

A preliminary assessment of the likely extent and significance of each impact identified is made in the tables below. It is however important to note that this a scoping assessment and represents the potential significance of impacts which may change substantially in the EIA depending on the mitigation and avoidance measures that are implemented by the developer in response to the sensitivity maps and site attributes reported here.

Impact Phase: Construction							
Impact Description: Impact on vegetation and listed plant species The development would require vegetation clearing for turbines, roads, powerlines and other hard infrastructure. Apart from the direct loss of vegetation within the development footprint, listed and protected species are also highly likely to be impacted.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	L	H	M-H	Negative	M-H	H	H
With Mitigation	L	M	M	Negative	M	H	H
Can the impact be reversed?	No - transformation is a necessary outcome of the development.						
Will impact cause irreplaceable loss or resources?	Yes, some loss of rare habitats or species may occur.						
Can impact be avoided, managed or mitigated?	Possibly, through avoidance, but some residual impact is likely.						
Mitigation measures: 1) Minimise development footprint within sensitive areas and ensure that final development layout takes account of areas identified as sensitive during the field survey. Some avoidance and changes to the layout may be required if some areas with a high abundance of species of concern are shown to occur within the preferred development areas. 2) Ensure that lay-down and other temporary infrastructure is within low sensitivity areas, preferably previously transformed areas if possible.							
Impact to be addressed / further investigated and assessed in Impact Assessment Phase?	Yes. Particular attention will be paid to the presence of listed species within the affected areas and the possibilities for avoidance and mitigation.						

Impact Phase: Construction							
Impact Description: Direct faunal impacts 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 as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the activities and might be killed. Traffic at the site would pose a risk of collisions with fauna. Slower types such as tortoises, snakes and amphibians would be most susceptible. Some mammals and reptiles would be vulnerable to illegal collection or poaching as a result of the large number of personnel that are likely to be present. Many of these impacts can however be effectively managed or mitigated.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	M	M	H	Negative	H	H	H
With Mitigation	L	M	L-M	Negative	M	H	M
Can the impact be reversed?	Construction phase disturbance will be transient, but some habitat loss would be long term.						
Will impact cause irreplaceable loss or resources?	Potentially, if high impact on high elevation habitats of limited extent occurs.						
Can impact be avoided, managed or mitigated?	Only partly as noise and construction phase disturbance cannot be entirely avoided or mitigated.						

Mitigation measures: 1) Avoid sensitive faunal habitats such as drainage lines and wetlands. 2) A variety of avoidance and mitigation measures to reduce impact on fauna will need to be implemented during construction, including limiting impacts from construction staff and the operation of construction vehicles.	
Impact to be addressed / further investigated and assessed in Impact Assessment Phase?	Yes, the fauna present at the site will be characterized in the field and sensitive habitats identified and delineated.

Impact Phase: Operational

Impact Description: Direct faunal impacts

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 as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the activities and might be killed. Traffic at the site would pose a risk of collisions with fauna. Slower types such as tortoises, snakes and amphibians would be most susceptible. Some mammals and reptiles would be vulnerable to illegal collection or poaching as a result of the large number of personnel that are likely to be present. Many of these impacts can however be effectively managed or mitigated.

	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	M	M	H	Negative	M	H	H
With Mitigation	L	M	M	Negative	M	H	H

Can the impact be reversed?	The impact will persist for the lifespan of the facility.
Will impact cause irreplaceable loss or resources?	Unlikely.
Can impact be avoided, managed or mitigated?	Some management is possible, but residual impact from the wind turbines and general disturbance will persist.
Mitigation measures: 1) Ensure than management and maintenance activities are favourable for fauna.	
Impact to be addressed / further investigated and assessed in Impact Assessment Phase?	Yes, the potential for long-term impact on fauna is likely and will need to be assessed during the EIA.

Impact Phase: Operational

Impact Description: Soil Erosion Risk following construction

The large amount of disturbance created during construction would leave the site vulnerable to soil erosion, especially as many parts of the site are steep. Measures to limit erosion will need to be a key element of mitigation measures at the site. Furthermore, if the eroded material were to enter streams and rivers at the site it could have significant impact on these systems through siltation of pools and changes in the chemistry and turbidity of the water.

	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	M	H	H	Negative	H	H	H
With Mitigation	L	L	L	Negative	M	H	H

Can the impact be reversed?	With appropriate mitigation the impact can be ameliorated.

Will impact cause irreplaceable loss or resources?	The loss of large amounts to topsoil would potentially be an irreplaceable loss of resources.
Can impact be avoided, managed or mitigated?	With appropriate control measures, erosion risk can be mitigated.
Mitigation measures: 1) Runoff management and erosion control should be integrated into the project design. 2) Development on steep slopes should be avoided as much as possible and specific additional mitigation may be required where this cannot be avoided.	
Impact to be addressed / further investigated and assessed in Impact Assessment Phase?	Yes. As this a highly likely potential impact, it will be assessed in the EIA phase.

Impact Phase: Operation

Impact Description: Following construction, the site will be highly vulnerable to **alien plant invasion.**

The disturbance associated with the construction phase of the project will render the disturbed areas vulnerable to alien plant invasion. Some alien invasion is inevitable and regular alien clearing activities would be required to limit the extent of this problem. Once the natural vegetation has returned to the disturbed areas, the site will be less vulnerable to alien plant invasion, however, the roadsides and turbine service areas are likely to remain foci of alien plant invasion.

	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	L	H	M	Negative	M	H	H
With Mitigation	L	L	L	Negative	L	H	H

Can the impact be reversed?	With appropriate mitigation the impact can be ameliorated.
Will impact cause irreplaceable loss or resources?	With mitigation there would not be loss of resources.
Can impact be avoided, managed or mitigated?	With appropriate control measures, alien plants can be controlled and reduced to very low impact.
Mitigation measures: 1) Alien management plan to be part of the EMP. 2) Regular alien clearing where invasion occurs.	
Impact to be addressed / further investigated and assessed in Impact Assessment Phase?	Yes. As this a highly likely potential impact, it will be assessed in the EIA phase

Impact Phase: Operation

Impact Description: Cumulative impact on Critical Biodiversity Areas and broad-scaled ecological processes.

The site contains National Protected Area Expansion Areas (NPAES) which are within the development footprint. Development within NPAES is not encouraged as such development may compromise the biodiversity targets of the country as well as result in direct biodiversity loss. In addition, the presence of the wind turbines and daily activity at the site may deter certain species from the area, resulting in a loss in broad-scale landscape connectivity. The extent of this impact would depend on the location of the infrastructure as well as the total development footprint. In this regard it is important to note that while the development footprint is not very large in comparison with the total extent of the site,

this impact should be considered in context of the impact on the affected higher elevation areas and their specific habitats which may be much more restricted.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	M	H	M	Negative	H	H	H
With Mitigation	L	H	M	Negative	M	H	H
Can the impact be reversed?	The impact would last for the lifetime of the development.						
Will impact cause irreplaceable loss or resources?	Unlikely.						
Can impact be avoided, managed or mitigated?	To some extent, but the main impact results from the loss and transformation of habitat which cannot be avoided.						
Mitigation measures: 1) Minimise the development footprint, especially within the high sensitivity areas and some reduction in the number of turbines within these areas may be required. 2) There should be an integrated management plan for the development area during operation, which is beneficial to fauna and flora. 3) Specific avoidance and mitigation may be required to reduce the impact on certain habitats of limited extent and high ecological or conservation significance.							
Impact to be addressed / further investigated and assessed in Impact Assessment Phase?	Yes. The habitats at the site will need to be verified in the field the potential impact of the development considered in this light.						

8.5 Conclusion

Although none of the vegetation types of the site are listed, the higher elevation grasslands of the site are considered moderately sensitive, based on the presence of some listed or endemic species. There are however no very high-lying areas within the site, which is seen to reduce the overall sensitivity of the site in the local context as the affected areas do not offer the full range of climatic conditions and associated habitats present in the area. The abundance of wetlands and seeps in the site is of potential concern. Some of these have been identified as NFEPA priority wetlands, confirming that these are likely to of local and even regional significance. Although such wetlands are confined to the lower-lying parts of the site, these may be impacted by access roads and other associated infrastructure. In addition, the soils of the area are particularly vulnerable to erosion and widespread erosion problems were evident at the site and disturbance associated with the development would be certain to increase the risk of erosion problems in the affected areas. Sediment movement resulting from the development would also have a negative impact on receiving wetlands and drainage systems.

Overall, the site should be considered moderately sensitive and while there are some areas that appear to be largely suitable for wind farm development, a variety of avoidance and mitigation measures are likely to be required to minimize potential negative impact on sensitive features such as wetlands and drainage lines. Planning the layout of the facility in a manner which minimizes impacts on the sensitive features is a key mitigation measure to ensure that the impact of the development is maintained at a low level.

9 AVIFAUNA (BIRDS) ASSESSMENT

9.1 Methodology

The following methods were applied:

- Bird distribution data of the South African Bird Atlas 2 (SABAP 2) were obtained from the Animal Demography Unit of the University of Cape Town, as a means to ascertain which species occurs within the broader area i.e. within a block consisting of nine pentad grid cells within which the proposed wind facilities are situated. The nine pentad grid cells are the following: 3110_2450, 3110_2455, 3110_2500, 3115_2450, 3115_2455, 3115_2500, 3120_2450, 3120_2455 and 3120_2500 (Figure 9.1). A pentad grid cell covers 5 minutes of latitude by 5 minutes of longitude (5'× 5'). Each pentad is approximately 8 × 7.6 km. From 2011 to date, a total of 52 full protocol cards (i.e. 52 surveys lasting a minimum of two hours or more each) have been completed for this area.
- The national threatened status of all priority species was determined with the use of the most recent edition of the Red Data Book of Birds of South Africa[24], and the latest authoritative summary of southern African bird biology.[25]
- The global threatened status of all priority species was determined by consulting the latest (2015.4) IUCN Red List of Threatened Species (http://www.iucnredlist.org/).
- A classification of the vegetation types in the study area was obtained from the Atlas of Southern African Birds 1 (SABAP1) and the National Vegetation Map compiled by the South African National Biodiversity Institute.[26]
- The Important Bird and Biodiversity Areas of South Africa was consulted for information on Important Bird Areas (IBAs).27
- Satellite imagery was used in order to view the broader development area on a landscape level and to help identify sensitive bird habitat.
- Priority species were taken from the updated list of priority species for wind farms compiled for the Avian Wind Farm Sensitivity Map.[28]
- A site visit was conducted from 7 – 9 April 2015 to record bird habitat at the site and to identify transects, vantage points and potential focal points for the 12-months pre-construction monitoring which commenced in March 2015. Refer to the Avifaunal Specialist report in Volume 2 for a summary of the methodology employed in the pre-construction programme.
- All the available published count data of the Co-ordinated Avifaunal Roadcount (CAR) (2003 to 2014) was consulted to get an overview of the densities of large terrestrial species in the Eastern Karoo.

9.2 Assumptions and Limitations

1. A total of 52 full protocol lists have been completed to date to date for the nine pentads where the study area is located (i.e. lists surveys lasting a minimum of two hours or more each). This is a fairly comprehensive dataset which provides a reasonably accurate snapshot of the avifauna which could occur in the study area. For purposes of

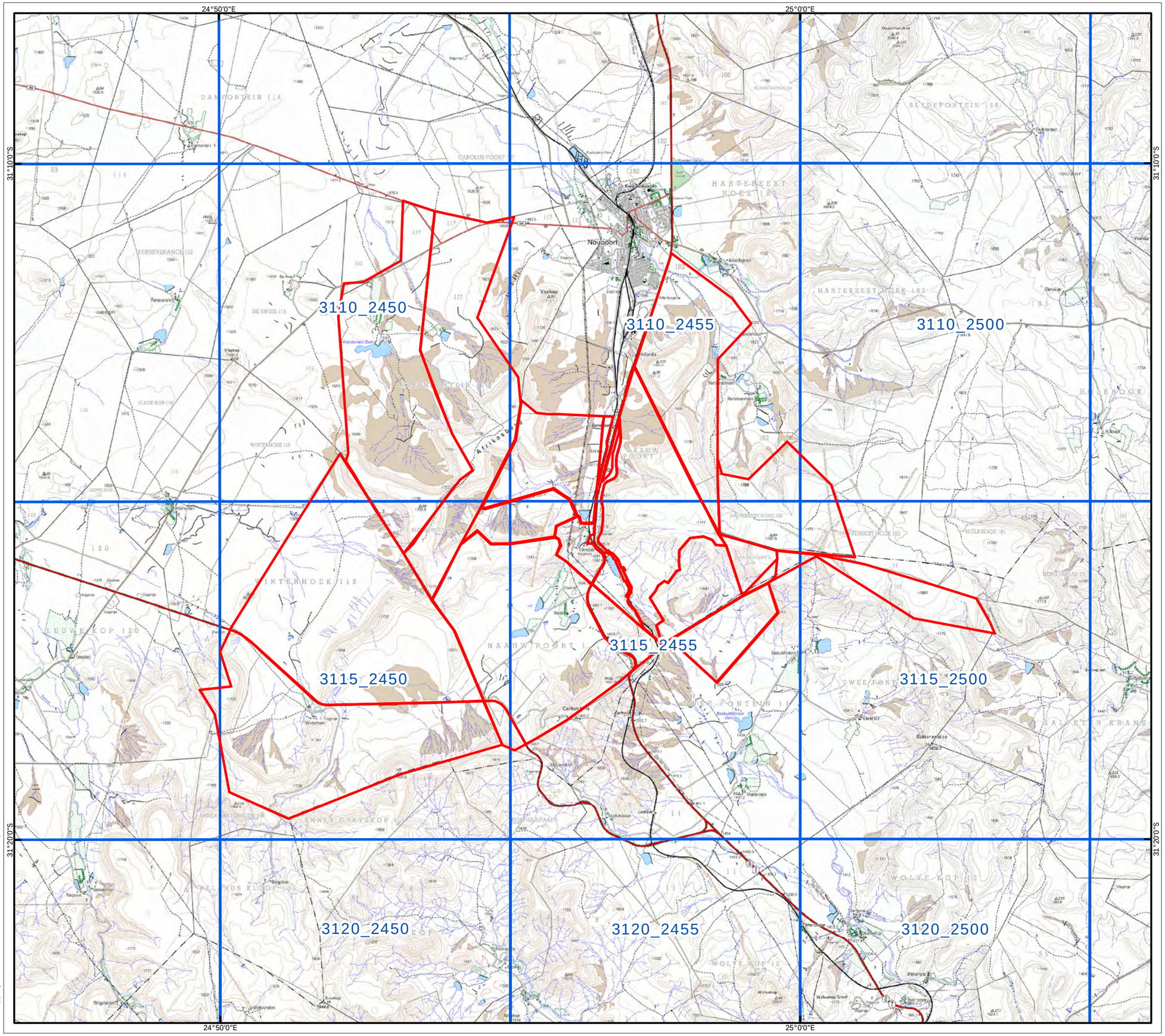
[24] TAYLOR, M.R. (ed.) 2015. The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. BirdLife South Africa, Johannesburg.

[25] HOCKEY P.A.R., DEAN W.R.J., AND RYAN P.G. 2005. Robert's Birds of Southern Africa, seventh edition. Trustees of the John Voelcker Bird Book Fund, Cape Town.

[26] MUCINA. L. & RUTHERFORD, M.C. (Eds) 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

[27] MARNEWICK, M.D., RETIEF E.F., THERON N.T., WRIGHT D.R., ANDERSON T.A. 2015. Important Bird and Biodiversity Areas of South Africa. Johannesburg: Birdlife South Africa

[28] RETIEF E.F., DIAMOND M, ANDERSON M.D., SMIT, H.A., JENKINS, A & M. BROOKS. 2012. Avian Wind Farm Sensitivity Map. Birdlife South Africahttp://www.birdlife.org.za/conservation/birds-and-wind-energy/windmap.



InnoWind

ARCUS

Site Boundary

SABAP-2 Pentad

1:100 000 Scale @ A3

0 2 4 km

N

Produced: AA Reviewed: SC Approved: AB	Ref: 2245/REP/011 Date: 06/04/2017

SABAP-2 Pentads
Figure 9.1

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completeness, the list of species that could be encountered was supplemented with personal observations, general knowledge of the area, SABAP1 records and data from the pre-construction monitoring.

2. Conclusions are based on experience of these and similar species in different parts of South Africa. Bird behaviour can never be entirely reduced to formulas that will be valid under all circumstances, especially for a relatively new field such as wind energy. However, power line and substation impacts can be predicted with a fair amount of certainty, based on a robust body of research stretching back over thirty years.
3. To date no peer-reviewed scientific papers are available on the impacts of wind farms on birds in South Africa. The precautionary principle is therefore applied throughout.
4. Predicted mortality rates are often inaccurate, indicating that this is still a fledgling science in many respects. Mortality data from post-construction monitoring programmes currently implemented at wind farms in South Africa was used to assist with the priority species risk assessments.
5. Priority species were taken from the updated list of priority species for wind farms compiled for the Avian Wind Farm Sensitivity Map.

9.3 Baseline Environment

9.3.1 Important Bird Areas

The study area is not located in an Important Bird Area. The border of the closest Important Bird Area (IBA), the Platberg Karoo Conservancy IBA SA037, is located approximately 20 km away from the centre of the proposed development site.

9.3.2 Habitat Classes and Avifauna in the Study Area

SABAP1 recognises six primary vegetation divisions within South Africa, namely (1) Fynbos (2) Succulent Karoo (3) Nama Karoo (4) Grassland (5) Savanna and (6) Forest. The criteria used to amalgamate botanically defined vegetation units, or to keep them separate were (1) the existence of clear differences in vegetation structure, likely to be relevant to birds, and (2) the results of published community studies on bird/vegetation associations. It is important to note that no new vegetation unit boundaries were created, with use being made only of previously published data. All the natural vegetation types in the study area can be collectively classified as Grassy Karoo, which can be described is an ecological transition zone between the Grassland and Nama Karoo biomes.

Whilst much of the distribution and abundance of the bird species in the study area can be explained by the description of the biomes and vegetation types, it is as important to examine the modifications which have changed the natural landscape, and which may have an effect on the distribution of avifauna. These are sometimes evident at a much smaller spatial scale than the biome or vegetation types, and are determined by a host of factors such as topography, land use and man-made infrastructure.

The bird habitat classes identified in the study area are discussed below:

9.3.2.1 Grassy karoo

The Karoo vegetation types support a particularly high diversity of bird species endemic to Southern Africa, particularly in the family Alaudidae. Its avifauna typically comprises ground-dwelling species of open habitats. Many typical karroid species are nomads, able to use resources that are patchy in time and space, especially enhanced conditions associated with rainfall.

Priority species associated with Grassy Karoo which could potentially occur in the study area are the nomadic Ludwig's Bustard, which may occur in flocks following rainfall events, Karoo Korhaan, Blue Korhaan, Blue Crane, Booted Eagle, Martial Eagle, Steppe Buzzard, Southern Pale Chanting Goshawk, Northern Black Korhaan, Grey-winged Francolin, Greater Kestrel, Lesser Kestrel, Amur Falcon, Spotted Eagle-Owl, Melodious Lark, Black Harrier, Black-shouldered Kite, White Stork and Lanner Falcon. Secretarybird, Jackal Buzzard, Black Harrier and Verreaux's Eagle could occur irregularly in this habitat class (refer to Table 9:1 for a complete list of priority species which have been recorded at the site so far, as well as those potentially occurring at the site). CAR counts between 2003 and 2004 indicate particular high densities of Blue Crane, Northern Black Korhaan and White Stork in this habitat in the eastern Karoo.

9.3.2.2 Waterbodies

Surface water is of specific importance to avifauna in this semi-arid study area. The study area contains several man-made dams and a few small pans on the plateau.

There are no large man-made dams at the wind development site itself, only a few boreholes. There are however several large farm dams in the greater study area. These dams, when filled with water, serve as focal points for water birds and can act as roosting areas for Blue Cranes and possibly Greater Flamingo. Three dams are being monitored as potential avifaunal focal points. Counts in April (autumn), August (winter) and November (spring) 2015 have not produced any priority species, only common species i.e. Yellow-billed Duck, Southern Pochard, Grey Heron, Black-winged Stilt, Red-knobbed Coot, South African Shelduck, Little Grebe and Egyptian Goose. The attractiveness of the dams is largely determined by the water levels, and it must be assumed that highly mobile species such as flamingos and cranes could potentially turn up at any large dam in the study area. The drought conditions that prevailed in 2015 resulted in low water levels, and in some instances dams dried up completely during the course of the year, which may be partially responsible for the lack of priority species.

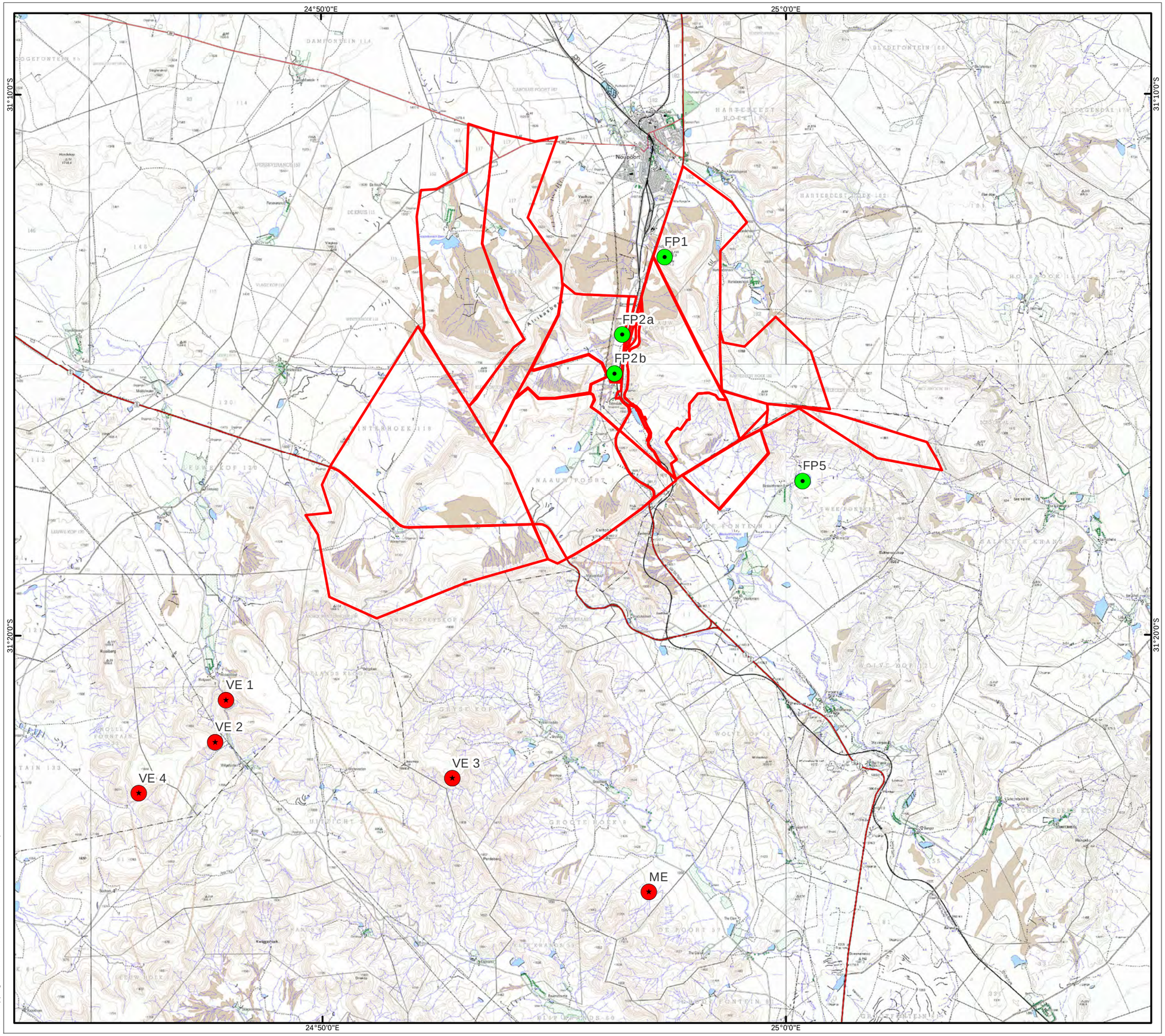
Refer to Figure 9.2 which indicates the locality of waterbodies which are being monitored as focal points as part of the pre-construction monitoring.

9.3.2.3 Slopes and cliffs

The wind development area is situated on a plateau, bordered by an escarpment consisting of steep boulder-strewn slopes with exposed rocky ridges and low cliffs on three sides. In the extreme south-west of the study area some of the proposed powerline alternatives cross broken country consisting of similar steep slopes, mountain ridges, low cliffs and koppies.

Priority species that could be attracted to slopes and cliffs habitat are Verreaux's Eagle, Booted Eagle, Jackal Buzzard, Cape Eagle-Owl, Lanner Falcon and African Rock-Pipit. The escarpment at the wind development site itself was inspected for signs of Lanner Falcon, Jackal Buzzard Booted Eagle and Verreaux's Eagle breeding activity, but none were found. The reason for that is most likely that the cliffs are too low and not vertical enough to provide suitable nesting habitat.

The one exception is a Verreaux's Eagle nest located approximately 1.3 km north of the northern-most border of the wind development area. The nest is being monitored as a focal point as part of the pre-construction monitoring. The nest was occupied with a pair of eagles recorded at the nest during the initial site visit in April 2015. The nest was subsequently monitored for three four seasons. Breeding activity was recorded in June 2015, but somehow inexplicably, the pair did not breed successfully, and was not recorded at the nest again that year. An adult bird was recorded soaring near the nest in October 2015, and the nest shows signs of still being occupied (guano). It must be assumed that



InnoWind

ARCUS

Site Boundary

Martial / Verreaux's Eagle Nest

Focal Site

1:125 000 Scale @ A3

N

0 2.5 5 km

Produced: AA Reviewed: SC Approved: AB	Ref: 2245/REP/012 Date: 06/04/2017

Bird Monitoring Focal Sites and Eagle Nests
Figure 9.2

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Basemapping from the Chief Directorate: National Geo-Spatial Information of South Africa

the nest is active or could become active again. It can therefore not be assumed that the territory is abandoned.[29] There are several Verreaux's Eagle nests south of the study area, but they all fall outside the immediate impact zone of the proposed development (refer to Figure 9.2).

9.3.2.4 Trees

The proposed development site is devoid of trees. In the greater study area, isolated stands of alien trees are found at farmyards, dams and inside the town of Noupoort, consisting mostly of *Eucalyptus*, *Salix* and *Salicaceae* species. Priority species that could potentially use the trees for nesting and/or roosting are Black Sparrowhawk, Rufous-chested Sparrowhawk, Lesser Kestrel (there is a confirmed roost in the town of Noupoort), Black-shouldered Kite, Jackal Buzzard, Steppe Buzzard-, Martial Eagle, Verreaux's Eagle, Amur Falcon, Spotted Eagle-Owl and White Stork.

9.3.2.5 High voltage lines and telephone lines

High voltage lines are an important potential roosting and breeding substrate for large raptors in the greater study area. There are no existing high voltage lines crossing the actual wind development area, but there are two high voltage lines running through the centre of the study area along the N9 motorway, and also in the extreme south-west of the study area. There is an abandoned Martial Eagle nest on a transmission line approximately 16 km south of the wind development area. There are also a multitude of smaller reticulation lines and telephone lines which are used as perches by priority species such as Lesser Kestrel, Amur Falcon, Jackal Buzzard, Steppe Buzzard and Southern Pale Chanting Goshawks in the largely treeless environment.

9.3.2.6 Agriculture

There are a few agricultural lands in the study area where lucerne is cultivated as fodder for livestock. Priority species which could be attracted to these fields are White Stork, Ludwig's Bustard and Blue Crane.

9.3.2.7 Avifauna

An estimated 209 species could potentially occur in the study area. Of the 209 species that could occur at the site, 32 are classified as priority species for wind farm developments.

Refer to the avifaunal specialist report in Volume 2 for a list of species potentially occurring in the study area. Potential long-term impacts on priority species are listed in Table 9:1.

[29] It was subsequently established that the next has not been active since July 2015.

Table 9.1: Priority Species potentially occurring in the Study Area

Family name	Taxonomic name	Priority species	Global status	Regional status	Endemic status South Africa	Endemic status Southern Africa	SABAP2 reporting rate	Recorded during pre-construction monitoring	Collisions with associated power line	Collisions with turbines	Displacement through disturbance	Displacement through habitat transformation
Bustard, Ludwig's	*Neotis ludwigii*	*x*	EN	EN		Near-endemic	5.77	x	x	x	x*	x
Buzzard, Jackal	*Buteo rufofuscus*	*x*			Near endemic	Endemic	34.62	x		x		
Crane, Blue	*Anthropoides paradiseus*	*x*	VU	NT		Endemic	44.23	x	x	x	x*	
Eagle, Booted	*Hieraaetus pennatus*	*x*					25	x		x		
Eagle, African Fish	*Haliaeetus vocifer*	*x*					0		x	x		
Eagle, Martial	*Polemaetus bellicosus*	*x*	VU	EN			3.85	x		x		
Eagle, Verreaux's	*Aquila verreauxii*	*x*	LC	VU			17.31	x		x		
Francolin, Grey-winged	*Scleroptila afra*	*x*			Endemic (SA, Lesotho, Swaziland)	Endemic	32.69	x		x	x*	
Goshawk, Southern Pale Chanting	*Melierax canorus*	*x*				Near-endemic	25	x		x		
Hawk, African Harrier-	*Polyboroides typus*	*x*					0			x		
Kestrel, Greater	*Falco rupicoloides*	*x*					1.92	x		x		
Kestrel, Lesser	*Falco naumanni*	*x*					36.54	x		x		
Kestrel, Rock	*Falco rupicolus*	*x*					32.69			x		
Lark, Melodious	*Mirafra cheniana*	*x*	NT	LC	Near endemic	Endemic	3.85	x		x	x*	
Pipit, African Rock	*Anthus crenatus*	*x*	LC	NT	Endemic (SA,	Endemic	44.23	x		x	x*	x

Family name	Taxonomic name	Priority species	Global status	Regional status	Endemic status South Africa	Endemic status Southern Africa	SABAP2 reporting rate	Recorded during pre-construction monitoring	Collisions with associated power line	Collisions with turbines	Displacement through disturbance	Displacement through habitat transformation
					Lesotho, Swaziland)							
Sparrowhawk, Rufous-chested	*Accipiter rufiventris*	*x*					1.92	x				
Buzzard, Steppe	*Buteo buteo*	*x*					11.54			x		
Eagle, Tawny	*Aquila rapax*	*x*	LC	EN			1.92			x		
Eagle-owl, Cape	*Bubo capensis*	*x*					1.92			x	x*	x
Eagle-owl, Spotted	*Bubo africanus*	*x*					5.77			x	x*	x
Falcon, Amur	*Falco amurensis*	*x*					9.62			x		
Falcon, Lanner	*Falco biarmicus*	*x*	LC	VU			3.85			x		
Flamingo, Greater	*Phoenicopterus roseus*	*x*	LC	NT			1.92		x			
Harrier, Black	*Circus maurus*	*x*	VU	EN	Near endemic	Endemic	0			x		
Kite, Black-shouldered	*Elanus caeruleus*	*x*					15.38			x		
Korhaan, Blue	*Eupodotis caerulescens*	*x*	NT	LC	Endemic (SA, Lesotho, Swaziland)	Endemic	13.46		x	x	x*	x
Korhaan, Karoo	*Eupodotis vigorsii*	*x*	LC	NT		Endemic	1.92		x	x	x*	x
Korhaan, Northern Black	*Afrotis afraoides*	*x*				Endemic	44.23		x	x	x*	x
Secretarybird	*Sagittarius serpentarius*	*x*	VU	VU			0		x	x	x*	
Sparrowhawk, Black	*Accipiter melanoleucus*	*x*					1.92					

Family name	Taxonomic name	Priority species	Global status	Regional status	Endemic status South Africa	Endemic status Southern Africa	SABAP2 reporting rate	Recorded during pre-construction monitoring	Collisions with associated power line	Collisions with turbines	Displacement through disturbance	Displacement through habitat transformation
Stork, Black	*Ciconia nigra*	*x*	LC	VU			1.92		x	x		
Stork, White	*Ciconia ciconia*	*x*					7.69		x	x	x*	

* This is likely to be a temporary impact during the construction phase.

9.4 Preliminary Assessment

The effect of a wind farm on birds is highly variable and depends on a wide range of factors including the specification of the development, the topography of the surrounding land, the habitats affected, and the number and species of birds present, and their behaviour on site. With so many variables involved, the impacts of each wind farm must be assessed individually.

The principal areas of concern with regard to effects on birds are listed below. Each of these potential effects can interact with each other, either increasing the overall impact on birds or, in some cases, reducing a particular impact (for example, where habitat loss or displacement causes a reduction in birds using an area which might then reduce the risk of collision). Possible impacts include:

- Collision mortality on the wind turbines;
- Displacement due to disturbance during construction and operation of the wind farm;
- Displacement due to habitat change and loss;
- Collision with the proposed power line grid connections; and
- Displacement due to disturbance during the construction of the power line grid connection.

It is important to note that the assessment is made on the *status quo* as it is currently in the study area. The possible change in land use in the broader development area is not taken into account because the extent and nature of future developments are unknown at this stage. It is highly unlikely that the land use will change in the foreseeable future.

The possible impacts are discussed below, and in further detail in the specialist's report in Volume 2. The impacts are also preliminarily assessed in the tables below.

9.4.1 Collision mortality on wind turbines

9.4.1.1 Species-specific factors

Morphological features

Certain morphological traits of birds, especially those related to size, are known to influence collision risk with structures such as power lines and wind turbines. Priority species that could potentially be vulnerable to wind turbine collisions due to morphological features (e.g. high wing loading) are Northern Black Korhaan, Blue Korhaan, Karoo Korhaan, Grey-winged Francolin and Ludwig's Bustard. It is noted that no Ludwig's Bustard mortalities have as yet been reported at wind farms in South Africa, despite initial concerns that the species might be vulnerable in this respect. To date, three Blue Crane collision mortalities have been recorded at operational wind farms in South Africa in 69 months of monitoring at six wind farms. At the wind farm where it happened, it was the first mortalities in 21 months of monitoring, despite having high densities of Blue Cranes at the site, including breeding pairs. It is likely that these three birds represent the actual mortality figures for the species at operational wind farms where monitoring is taking place, as Blue Crane carcasses are large and easily visible, and tend to persist for months. It is yet too early to make conclusive statements about the vulnerability of the species to wind turbine collisions.

Sensorial perception

Birds are assumed to have excellent visual acuity, but this assumption is contradicted by the large numbers of birds killed by collisions with man-made structures. Many of the priority species at the proposed wind farm probably have high resolution vision areas found in the lateral fields of view, rather than frontally, e.g., the bustards, cranes, korhaans and passerines. The possible exceptions to this are the raptors which all have wider binocular

fields, although this does not necessarily result in these species being able to avoid obstacles better.

Phenology

It has been suggested that resident birds would be less prone to collision, due to their familiarity with the presence of the structures. Resident birds generally use the wind farm area several times while a migrant bird crosses it just once. Migratory priority species that could be encountered at the wind development site are White Stork, Steppe Buzzard, Booted Eagle, Lesser Kestrel and Amur Falcon. Lesser Kestrels are expected to occur in considerable numbers during the summer.

Bird behaviour

Flight type seems to play an important role in collision risk, especially when associated with hunting and foraging strategies. The priority species at the wind farm can be classified as either terrestrial species or soaring species, with some, e.g. Secretarybird, Blue Crane and White Stork exhibiting both types of flight behaviour.

Terrestrial species spend most of the time foraging on the ground. They do not fly often and then fly generally short distances at low to medium altitude, usually powered flight. At the wind farm site, korhaans, bustards, cranes and larks are included in this category. Some larger species undertake longer distance flights at higher altitudes (specifically Ludwig's Bustard and Blue Crane). Soaring species spend a significant time on the wing in a variety of flight modes including soaring, kiting, hovering and gliding at medium to high altitudes. At the wind farm site, the raptor species are included in this class. Based on the potential time spent potentially flying at rotor height, soaring species are likely to be at greater risk of collision, especially Jackal Buzzard, which is clearly highly vulnerable to turbine collisions. Specific behaviour of some terrestrial species might put them at risk of collision, e.g. display flights of Northern Black Korhaan and Melodious Lark might place them within the rotor swept zone.

Avoidance behaviours

It is anticipated that most birds at the proposed wind farm will successfully avoid the wind turbines. Possible exceptions might be raptors (especially Lesser Kestrel and Jackal Buzzard) engaged in hunting which might serve to distract them and place them at risk of collision, or birds engaged in display behaviour, e.g. Northern Black Korhaan (see earlier point). Despite being potential collision candidates based on morphology and flight behaviour, bustards do not seem to be particularly vulnerable to wind turbine collisions, indicating a high avoidance rate. Complete macro-avoidance of the wind farm is unlikely for any of the priority species.

Bird abundance

The abundance of priority species at the proposed wind farm site will fluctuate depending on season of the year, and particularly in response to rainfall. This is a common phenomenon in arid ecosystems, where stochastic rainfall events can trigger irruptions of insect populations which in turn attract large numbers of birds. This is particularly likely to be the case with Lesser Kestrels. In general, higher populations of priority species are likely to be present when the veld conditions are good, especially in the rainy season.

9.4.1.2 Site specific factors

Landscape features

Landscape features are likely to play an important role at proposed development site. As mentioned before, the proposed development site is surrounded by the steep slopes of the escarpment on three sides. These slopes are likely to be important landscape features for soaring species, particularly raptors such as Jackal Buzzard, Booted Eagle, Verreaux's Eagle and Martial Eagle, due to the presence of declivity currents.

Flight paths

The proposed development site is not located on any known or obvious flight path. It is also not located on any known migration route. The pair of Verreaux's Eagles which was breeding approximately 1.3km from the northern border of the site could at times forage over the site, although very little Verreaux's Eagle flights were recorded over the site during pre-construction surveys to date, perhaps because the nest was not active in 2015[30]. Monitoring at other wind farm sites in the Karoo has indicated that the majority of Verreaux's Eagle flight activity is within a 2-3km radius around the nest (pers. obs.). The areas where Verreaux's Eagles, Lanner Falcons, Booted Eagles and Jackal Buzzards are most likely to be found foraging, is along the escarpment. Buffer zones will be necessary to ensure that the areas where most flight activity is likely to take place are appropriately buffered. In this respect, a 150m set-back from the escarpment edge is recommended, as well as a 2.5km no turbine zone around the VE nest at FP1

Food availability

In semi-arid zones such as where this proposed wind farm is located, food availability is often linked to rainfall. It is a well-known fact that insect outbreaks may occur after rainfall events, which could draw in various priority species such as Ludwig's Bustard, and particularly Lesser Kestrel. This in turn could heighten the risk of collisions.

Weather

Weather conditions at the proposed wind farm are likely to influence flight behaviour in much the same manner as has been recorded elsewhere at wind farms. The flight behaviour of priority species are currently being recorded at the site, together with various environmental parameters such as weather conditions and wind speeds. Provided enough flight data is collected, this could be used to detect any statistically significant relationships between flight behaviour and various environmental parameters.

9.4.1.3 Wind-farm specific factors

Turbine features

Due to the fact that the turbine dimensions are constantly changing as newer models are introduced, it is best to take a pre-cautionary approach in order to anticipate any future potential changes in the turbine dimensions. The pre-construction monitoring programme is currently working on a potential rotor swept area of 80 m – 220 m to incorporate a wide range of models, which accommodates the current proposed turbines.

Blade visibility

Motion smear is inherent to all wind turbines and will therefore also be a potential risk factor at the proposed wind farm.

[30] It has subsequently been established that the nest was also inactive in 2016.

Wind farm configuration

Wind farm lay-out can also have a critical influence on bird collision risk. For example, wind farms arranged perpendicularly to a main flight path may be responsible for a higher collision risk. Engineering features of the newest wind turbines require a larger minimum distance between adjacent wind turbines and in new wind farms it is less likely that birds perceive rows of turbines as impenetrable walls.

The turbine layout has not yet been finalised, and may still change based on the inputs from specialists during the EIA process. Figure 9.3 indicates proposed turbine-free buffer zones from an avifaunal perspective, as well as the recommended of relocation of individual turbines which pose a high collision risk for slope soaring species.

9.4.2 Displacement due to Disturbance

The displacement of birds from areas within and surrounding wind farms due to visual intrusion and disturbance in effect can amount to habitat loss. Displacement may occur during both the construction and operational phases of wind farms, and may be caused by the presence of the turbines themselves through visual, noise and vibration impacts, or as a result of vehicle and personnel movements related to site maintenance. The scale and degree of disturbance will vary according to site- and species-specific factors and must be assessed on a site-by-site basis.

None of the priority species are likely to be permanently displaced due to disturbance, although displacement in the short term during the construction phase is very likely. The risk of permanent displacement is larger for large species such as Blue Crane and Ludwig's Bustard, although displacement of the closely related Denham's Bustard (*Neotis denhami*) is evidently not happening at existing wind farms in the Eastern Cape. Blue Cranes are likewise not being displaced at wind farms in the Western Cape. If the wind farm follows the modern trend of fewer, larger turbines, the risk of displacement is also lower. This will only be established through a post-construction monitoring programme.

The Verreaux's Eagle guidelines adopted by BLSA in October 2016 states as follows:

"*A buffer of 3 km is recommended around all nests (including alternate nests). This is intended to reduce the risk of collisions and displacement. This is a precautionary buffer and may be reduced (or increased) based on the results of rigorous avifaunal surveys, but nest buffers should never be less than 1.5 km*" (Ralston 2016).

It is recommended that a 2.5km pre-cautionary no turbine buffer is implemented around the Verreaux's Eagle nest. The lack of recent breeding activity and absence of flight activity of Verreaux's Eagles at the site may point to possible abandonment of the territory, but that cannot be assumed and therefore a substantial pre-cautionary buffer should still be implemented.

9.4.3 Displacement due to Habitat Loss

The direct habitat transformation at the proposed wind farm is likely to be fairly minimal. The indirect habitat transformation is likely to have a bigger impact on priority species. It is expected that the densities of most priority species will decrease due to this impact, but complete displacement is unlikely. Indications are that bustards and cranes continue to use the wind farm areas.

9.4.4 Mortality on associated Transmission Line Infrastructure

Several of the priority species which occur or potentially occur in the study area are power line sensitive. These include Ludwig's Bustard, Blue Crane, Northern Black Korhaan, Karoo Korhaan, Blue Korhaan, Secretarybird, White Stork and Greater Flamingo. All of these

species, but particularly Ludwig's Bustard and Blue Crane, could be impacted by the proposed grid connection through collision with the earthwire of the proposed line.

9.4.5 Preliminary Assessment Tables

Impact Phase: Construction							
Potential impact description: Displacement of priority species due to construction activities at the wind development area.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	L	L	M	Negative	M	H	M
With Mitigation	L	L	L	Negative	M	M	M
Can the impact be reversed?	YES. The impacts should be temporary and restricted to the construction phase.						
Will impact cause irreplaceable loss or resources?	NO. The impacts should be temporary and restricted to the construction phase.						
Can impact be avoided, managed or mitigated?	YES: To some extent, however the impact will be negated naturally after the construction phase.						
Mitigation measures: • Restrict the construction activities to the construction footprint area. • Do not allow any access to the remainder of the property during the construction period. • Measures to control noise and dust should be applied according to current best practice in the industry. • Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum. • It is recommended that a 2.5 km pre-cautionary no turbine buffer is implemented around the Verreaux's Eagle nest at FP1 (31°12'59.66"S 24°57'26.08").							
Impact to be addressed/ further investigated and assessed in Impact Assessment Phase?	YES: The final analysis of the pre-construction monitoring data will be completed in the EIA phase.						

Impact Phase: Construction							
Potential impact description: - Displacement of priority species due to construction activities associated with the grid connection powerline.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	L	L	M	Negative	M	M	H
With Mitigation	L	L	L	Negative	L	L	M
Can the impact be reversed?	YES. The impacts should be temporary and restricted to the construction phase.						
Will impact cause irreplaceable loss or resources?	NO. The impacts should be temporary and restricted to the construction phase.						
Can impact be avoided, managed or mitigated?	YES: To some extent, however the impact will be negated naturally after the construction phase.						
Mitigation measures: • Restrict the construction activities to the construction footprint area. • Do not allow any access to the remainder of the property during the construction period.							

• Measures to control noise and dust should be applied according to current best practice in the industry. • Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum.	
Impact to be addressed / further investigated and assessed in Impact Assessment Phase?	YES: The powerline routes will be further investigated during the EIA phase.

Impact Phase: Operation							
Potential impact description: Displacement of priority species due to habitat destruction at the wind development site.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	L	H	L	Negative	M	M	M
With Mitigation	L	H	L	Negative	L	L	M
Can the impact be reversed?	NO: While it is expected that most species will continue to use the wind farm area, some species might do so in reduced densities, primarily due to the fragmentation of the habitat.						
Will impact cause irreplaceable loss or resources?	YES: While it is expected that most species will continue to use the wind farm area, some species might do so in reduced densities, primarily due to the fragmentation of the habitat.						
Can impact be avoided, managed or mitigated?	YES: To some extent by ensuring that no impacts occur outside the immediate footprint.						
Mitigation measures: • The recommendations of the specialist ecological study must be strictly adhered to. • Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum.							
Impact to be addressed / further investigated and assessed in Impact Assessment Phase?	YES: The final analysis of the pre-construction monitoring data will be completed in the EIA phase.						

Impact Phase: Operation							
Potential impact description: Direct mortality of priority species due to collisions with the turbines at the wind development area.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	M	H	M	Negative	H	H	M
With Mitigation	M	H	L	Negative	M	M	M
Can the impact be reversed?	YES: Partly reversible. Mitigation measures could reduce the risk of collisions.						
Will impact cause irreplaceable loss or resources?	NO: It is not expected that the mortality will led to the complete eradication of a priority species at the wind development area.						
Can impact be avoided, managed or mitigated?	YES: To some extent through the application of buffer zones and selective curtailment.						
Mitigation measures: • Pre-construction monitoring should be implemented to guide the lay-out of the turbines. • Once the turbines have been constructed, post-construction monitoring should be implemented to compare actual collision rates for predicted collision rates. • If actual collision rates indicate high mortality levels, curtailment of selective turbines should be implemented. • A 150 m no-development set-back buffer zone is required around the escarpment to minimise the risk of collisions with slope soaring species. • It is recommended that a 2.5 km pre-cautionary no turbine buffer is implemented around the Verreaux's Eagle nest at FP1 (31°12'59.66"S 24°57'26.08").							

• In addition, it is recommended that turbines 7, 62 and 63 are relocated to the top of the plateau as they pose a high collision risk on the slopes where they are situated.	
Impact to be addressed/ further investigated and assessed in Impact Assessment Phase?	YES: The final analysis of the pre-construction monitoring data will be completed in the EIA phase.

Impact phase: Operational							
Impact Description: Direct mortality of priority species due to collisions with the grid connection powerline at the wind development area.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	M	H	H	Negative	H	H	M
With Mitigation	M	H	L	Negative	M	M	M
Can the impact be reversed?	YES: Partly reversible. Mitigation measures could reduce the risk of collisions.						
Will impact cause irreplaceable loss or resources?	NO: It is not expected that the mortality will lead to the complete eradication of a priority species from the study area.						
Can impact be avoided, managed or mitigated?	YES: Partially through the application of anti-collision devices.						
Mitigation measures: • The final power line route should be assessed by way of a walk-through and those sections requiring Bird Flight Diverters (BFDs) must be identified, and the BFDs fitted accordingly.							
Impact to be addressed/ further investigated and assessed in Impact Assessment Phase?	YES: The powerline routes will be further investigated during the EIA phase.						

Impact phase: Closure / Decommissioning							
Impact description: - Displacement of priority species due to dismantling activities at the wind development area.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**		**Confidence**
Without Mitigation	L	L	M	Negative	M	H	M
With Mitigation	L	L	L	Negative	M	M	M
Can the impact be reversed?	YES. The impacts should be temporary and restricted to the closure phase.						
Will impact cause irreplaceable loss or resources?	NO. The impacts should be temporary and restricted to the closure phase.						
Can impact be avoided, managed or mitigated?	YES: To some extent, however the impact will be negated naturally after the closure phase.						
Mitigation measures: • Restrict the dismantling activities to the footprint area. • Do not allow any access to the remainder of the property during the dismantling period. • Measures to control noise and dust should be applied according to current best practice in the industry. • Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum.							
Impact to be addressed/ further investigated and assessed in Impact Assessment Phase?	YES: The final analysis of the pre-construction monitoring data will be completed in the EIA phase.						

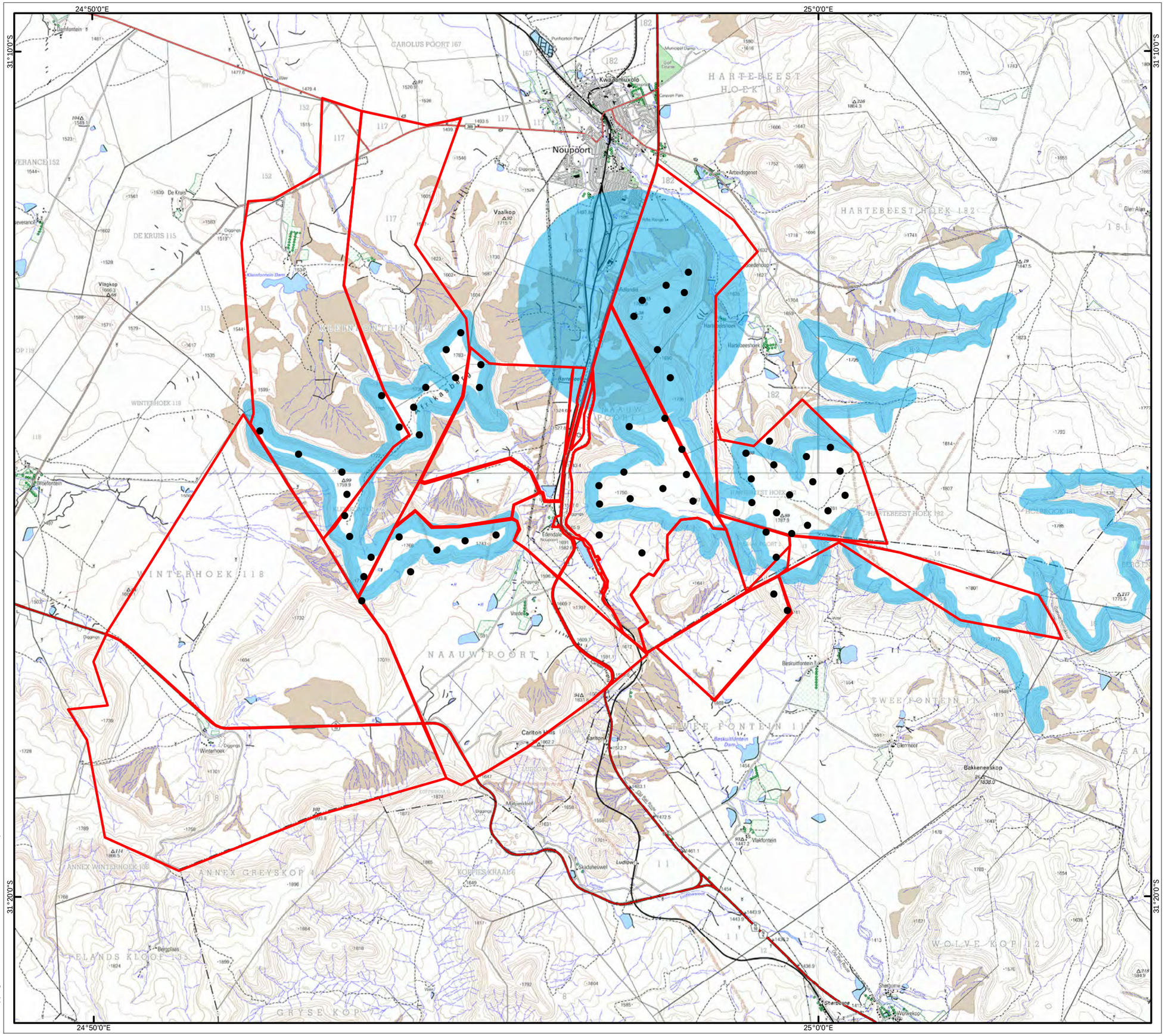
Impact phase: Closure / Decommissioning							
Impact description: - Displacement of priority species due to dismantling of the powerline							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	L	L	L	Negative	M	M	H
With Mitigation	L	L	L	Negative	L	L	M
Can the impact be reversed?	YES. The impacts should be temporary and restricted to the closure phase.						
Will impact cause irreplaceable loss or resources?	NO. The impacts should be temporary and restricted to the closure phase.						
Can impact be avoided, managed or mitigated?	YES: To some extent, however the impact will be negated naturally after the closure phase.						
Mitigation measures: 1. Restrict the dismantling activities to the footprint area. 2. Do not allow any access to the remainder of the property during the dismantling period. 3. Measures to control noise and dust should be applied according to current best practice in the industry. 4. Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum.							
Impact to be addressed/ further investigated and assessed in Impact Assessment Phase?	YES: The powerline routes will be further investigated during the EIA phase.						

9.5 Summary

The proposed WEF will have a variety of impacts on avifauna the significances of which range from low to high.

- Displacement of priority species due to disturbance during the construction and dismantling phases of the WEF is likely to be a temporary, medium negative impact, and will remain at a medium level despite the application of mitigation measures.
- Displacement of priority species due to disturbance during construction and dismantling phases of the grid connection is likely to be a temporary, medium negative impact, and will be reduced to a low level with the application of mitigation measures.
- Displacement of priority species due to habitat destruction during the operational lifetime of the wind energy facility phase is likely to be a medium negative impact but will be reduced to a low level with the application of mitigation measures.
- Collisions of priority species with the turbines in the operational phase are likely to be a high negative impact but it could be reduced to medium negative through the application of mitigation measures. In addition, the implementation of a 150m no development buffer zone along the escarpment edge is recommended to reduce the risk of collisions to soaring species using the declivity currents along the escarpment, the relocation of turbines 7, 62 and 63 as they pose a high collision risk
- Mortality of priority species with the grid connection in the operational phase is likely to be of high significance, but it can be reduced to medium through the fitting of Bird Flight Diverters on selected sections.

The conclusions above are preliminary and subject detailed analysis of monitoring results. Refer to Figure 9.3 for a preliminary sensitivity map indicating proposed buffer zones. Potentially the need for turbines to be relocated within the WEF site boundary based on this recommended 2.5 km pre-cautionary no turbine buffer around the Verreaux's Eagle nest at FP1 (31°12'59.66"S 24°57'26.08").



InnoWind

ARCUS

- Site Boundary
- Proposed Turbine Position
- Avifaunal Buffer (No Turbines Permitted)

1:80 000 Scale @ A3

N

0 1.5 3 km

Produced: AA Reviewed: SC Approved: AB	Ref: 2245/REP/012 Date: 06/04/2017

Preliminary Avifaunal Sensitivity Map
Figure 9.3

Phezukomoya Wind Energy Facility
Draft Scoping Report

10 BAT ASSESSMENT

10.1 Methodology

Bat activity is being monitored using active and passive bat monitoring techniques. Active monitoring is done through site visits with transects made throughout the site with a vehicle-mounted bat detector. Passive detection has commenced with the mounting of passive bat monitoring systems placed on four monitoring masts on site. Specifically, three short 10 m masts and one meteorological mast.

The monitoring systems consist of SM2BAT+ time expansion bat detectors. One ultrasound microphone was mounted at a height of 10 m on the short masts, while two microphones were mounted at 10 m and 50 m on the meteorological mast. These microphones were then connected to the SM2BAT+ bat detectors.

Each detector is set to operate in continuous trigger mode from dusk each evening until dawn. Trigger mode is the setting for a bat detector in which any frequency which exceeds 16 kHz and -18 dB will trigger the detector to record for the duration of the sound and 500 ms after the sound has ceased.

The first site visit was conducted 6 – 12 July 2015, during which the bat detectors were set up. In addition the terrain was investigated during the day for signs of roosting and foraging habitat.

A second site visit was conducted 30 July – 1 August 2015, during which the 50 m microphone was moved to 100 m. Monitoring at 100 m height will provide an assessment of the bat activity occurring within rotor-swept height.

Site visits for each season of the year were conducted following the same methodology as mentioned above, over the course of a 12-month preconstruction monitoring period.

10.2 Assumptions and Limitations

- Distribution maps of South African bat species still require further refinement such that the bat species proposed to occur on the site (that were not detected) are assumed accurate. If a species has a distribution marginal to the site it was assumed to occur in the area. The literature based table of species probability of occurrence may include a higher number of bat species than actually present.
- The migratory paths of bats are largely unknown, thus limiting the ability to determine if the wind farm will have a large scale effect on migratory species. Attempts to overcome this limitation, however, will be made during this long-term sensitivity assessment.
- The satellite imagery partly used to develop the sensitivity map may be slightly imprecise due to land changes occurring since the imagery was taken.
- Species identification with the use of bat detection and echolocation is less accurate when compared to morphological identification, nevertheless it is a very certain and accurate indication of bat activity and their presence with no harmful effects on bats being surveyed.
- It is not possible to determine actual individual bat numbers from acoustic bat activity data. However, bat passes per night are internationally used and recognized as a comparative unit for indicating levels of bat activity in an area as well as a measure of relative abundance.
- Spatial distribution of bats over the study area cannot be accurately determined by means of transects, although the passive systems can provide comparative data for different areas of the site. Transects may still possibly uncover high activity in areas where it is not necessarily expected and thereby increase insight into the site.

- Exact foraging distances from bat roosts or exact commuting pathways cannot be determined by the current methodology. Radio telemetry tracking of tagged bats is required to provide such information if needed.

10.3 Baseline Environment

10.3.1 Roosting and Foraging Areas

Vegetation units and geology are of great importance as these may serve as suitable sites for the roosting of bats and support of their foraging habits. Houses and buildings may also serve as suitable roosting spaces. The importance of the vegetation units and associated geomorphology serving as potential roosting and foraging sites have been described in Table 10:1.

Table 10.1: Potential of the vegetation to serve as suitable roosting and foraging spaces for bats.

Vegetation Unit	Roosting Potential	Foraging Potential	Comments
Besemkaree Koppies Shrubland	Moderate	Moderate- High	The tall and dolerite outcrops have roosting potential while the vegetation provides foraging potential for insectivorous bats.
Eastern Upper Karoo	Low - Moderate	Moderate - High	The presence of sandstone and some dolerite outcrops may provide potential roost sites while the variety of plant species and open grasslands can attract a variety of insect species for insectivorous bat species to feed on.
Karoo Escarpment Grassland	Low	Low - Moderate	Large flat open areas make for good foraging for livestock which acts as a lure for different insects making it a good foraging area for insectivorous bats.
Tarkastad Montane Schrubland	Moderate -High	Moderate - High	The presence of large boulders and rock overhangs as well as crevices in cliffs could provide roost sites.

10.3.2 Literature Based Species Probability of Occurrence

"Probability of Occurrence" is assigned based on consideration of the presence of roosting sites and foraging habitats on the site, compared to literature described preferences. The probability of occurrence is described by a percentage indicative of the expected numbers of individuals present on site and the frequency with which the site will be visited by the species (in other words the likelihood of encountering the bat species).

The column of "Likely risk of impact" describes the likelihood of risk of fatality from direct collision or barotrauma with wind turbine blades for each bat species. The risk was assigned by Sowler and Stoffberg (2014) based on species distributions, altitudes at which they fly and distances they travel; and assumes a 100% probability of occurrence. The ecology of most applicable bat species recorded in the vicinity of the site is discussed below (Table 10:2).

Table 10.2: Table of Species that may be Roosting or Foraging on the Study Area, the Possible Site Specific Roosts, and their Probability of Occurrence based on Literature

Species	Common name	Probability of occurrence (%)	Conservation status	Possible roosting habitat on site	Possible foraging habitat utilised on site	Likelihood of risk of fatality (Sowler & Stoffberg,2014)
Eptesicus hottentotus	Long-tailed serotine	70 - 80	Least Concern	It is a crevice dweller roosting in rock crevices, expansion joints in bridges and road culverts	It seems to prefer woodland habitats, but has been caught in granitic hills and near rocky outcrops. Clutter edge forager	Medium
Cistugo lesueuri	Lesueur's Wing- gland bat	10 - 20	Vulnerable	Roosts in rock crevices near water. Associated with broken terrain in high-altitude montane grasslands.	Not well known, probably near water.	Not known
Miniopterus natalensis	Natal long-fingered bat	90 - 100	Near Threatened	It is mostly cave/mine dependent and hence the availability of suitable roosting sites is a critical factor in determining its presence. It may be found in the Noupoort copper mines. Have been found roosting singly or in small groups inside culverts and manmade hollows.	Forages around the edge of clutters of vegetation, and may therefore avoid most of the site and may only be found at the denser drainage systems. It is also dependant on open surface water sources.	Medium - High
Myotis tricolor	Temmink's myotis	20 - 30	Least Concern	Roosts gregariously in caves, but have been found roosting singly or in small groups inside culverts and manmade hollows.	It is restricted to areas with suitable caves or hollows, which may explain its absence from flat and featureless terrain; its close association with mountainous areas may therefore be due to its roosting requirements.	Medium - High
Neoromicia capensis	Cape serotine	90 - 100	Least Concern	Roosts under the bark of trees, at the base of aloe leaves, and inside the roofs of houses. The farm buildings are the most likely roosting space.	It appears to tolerate a wide range of environmental conditions from arid semi-desert areas to montane grasslands, forests, and savannas. Highly adaptable species, but a clutter edge forager limiting its utilisation of the site.	Medium - High
Nycteris thebaica	Egyptian slit-faced bat	10 - 20	Least Concern	Roosts in caves, aardvark burrows, culverts under roads and the trunks of large trees	It appears to occur throughout the savanna and karoo biomes, but avoids open grasslands. May be found	Low

Species	Common name	Probability of occurrence (%)	Conservation status	Possible roosting habitat on site	Possible foraging habitat utilised on site	Likelihood of risk of fatality (Sowler & Stoffberg,2014)
				and hollows (manmade or natural). Roosting space unlikely on site.	in denser drainage systems. Relatively small foraging range and an open space forager	
Rhinolophus clivosus	Geoffroy's horseshoe bat	10 - 20	Least Concern	Roosts in caves, mine adits and hollows (manmade and natural).	Arid savanna, woodland and riparian forest. Clutter forager that may only possibly be found in denser drainage systems. Relatively small foraging range	Low
Rhinolophus capensis	Cape horseshoe bat	40 - 50	Near Threatened	Roosts in caves and mine adits	Forages predominantly in the canopy of trees	Low
Sauromys petrophilus	Roberts's flat-headed bat	60 - 70	Least Concern	Roosts in narrow cracks and under slabs of exfoliating rock. Closely associated with rocky habitats in dry woodland, mountain fynbos or arid scrub.	Open space forager with relatively large foraging range.	High
Tadarida aegyptiaca	Egyptian free-tailed bat	90 - 100	Least Concern	Roost in rock crevices, under exfoliating rocks, in hollow trees, and behind the bark of dead trees. The species has also taken to roosting in buildings, in particular roofs of houses.	It forages over a wide range of habitats; its preferences of foraging habitat seem independent of vegetation. It seems to forage in all types of natural and urbanised habitats with a relatively large foraging range. Open space forager	High

10.3.3 Ecology of Bat Species that may be largely impacted by the Phezukomoya WEF

There are three bat species recorded in the vicinity of the site that occur commonly in the area due to their probably of occurrence and widespread distribution. These species are of importance based on their likelihood of being impacted by the proposed WEF, due to a combination of abundance and behaviour. The relevant species are discussed below.

10.3.3.1 Miniopterus natalensis

Miniopterus natalensis, also commonly referred to as the Natal long-fingered bat, occurs widely across the country but mostly within the southern and eastern regions and is listed as Near Threatened. This bat is a cave-dependent species and identification of suitable roosting sites may be more important in determining its presence in an area than the presence of surrounding vegetation. It occurs in large numbers when roosting in caves with approximately 260 000 bats observed making seasonal use of the De Hoop Guano Cave in the Western Cape, South Africa. Culverts and mines have also been observed as roosting sites for either single bats or small colonies. Separate roosting sites are used for winter hibernation activities and summer maternity behaviour, with the winter hibernacula generally occurring at higher altitudes in more temperate areas and the summer hibernacula occurring at lower altitudes in warmer areas of the country.

Mating and fertilisation usually occur during March and April and is followed by a period of delayed implantation until July/August. Birth of a single pup usually occurs between October and December as the females congregate at maternity roosts.

The Natal long-fingered bat undertakes short migratory journeys between hibernaculum and maternity roosts. Due to this migratory behaviour, they are considered to be at high risk of fatality from wind turbines if a wind farm is placed within a migratory path. The mass movement of bats during migratory periods could result in mass casualties if wind turbines are positioned over a mass migratory route and such turbines are not effectively mitigated. Very little is known about the migratory behaviour and paths of *M. natalensis* in South Africa with migration distances exceeding 150 kilometres. If the site is located within a migratory path the bat detection systems should detect high numbers and activity of the Natal long-fingered bat. This will be examined over the course of the 12 month monitoring survey.

Individual home ranges of lactating females have been found to be significantly larger than that of pregnant females. It was also found that the bats predominately made use of urban areas (54%) followed by open areas (19.8%), woodlands (15.5%) orchards and parks (9.1%) and water bodies (1.5%) when selecting habitats. Foraging areas were also investigated with the majority again occurring in urban areas (46%); however a lot of foraging also occurred in woodland areas (22%), crop and vineyard areas (8%), pastures, meadows and scrubland (4%) and water bodies (4%).

M. natalensis faces a medium to high risk of fatality due to wind turbines. This evaluation was based on broad ecological features and excluded migratory information.

10.3.3.2 Neoromicia capensis

Neoromicia capensis is commonly called the Cape serotine and has a conservation status of Least Concern as it is found in high numbers and is widespread over much of Sub-Saharan Africa. High mortality rates of this species due to wind turbines would be a cause of concern as *N. capensis* is abundant and widespread and as such has a more significant role to play within the local ecosystem than the rarer bat species. They do not undertake migrations and thus are considered residents of the site.

It roosts individually or in small groups of two to three bats in a variety of shelters, such as under the bark of trees, at the base of aloe leaves, and under the roofs of houses. They will use most man-made structures as day roosts which can be found throughout the site and surrounding areas. They are tolerant of a wide range of environmental conditions as they survive and prosper within arid semi-desert areas to montane grasslands, forests, and savannas; indicating that they may occupy several habitat types across the site, and are amenable towards habitat changes. They are however clutter-edge foragers, meaning they prefer to hunt on the edge of vegetation clutter mostly, but can occasionally forage in open spaces. They are thought to have a Medium-High likelihood of risk of fatality due to wind turbines.

Mating takes place from the end of March until the beginning of April. Spermatozoa are stored in the uterine horns of the female from April until August, when ovulation and fertilisation occurs. They give birth to twins during late October and November but single pups, triplets and quadruplets have also been recorded.

10.3.3.3 Tadarida aegyptiaca

The Egyptian Free-tailed bat, *Tadarida aegyptiaca*, is a Least Concern species as it has a wide distribution and high abundance throughout South Africa. It occurs from the Western Cape of South Africa, north through to Namibia and southern Angola; and through Zimbabwe to central and northern Mozambique. This species is protected by national legislation in South Africa.

They roost communally in small (dozens) to medium-sized (hundreds) groups in rock crevices, under exfoliating rocks, caves, hollow trees and behind the bark of dead trees. *T. aegyptiaca* has also adapted to roosting in buildings, in particular roofs of houses.

The Egyptian Free-tailed bat forages over a wide range of habitats, flying above the vegetation canopy. It appears that the vegetation has little influence on foraging behaviour as the species forages over desert, semi-arid scrub, savannah, grassland and agricultural lands. Its presence is strongly associated with permanent water bodies due to concentrated densities of insect prey.

The Egyptian Free-tailed bat is considered to have a High likelihood of risk of fatality by wind turbines. Due to the high abundance and widespread distribution of this species, high mortality rates by wind turbines would be a cause of concern as these species have more significant ecological roles than the rarer bat species. The sensitivity maps are strongly informed by the areas that may be used by this species.

After a gestation of four months, a single pup is born, usually in November or December, when females give birth once a year. In males, spermatogenesis occurs from February to July and mating occurs in August. Maternity colonies are apparently established by females in November.

Several North American studies indicate the impact of wind turbines to be highest on migratory bats, however there is evidence to the impact on resident species. Fatalities from turbines increase during natural changes in the behaviour of bats leading to increased activity in the vicinity of turbines. Increases in non-migrating bat mortalities around wind turbines in North America corresponded with when bats engage in mating activity. This long term assessment will also be able to indicate seasonal peaks in species activity and bat presence.

10.3.4 Transects

10.3.4.1 First Site Visit

No transects were carried out over the first site visit, due to equipment installation receiving priority. Transects will be carried out over the following site visits, covering all four seasons.

10.3.4.2 Second Site Visit

The driven transect was done using a Wildlife Acoustics SM2BAT+ detector. Four bat species were detected during transects, namely *Eptesicus hottentotus, Miniopterus natalensis, Neoromicia capensis* and *Tadarida aegyptiaca*. Bat activity detected across the site shows quite a large dispersion with concentrated activity occurring in specific areas. A concentration of activity was detected in a central to north-west position within the site boundary, along an inclining road summiting a mountain. It is a relatively sheltered valley type habitat. A large concentration of bat passes, predominantly *Tadarida aegyptiaca,* was detected across the south-west tip of the site boundary. It occurs along a variety of different habitat types of plateaus, sheltered valley areas and the curving contours of the mountains.

10.3.4.3 Third Site Visit

The driven transect was done using a Wildlife Acoustics SM2BAT+ detector. The routes were chosen randomly based on the condition of the roads and location at time of sunset.

Detected bat passes were mostly clustered around high bat sensitivity features such as buildings. The highly concentrated activity was detected mostly during the first portion of the night around the time of sunset with suitable weather conditions prevailing over the duration of the site visit.

10.3.5 Sensitivity Map

Figure 10.1 depicts the sensitive areas of the site, based on features identified to be important for foraging and roosting of the species that are confirmed and most probable to occur on site. Thus the sensitivity map is based on species ecology and habitat preferences. This map can be used as a means of additional pre-construction mitigation in terms of improving turbine placement with regards to bat preferred habitats on site.

The areas designated as having a High Bat Sensitivity (Table 10:3) implicate that no turbines should be placed in these areas and their respective buffer zones, due to the elevated impacts it can have on bat mortalities. If turbines are located within the Moderate Bat Sensitivity zone or buffer zone, they must receive special attention and preference for post-construction monitoring and implementation of mitigations during the operational phase (if mitigation is found to be required).

Table 10.3: Description of Sensitivity Categories utilized in the Sensitivity Map

Sensitivity	Description
Moderate Sensitivity	Areas of foraging habitat or roosting sites considered to have significant roles for bat ecology. Turbines within or close to these areas must acquire priority (not excluding all other turbines) during pre/post-construction studies and mitigation measures, if any is needed.
High Sensitivity	Areas that are deemed critical for resident bat populations, capable of elevated levels of bat activity and support greater bat diversity than the rest of the site. These areas are 'no-go' areas and turbines must not be placed in these areas.

10.4 Preliminary Impact Assessment

Impact Phase: Construction phase							
Potential impact description: Destruction of bat roosts due to earthworks and blasting. During construction, the earthworks and especially blasting can damage bat roosts in rock crevices. Intense blasting close to a rock crevice roost, if applicable, can cause mortality to the inhabitants of the roost.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	M	Le	H	Negative	M	M	H
With Mitigation	L	L	M	Negative	L	L	H
Can the impact be reversed?	No.						
Will impact cause irreplaceable loss or resources?	Yes, if blasting occurs close to a rock crevice roost.						
Can impact be avoided, managed or mitigated?	Yes, by not blasting in sensitive areas.						
Mitigation measures: : • Adhere to the sensitivity map during turbine placement. Blasting should be minimised and used only when necessary.							
Impact to be addressed/ further investigated and assessed in Impact Assessment Phase?	Yes, identifying rock crevice roosts in the development area.						

Impact Phase: Construction phase							
Potential impact description: Loss of foraging habitat. Some minimal foraging habitat will be permanently lost by construction of turbines and access roads. Temporary foraging habitat loss will occur during construction due to storage areas and movement of heavy vehicles.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	L	H	L	Negative	M	M	H
With Mitigation	L	M	L	Negative	L	L	H
Can the impact be reversed?	No, as minimal foraging habitat will be permanently lost. When habitat is removed for temporary storage areas, the impact can be reversed through rehabilitation of the area.						
Will impact cause irreplaceable loss or resources?	Yes in areas where foraging habitat will be permanently lost.						
Can impact be avoided, managed or mitigated?	Possibly through keeping the removal of foraging habitat to a minimum and adhering to the sensitivity maps.						
Mitigation measures: • Adhere to the sensitivity map. Keep to designated areas when storing building materials, resources, turbine components and/or construction vehicles and keep to designated roads with all construction vehicles. • Damaged areas not required after construction should be rehabilitated by an experienced vegetation succession specialist.							
Impact to be addressed/ further investigated and assessed in Impact Assessment Phase?	Yes, through compiling sensitivity maps to indicate the areas that will need to be avoided or mitigation will be needed.						

Impact Phase: Operational phase							
Potential impact description: Bat mortalities due to direct blade impact or barotrauma during foraging activities (not migration). If the impact is too severe (e.g. in the case of no mitigation) local bat populations may not recover from mortalities.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	L	H	H	Negative	H	H	H
With Mitigation	L	H		Negative	M	M	H
Can the impact be reversed?	The impact will occur throughout the lifespan of the wind facility.						
Will impact cause irreplaceable loss or resources?	Yes, it will have an impact on the resident bat population numbers.						
Can impact be avoided, managed or mitigated?	The impact can be mitigated through the micro siting of certain wind turbines located in bat sensitive areas, and applying mitigation measures deemed necessary from the 12-month preconstruction study.						
Mitigation measures: • Adhere to the sensitivity maps. • Apply proposed mitigations to any further layout revisions. • Avoid areas of high bat sensitivity and their buffers as well as preferably avoid areas of Moderate bat sensitivity and their buffers.							
Impact to be addressed/ further investigated and assessed in Impact Assessment Phase?	Compiling sensitivity maps and collecting necessary data through a pre-construction monitoring study.						

Impact Phase: Operational phase							
Impact Description: Cumulative bat mortalities due to direct blade impact or barotrauma during foraging – cumulative impact (resident and migrating bats affected). Mortalities of bats due to wind turbines during foraging and migration can have significant ecological consequences as the bat species at risk are insectivorous and thereby contribute significantly to the control of nocturnal flying insects. On a project specific level insect numbers in a certain habitat can increase if significant numbers of bats are killed off. But if such an impact is present on multiple projects in close vicinity of each other, insect numbers can increase regionally and possibly cause outbreaks of colonies of certain insect species. Additionally, if migrating bats are killed off it can have detrimental effects on the cave ecology of the caves that a specific colony utilises. This is due to the fact that bat guano is the primary form of energy input into a cave ecology system, given that no sunshine that allows photosynthesis exists in cave ecosystems.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	H	H	H	Negative	H	M	H
With Mitigation	M	M	M	Negative	M	M	H
Can the impact be reversed?	The impact will occur throughout the lifespan of the wind facility.						
Will impact cause irreplaceable loss or resources?	Yes, it will have an impact on the population numbers.						
Can impact be avoided, managed or mitigated?	The impact can be mitigated through the micro siting of certain wind turbines located in bat sensitive areas, and applying mitigation measures deemed necessary from the 12-month preconstruction study						
Mitigation measures:							

• The high sensitivity valley areas can serve as commuting corridors for bats in the larger area, potentially lowering the cumulative effects of several WEF's in an area. • Adhere to recommended mitigation measures for this project during the operational phase study. • It is essential that project specific mitigations be applied and adhered to for each project, as there is no overarching mitigation that can be recommended on a regional level due to habitat and ecological differences between project sites. • Adhere to the sensitivity map during any further turbine layout revisions, and preferably attempt to avoid placement of turbines in Moderate sensitivity areas, where possible.	
Impact to be addressed/ further investigated and assessed in Impact Assessment Phase?	Compiling sensitivity maps and collecting necessary data through a pre-construction monitoring study.

Impact Phase: Operational phase

Impact Description: Artificial lighting.

During operation strong artificial lights that may be used at the turbine base or immediate surrounding infrastructure will attract insects and thereby also bats. This will significantly increase the likelihood of impact to bats foraging around such lights. Additionally, only certain species of bats will readily forage around strong lights, whereas others avoid such lights even if there is insect prey available, which can draw insect prey away from other natural areas and thereby artificially favour only certain species.

	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	L	H	M	Negative	M	H	H
With Mitigation	L	H	L	Negative	L	L	H

Can the impact be reversed?	The impact will occur throughout the lifespan of the wind facility.
Will impact cause irreplaceable loss or resources?	Yes, it will have an impact on the population diversity.
Can impact be avoided, managed or mitigated?	Yes, it can be managed and mitigated.

Mitigation measures:

Utilise lights with wavelengths that attract less insects (low thermal/infrared signature). If not required for safety or security purposes, lights should be switched off when not in use or equipped with passive motion sensors.

Impact to be addressed/ further investigated and assessed in Impact Assessment Phase?	No

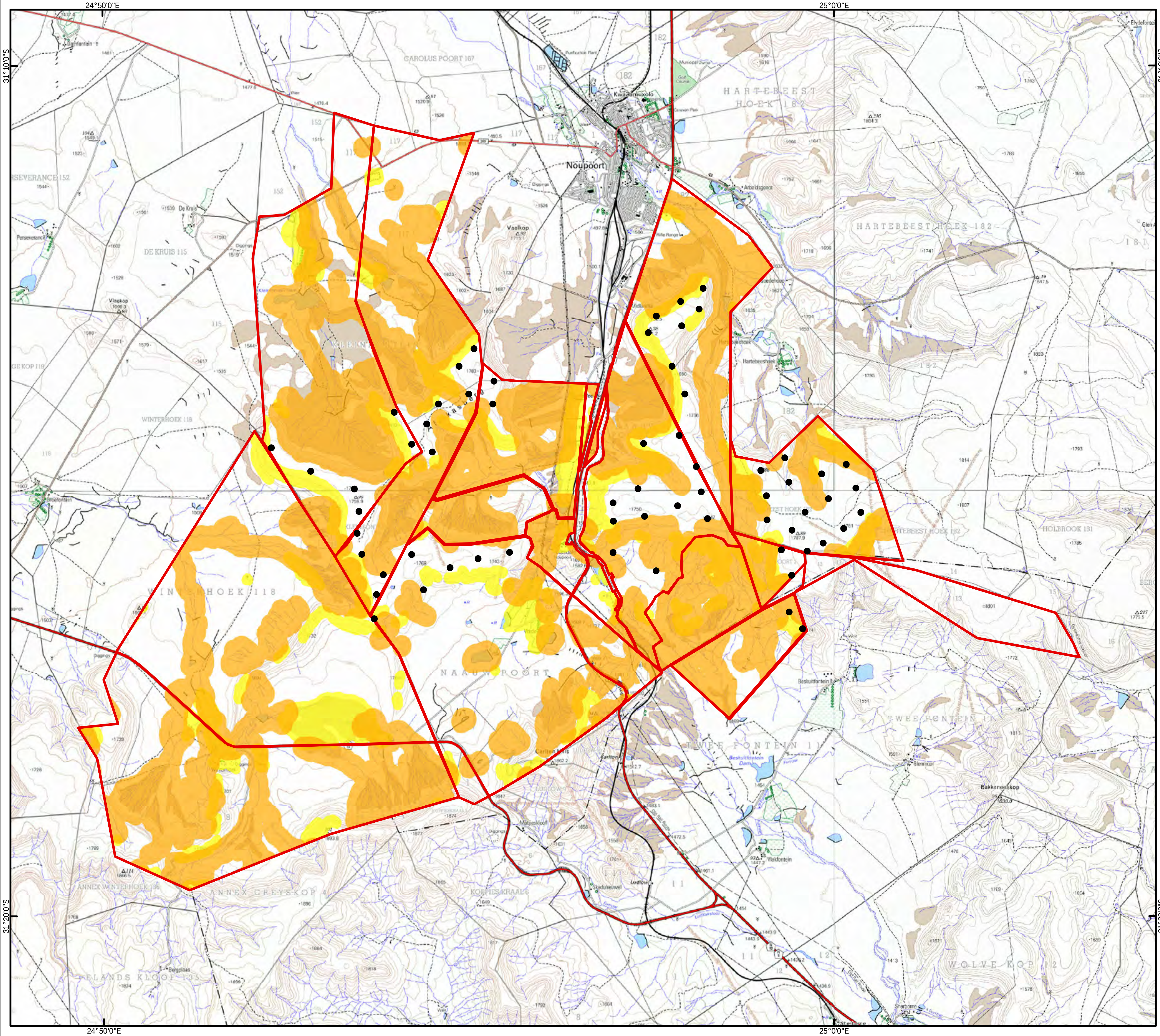
Impact Phase: Decommissioning phase

Impact Description: Loss of foraging habitat.

Some minimal foraging habitat will be temporarily lost during decommissioning of turbines and access roads.

	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	L	L	L	Negative	M	M	H
With Mitigation	L	L	L	Negative	L	L	H

Can the impact be reversed?	When habitat is removed for temporary storage areas, the impact can be reversed through rehabilitation of the area.



InnoWind

ARCUS

Site Boundary

Proposed Turbine Position

High Bat Sensitvity (No turbines permitted)

Moderate Bat Sesnitivity (Turbines Permitted)

1:80,000 Scale @ A3

0 1.5 3 km

N

Produced: AA
Reviewed: SC
Approved: AB

Ref: 2245/REP/014

Date: 05/06/2017

Preliminary Bat Sensitivity Map
Figure 10.1

Phezukomoya Wind Energy Facility
Draft Scoping Report

Will impact cause irreplaceable loss or resources?	Possibly, if not adhered to the mitigation measures.
Can impact be avoided, managed or mitigated?	Yes, by keeping the removal of foraging habitat to a minimum and adhering to the sensitivity maps.
Mitigation measures: • Adhere to the sensitivity map. • Keep to designated areas when storing building materials, resources, turbine components and/or heavy vehicles and keep to designated roads with all heavy vehicles. • Damaged areas should be rehabilitated by an experienced vegetation succession specialist.	
Impact to be addressed/ further investigated and assessed in Impact Assessment Phase?	No

11 FRESHWATER AND WETLANDS ASSESSMENT

11.1 Methodology

In order to delineate any natural waterbodies remaining on the properties in question, as well as the potential consequences of the layout on the surrounding water courses, information was collected during a site visit in March 2016.

The water body delineation and classification was conducted using the standards and guidelines produced by the DWA (DWAF, 2005 & 2007) and the South African National Biodiversity Institute (SANBI, 2009). Detailed methodologies can be found in the specialist report in Volume 2, including wetland definitions, wetland conservation importance and Present Ecological State (PES) assessment methods used. Reference is also included with regard to relevant legislation related to the protection of waterbodies and the minimum requirements in terms of prescribed buffers.

For reference the following definitions are as follows:

Drainage line: A drainage line is a lower category or order of watercourse that does not have a clearly defined bed or bank. It carries water only during or immediately after periods of heavy rainfall i.e. non-perennial, and riparian vegetation may not be present.

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.

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).

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.

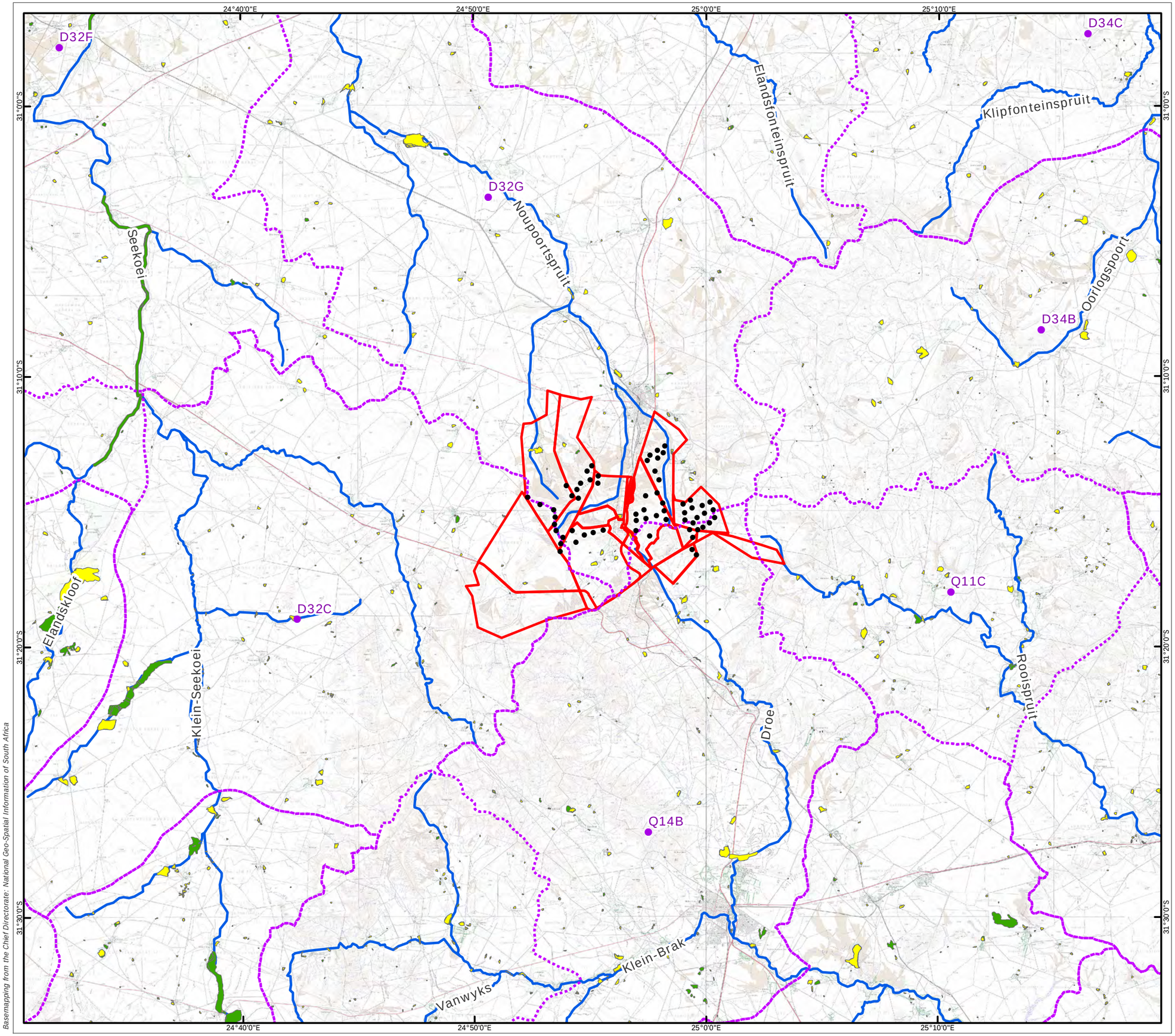
Water course: as per the National Water Act means -

(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

11.1.1 Present Ecological State and Conservation Importance

The Present Ecological State of a river represents the extent to which it has changed from the reference or near pristine condition (Category A) towards a highly impacted system where there has been an extensive loss of natural habit and biota, as well as ecosystem functioning (Category E).

The national Present Ecological Score or PES scores have been revised for the country and based on the new models, aspects of functional importance as well as direct and indirect impacts have been included (DWS, 2014). The new PES system also incorporates EI



Basemapping from the Chief Directorate: National Geo-Spatial Information of South Africa

InnoWind

ARCUS

- Site Boundary
- Proposed Turbine Position
- SA Quaternary Catchment Boundary
- Artificial NFEPA Wetland
- Natural NFEPA Wetland
- SA Quaternary Catchment Labels
- NFEPA River

1:250 000 Scale @ A3

0 5 10 km

N

Produced: AA Reviewed: SC Approved: AB	Ref: 2245/REP/015 Date: 06/04/2017

Quaternary Catchments and Mainstem Rivers and Wetlands within the Region
Figure 11.1

Phezukomoya Wind Energy Facility
Draft Scoping Report

(Ecological Importance) and ES (Ecological Sensitivity) separately as opposed to EIS (Ecological Importance and Sensitivity) in the old model. Although the new model is still heavily centered on rating rivers using broad fish, invertebrate, riparian vegetation and water quality indicators. The Recommended Ecological Category (REC) is still contained within the new models, with the default REC being B, when little or no information is available to assess the system or when only one of the above mentioned parameters is assessed or then overall PES is rated between a C or D.

11.1.2 Assumptions and Limitations

For the purposes of the impact assessment the following has been assumed:

- The final internal roads will avoid any water courses as far as possible, making use of existing tracks and roads; where this is not possible the required Water Use License Applications must be submitted.
- Existing road crossings will be upgraded, i.e. culverts and stormwater management features.
- Transmission line towers will be placed outside of any water courses (including the 32 m buffer).

11.2 Baseline Environment

The proposed development occurs within the following subquatenary catchments associated with the Drought Corridor Ecoregion spanning the boundary between the Orange and Mzimvubu / Tsitsikamma Water Management Areas (Figure 11.1).

- Q14B - Droe River
- D32G – Noupoortspruit
- D32C – Kleinseekoei (Portions of the transmission alternatives only)

These catchments are characterised by several perennial water courses and drainage lines associated with these mainstem systems listed above. The larger systems are characterised by alluvial riverbeds / washes. Most of these showing signs of erosion, with large head cuts forming in the upper catchment / foothills of these systems located within the study area.

In terms of the National Freshwater Ecosystems Priority Areas (NFEPA) assessment, all of watercourses within the site were assigned condition scores between AB and C indicating that they largely intact or moderately modified, but still with biological function. This is largely due to this catchments falling with the headwaters of the Gariep (Orange) River and thus some (D32C & G) were earmarked as upstream support areas for important fish habitats located in the Gariep River, by the NFEPA assessment.

The proposed transmission lines within the D32C catchment will cross the observed rivers within reaches that were classed as C (Moderately Modified) but it is anticipated that all towers could span these systems including their respective riparian zones (i.e. the 32 m buffer).

According to the National Freshwater Ecosystems Priority Area (NFEPA) wetland data, only one natural wetland could occur within the study area. The remaining waterbodies identified are artificial or man-made systems as shown in Figure 11.1. This was verified during the site visit that, and no natural wetlands were observed within the study area as these were all found to be impoundments / dams.

Figure 11.2 indicates significant watercourses observed within the site. Any activities within these areas or the 32 m buffer (or the 1:100 floodline, whichever is the greatest) will require a Water Use license (possible General Authorisation). It could not be determined

from the present information, which of the existing road section will require upgrades along the public roads but this will likely be required in parts.

The Present Ecological State scores (PES) for the drainage lines and the rivers in the study area were rated as follows (DWS, 2014 – where A = Natural or Close to Natural & B = Moderately Modified):

Subquaternary Catchment Number	Present Ecological State	Ecological Importance	Ecological Sensitivity
5861	C	Moderate	Moderate
6007	C	Low	Moderate
6010	C	Low	Moderate
6082	B	High	Moderate
6103	C	Moderate	Moderate

It is thus evident that the study area systems are largely functional and or have limited impacts as a result of current land use practices. This was confirmed for each of the affected reaches located within the development footprint. In other words, the systems observed are largely natural, with small or narrow riparian zones, dominated by *Searsia lancea* and *Vachellia karroo.* The only obligate species observed include small areas of *Juncus rigidus* and *Phragmites australis* associated with small pools created by road culverts found throughout the study area.

11.2.1 Preliminary Assessment

The following impacts were not assessed as the factors were not present within the study area aquatic ecosystems:

- Loss of aquatic species of special concern; and
- Wetland loss as no natural wetlands were observed in close proximity to any of the proposed infrastructure (i.e. within 500 m of the proposed layouts).

The following direct and indirect impacts were assessed with regard to the riparian areas and water courses:

- Impact 1: Loss of riparian systems and water courses;
- Impact 2: Impact on riparian systems through the possible increase in surface water runoff on riparian form and function;
- Impact 3: Increase in sedimentation and erosion; and
- Impact 4: Potential impact on localised surface water quality.

The proposed turbines will be located on the higher lying ridges, and only the required road crossings would have a direct impact on these systems. The closest proposed turbine was measured at 40 m from one such system, while the remainder are far greater distances from the centre lines of the observed water courses. The proposed turbine layout is therefore in line with the 32 m watercourse buffer.

Impact Phase: Construction Phase							
Impact description: Loss of riparian systems and water courses The physical removal of the narrow strips of riparian zones and disturbance of any alluvial watercourses by the road crossings only, being replaced by hard engineered surfaces. This biological impact would however be localised, as a large portion of the remaining catchment would remain intact, while the significant structures (turbines and hard standing areas) have been placed well outside of these areas. Possible impact on the remaining catchment due to changes in run-off characteristics in the development site.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	L	M	L	Negative	M	H	H

With Mitigation	L	L	L	Negative	L	L	H
Can the impact be reversed?	Yes						
Will impact cause irreplaceable loss or resources?	No						
Can impact be avoided, managed or mitigated?	Yes						
Mitigation measures: • Where water course crossings are required, the engineering team must provide effective means to minimise the potential upstream and downstream effects of sedimentation and erosion (erosion protection) as well minimise the loss of riparian vegetation (small footprint). • A number of the transmission line towers to the grid could be located within some of the watercourses and these should be placed outside of these areas (incl. 32m buffer) • No vehicles to refuel or be maintained within drainage lines/ riparian vegetation. • During the operational phase, monitor culverts to see if erosion issues arise and if any erosion control is required. • Where possible culvert bases must be placed as close as possible with natural levels in mind so that these don't form additional steps / barriers.							
Impact to be addressed/ further investigated and assessed in Impact Assessment Phase?	Yes - This impact will be assessed further in the EIA Phase						

Impact phase: Operational phase							
Impact description: Impact on riparian systems through the possible increase in surface water runoff from hard surfaces and or new road crossings on riparian form and function Possible impact on the remaining catchment due to changes in run-off characteristics in the development site. However due to low mean annual runoff within the region this is not anticipated due to the nature of the development together with the proposed layout.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	L	M	L	Negative	M	H	H
With Mitigation	L	L	L	Negative	L	L	H
Can the impact be reversed?	Yes						
Will impact cause irreplaceable loss or resources?	No						
Can impact be avoided, managed or mitigated?	Yes						
Mitigation measures: • Any stormwater within the site must be handled in a suitable manner, i.e. trap sediments, and reduce flow velocities. This is particularly important due to the levels of erosion already observed within the affected catchments.							
Impact to be addressed/ further investigated and assessed in Impact Assessment Phase?	Yes - This impact will be assessed further in the EIA Phase						

Impact phase: Construction phase and to a lesser degree operational phase
Impact Description: Increase in sedimentation and erosion within the development footprint

During flood events, any unstable banks (eroded areas) and sediment bars (sedimentation downstream) already deposited downstream. However due to low mean annual runoff within the region this is not anticipated due to the nature of the development together with the proposed layout.

	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	L	M	L	Negative	M	H	H
With Mitigation	L	L	L	Negative	L	L	H

Can the impact be reversed?	Yes
Will impact cause irreplaceable loss or resources?	No
Can impact be avoided, managed or mitigated?	Yes

Mitigation measures:

- Any stormwater within the site must be handled in a suitable manner, i.e. trap sediments and reduce flow velocities.

Impact to be addressed / further investigated and assessed in Impact Assessment Phase?	Yes - This impact will be assessed further in the EIA Phase

Impact phase: Pre-construction, construction and to a limited degree operational activities

Impact description: Impact on localized surface water quality

Chemical pollutants (hydrocarbons from equipment and vehicles, cleaning fluids, cement powder, wet cement, shutter-oil, etc.) associated with site-clearing machinery and construction activities could be washed downslope via the ephemeral systems.

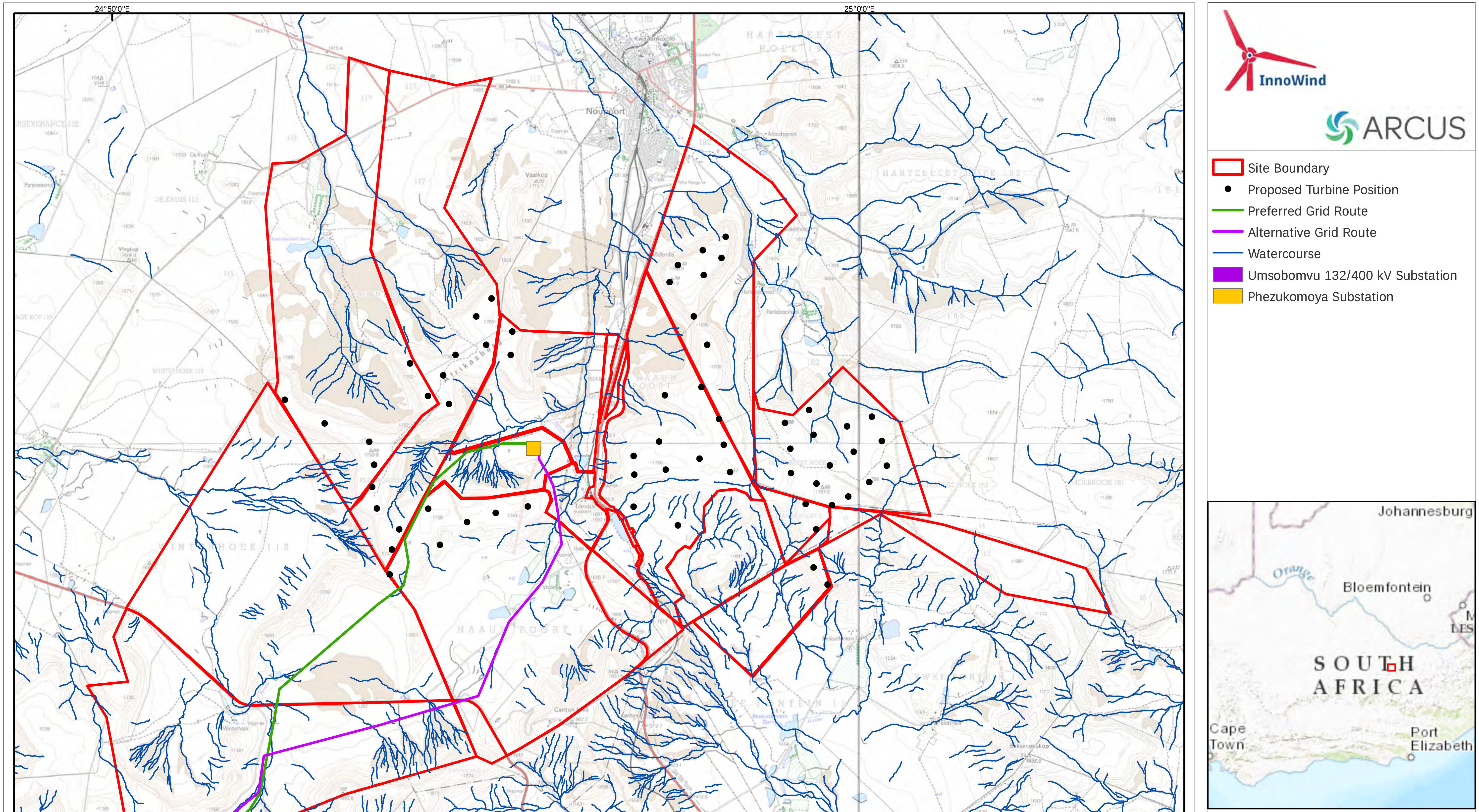
Possible impact on the remaining catchment due to changes in run-off characteristics in the development site. However due to low mean annual runoff within the region this is not anticipated due to the nature of the development together with the proposed layout.

	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	L	M	L	Negative	M	H	H
With Mitigation	L	L	L	Negative	L	L	H

Can the impact be reversed?	Yes
Will impact cause irreplaceable loss or resources?	Yes. Medium without mitigation, low with mitigation.
Can impact be avoided, managed or mitigated?	Yes

Mitigation measures:

- Strict use and management of all hazardous materials used on site.
- Strict management of potential sources of pollution (e.g. litter, hydrocarbons from vehicles & machinery, cement during construction, etc.).
- Containment of all contaminated water by means of careful run-off management on the development site.
- Strict control over the behaviour of construction workers.
- Working protocols incorporating pollution control measures (including approved method statements by the contractor) should be clearly set out in the Construction Environmental Management Plan (CEMP) for the project and strictly enforced.
- Appropriate ablution facilities should be provided for construction workers during construction and on-site staff during the operation of the facility.



Produced: AA
Reviewed: SC
Approved: AB

Ref: 2245/REP/016

Date: 05/06/2017

Watercourses in the Proposed Development Site
Figure 11.2

Phezukomoya Wind Energy Facility
Draft Scoping Report

Basemapping from the Chief Directorate: National Geo-Spatial Information of South Africa

Impact to be addressed / further investigated and assessed in Impact Assessment Phase?	Yes - This impact will be assessed further in the EIA Phase

11.2.2 Grid Connection and Substation Alternatives

It is anticipated the no impacts on the aquatic environment will occur based on the proposed alignments and the alternatives. This is based on the assumption that during the final design process all transmission line towers will be located outside of the delineated water courses and the 32 m buffer.

The only recommendation being that should any of the towers be located on steep slopes adequate erosion protection should be installed to prevent any surface water run-off from eroding these areas.

11.3 Conclusion

The proposed layouts for the facilities and proposed powerlines lines would seem to have limited impact on the aquatic environment as the proposed structures can avoid the delineated watercourses with the exception of a number of water course crossings. Use of any existing roads will support this.

Thus based on the findings of this study no objection to the authorisation of any of the proposed activities for both facilities inclusive of the alternatives is made.

No aquatic protected or species of special concern (flora) were observed during the site visit. Therefore, based on the site visit the significance of the impacts assessed for the aquatic systems after mitigation would be LOW.

There will be upgrades required in part to the public road approaching the site and these findings also apply there, but it is understood that these current crossings may be upgraded by increasing the current size of the culverts and provide additional erosion protection, thus a possible net benefit to the local systems. The actual requirements and designs will be finalized in the detail design phase. It is therefore recommended that these positions are assessed in the EMPr “pre-construction walkthrough” phase to provide detailed mitigations to the engineers as and when required. However as stated the overall impacts are envisaged low, i.e. no wetlands or sensitive habitats will be crossed by the upgrades.

Figure 11.2 further indicates the affected water courses and those that would trigger the need for a Water Use License application (a potential GA) in terms of Section 21 c and i of the National Water Act, should any construction take place within these areas.

12 NOISE ASSESSMENT

12.1 Background and Methodology

This desktop study investigated the potential noise impact that the Phezukomoya WEF and its grid connection may have on the surrounding environment. It is based on a desktop assessment, as well as a basic predictive model (making use of the worst case scenario in terms of the precautionary approach) to identify potential issues of concern. Noise emissions into the surrounding environment and the assessment criteria are explained below.

12.1.1 Noise Emissions into the Surrounding Environment

The noise emissions into the environment from the various sources shall be calculated during the EIA phase using the sound propagation models described by ISO 9613-2 (operational phase) and SANS 10357 (construction phase). The following will be taken into account:

- The octave band sound pressure emission levels of processes and equipment;
- The distance of the receiver from the noise sources;
- The impact of atmospheric absorption;
- The meteorological conditions in terms Pasquill stability;
- The preliminary layout details of the proposed project;
- The height of the noise source under investigation;
- Topographical layout; and
- Acoustical characteristics of the ground.

The potential impact from traffic is not considered during the Scoping phase, but shall be considered in the EIA phase.

Conceptual calculations will be used to assess the magnitude and extent of potential noises during the scoping phase. As these calculations do not consider potential topographical influences, ground correction or cumulative impacts, confidence levels are low in the resulting opinion. The assessment therefore leans towards a worst-case approach and the potential significance is likely higher than realistic values.

12.1.2 Impact Assessment Criteria

The word "noise" is generally used to convey a negative response or attitude to the sound received by a listener. There are four common characteristics of sound, any or all of which determine listener response and the subsequent definition of the sound as "noise". These characteristics are:

- Intensity;
- Loudness;
- Annoyance; and
- Offensiveness

Of the four common characteristics of sound, intensity is the only one which is not subjective and can be quantified. Loudness is a subjective measure of the effect sound has on the human ear. As a quantity, it is therefore complicated but has been defined by experimentation on subjects known to have normal hearing.

The annoyance and offensive characteristics of noise are also subjective. Whether or not a noise causes annoyance mostly depends upon its reception by an individual, the environment in which it is heard, the type of activity and mood of the person and how acclimatised or familiar that person is to the sound.

12.1.3 Noise Criteria of Concern

The criteria used in this report were drawn from the criteria for the description and assessment of environmental impacts from the EIA Regulations, published by the Department of Environmental Affairs and Tourism (April 1998) in terms of the NEMA, SANS 10103 as well as guidelines from the World Health Organization (WHO).

There are a number of criteria that are of concern for the assessment of noise impacts. These can be summarised in the following manner:

- Increase in noise levels: People or communities often react to an increase in the ambient noise level they are used to, which is caused by a new source of noise. With regards to the Noise Control Regulations, an increase of more than 7 dBA is considered a disturbing noise. (Figure 12.1).
- Zone Sound Levels: Previously referred as the acceptable rating levels, it sets acceptable noise levels for various areas.
- Absolute or total noise levels: Depending on their activities, people generally are tolerant to noise up to a certain absolute level, e.g. 65 dBA. However, anything above this level is considered unacceptable.

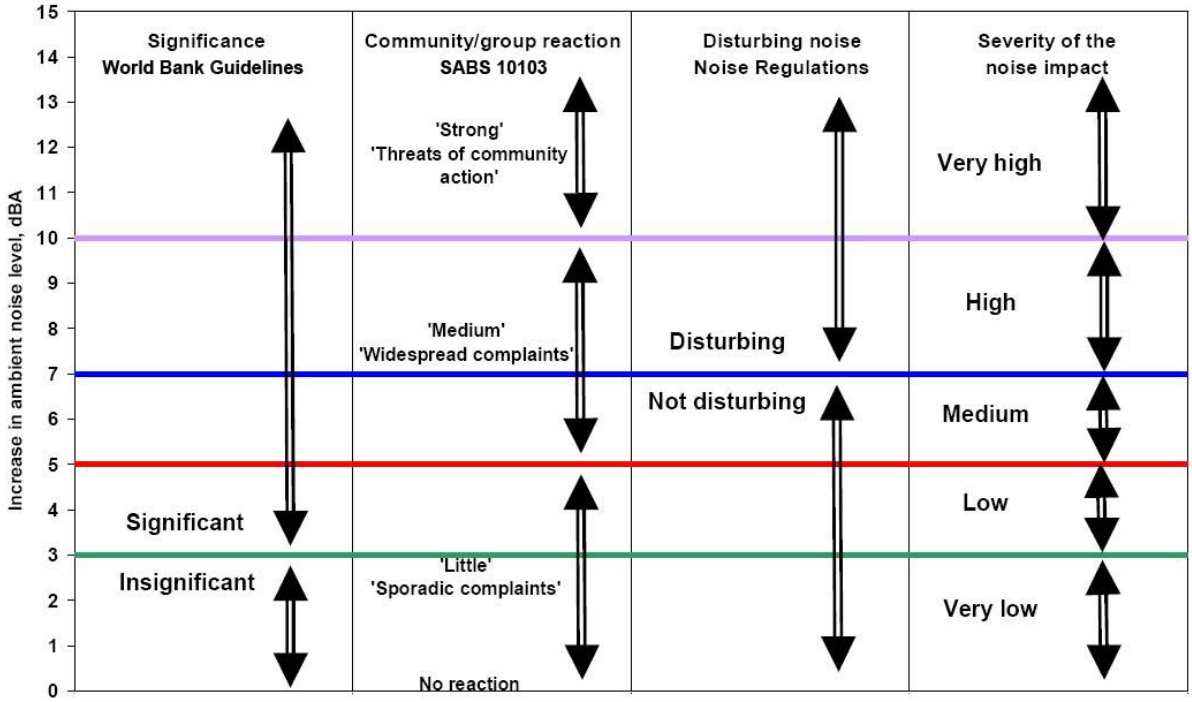


Figure 12.1: Criteria to assess the Significance of Impacts stemming from Noise.

In South Africa the document that addresses the issues concerning environmental noise is SANS 10103 (Figure 12-2). It provides the maximum average ambient noise levels, $L_{Req,d}$ and $L_{Req,n}$, during the day and night respectively to which different types of developments may be exposed. For rural areas the Zone Sound Levels (Rating Levels) are:

- Day (06:00 to 22:00) - LReq,d = 45 dBA, and
- Night (22:00 to 06:00) - LReq,n = 35 dBA.

However, the expected rating levels will be reviewed after the field work phase where on-site measurements will be collected.

SANS 10103 also provides a guideline for estimating community response to an increase in the general ambient noise level caused by an intruding noise. If Δ is the increase in noise level, the following criteria are of relevance:

- **Δ ≤ 3 dBA:** An increase of 3 dBA or less will not cause any response from a community. It should be noted that for a person with average hearing acuity an increase of less than 3 dBA in the general ambient noise level would not be noticeable.
- **3 < Δ ≤ 5 dBA:** An increase of between 3 dBA and 5 dBA will elicit 'little' community response with 'sporadic complaints'. People will just be able to notice a change in the sound character in the area.
- **5 < Δ ≤ 15 dBA:** An increase of between 5 dBA and 15 dBA will elicit a 'medium' community response with 'widespread complaints'. In addition, an increase of 10 dBA is subjectively perceived as a doubling in the loudness of a noise. For an increase of more than 15 dBA the community reaction will be 'strong' with 'threats of community action'.

In addition, it should be noted that the Noise Control Regulations defines disturbing noise to be any change in the ambient noise levels higher than 7 dBA than the background.

1	2	3	4	5	6	7
Type of district	**Equivalent continuous rating level ($L_{Req,T}$) for noise** dBA					
	Outdoors			**Indoors, with open windows**		
	Day/night $L_{R,dn}$[a]	**Daytime $L_{Req,d}$[b]**	**Night-time $L_{Req,n}$[b]**	**Day/night $L_{R,dn}$[a]**	**Daytime $L_{Req,d}$[b]**	**Night-time $L_{Req,n}$[b]**
a) Rural districts	45	45	35	35	35	25
b) Suburban districts with little road traffic	50	50	40	40	40	30
c) Urban districts	55	55	45	45	45	35
d) Urban districts with one or more of the following: workshops; business premises; and main roads	60	60	50	50	50	40
e) Central business districts	65	65	55	55	55	45
f) Industrial districts	70	70	60	60	60	50

Figure 12.2: Acceptable Zone Sound Levels for Noise in Districts (SANS 10103).

12.1.4 Determining Appropriate Zone Sound Levels

SANS 10103 does not cater for instances when background noise levels change due to the impact of external forces. Locations close to the sea for instance always have a background noise level exceeding 35 dBA, and, in cases where the sea is rather turbulent, it can easily exceed 45 dBA. Similarly, noise induced by high winds again is not included.

Setting noise limits relative to the background noise level is relatively straightforward when the prevailing background noise level and source level are constant. However, wind turbines emit noise that is related to wind speed, and the environment within which they are heard will probably also be dependent upon the strength of the wind and the noise associated with its effects. It is therefore necessary to derive a background noise level that is indicative of the noise environment at the receiving property for different wind speeds so that the turbine noise level at any particular wind speed can be compared with the background noise level in the same wind conditions.

Therefore, when assessing the overall noise levels emitted by a wind farm it is necessary to consider the full range of operating wind speeds of the wind turbines. This covers the wind speed range from around 3-5m/s (the turbine cut-in wind speed) up to a wind speed range of 25-35m/s measured at the hub height of a wind turbine. However, the Noise Working Group proposes that noise limits only be placed up to a wind speed of 12 m/s for the following reasons:

1. Wind speeds are not often measured at wind speeds greater than 12m/s at 10m height.
2. Reliable measurements of background noise levels and turbine noise will be difficult to make in high winds due to the effects of wind noise on the microphone and the fact that one could have to wait several months before such winds were experienced.
3. Turbine manufacturers are unlikely to be able to provide information on sound power levels at such high wind speeds for similar reasons.
4. If a wind farm meets noise limits at wind speeds lower than 12 m/s it is most unlikely to cause any greater loss of amenity at higher wind speeds. Whilst turbine noise levels will still be reasonably constant, even in sheltered areas the background is likely to contain much banging and rattling due to the force of the wind.

Available data indicates that noises from a Wind Turbine is drowned by other noises (wind howling around building, rustling of leaves in trees, rattling noises, etc) above a wind speed of 8 – 10 m/s, even if the wind blows in the direction of the receiver.

A typical background noise vs. wind speed regression curve is illustrated in Figure 12.3. It should be noted that curves for daytime (6:00 – 22:00) and night time (22:00 – 6:00) would be different, but as wind speeds increase, the wind induced noise levels approach each other (wind speeds exceeding 15 m/s).

The curve was developed by plotting all measurement data (as collected by the author during periods when the wind was blowing) and fitting a curve through the points. The measurement points were selected to be away from structures (buildings, trees, etc.) that could significantly impact the ambient sound levels during high winds. This is because ambient sound levels are generally significantly higher closer to dwellings or other structures than at points further away from such structures (during times when a wind is blowing). In addition data collected when other noise sources were present (traffic, industrial noises) were not included.

Once ambient sound levels are collected it will be evaluated as illustrated in Figure 12.3.

12.1.5 Determining the Significance of the Noise Impact

The level of detail as depicted in the EIA regulations was fine-tuned by assigning specific values to each impact. In order to establish a coherent framework within which all impacts could be objectively assessed, it was necessary to establish a rating system, which was applied consistently to all the criteria. For such purposes each aspect will be assigned a value as during the Environmental Noise Impact Assessment stage.

The significance of environmental impacts is a function of the environmental aspects that are present and to be impacted on, the probability of an impacts occurring and the consequence of such an impact occurring before and after implementation of proposed mitigation measures. The environmental aspects are:

- Magnitude (Intensity or severity);
- Duration;
- Spatial Extent; and
- Probability of impact occurring.

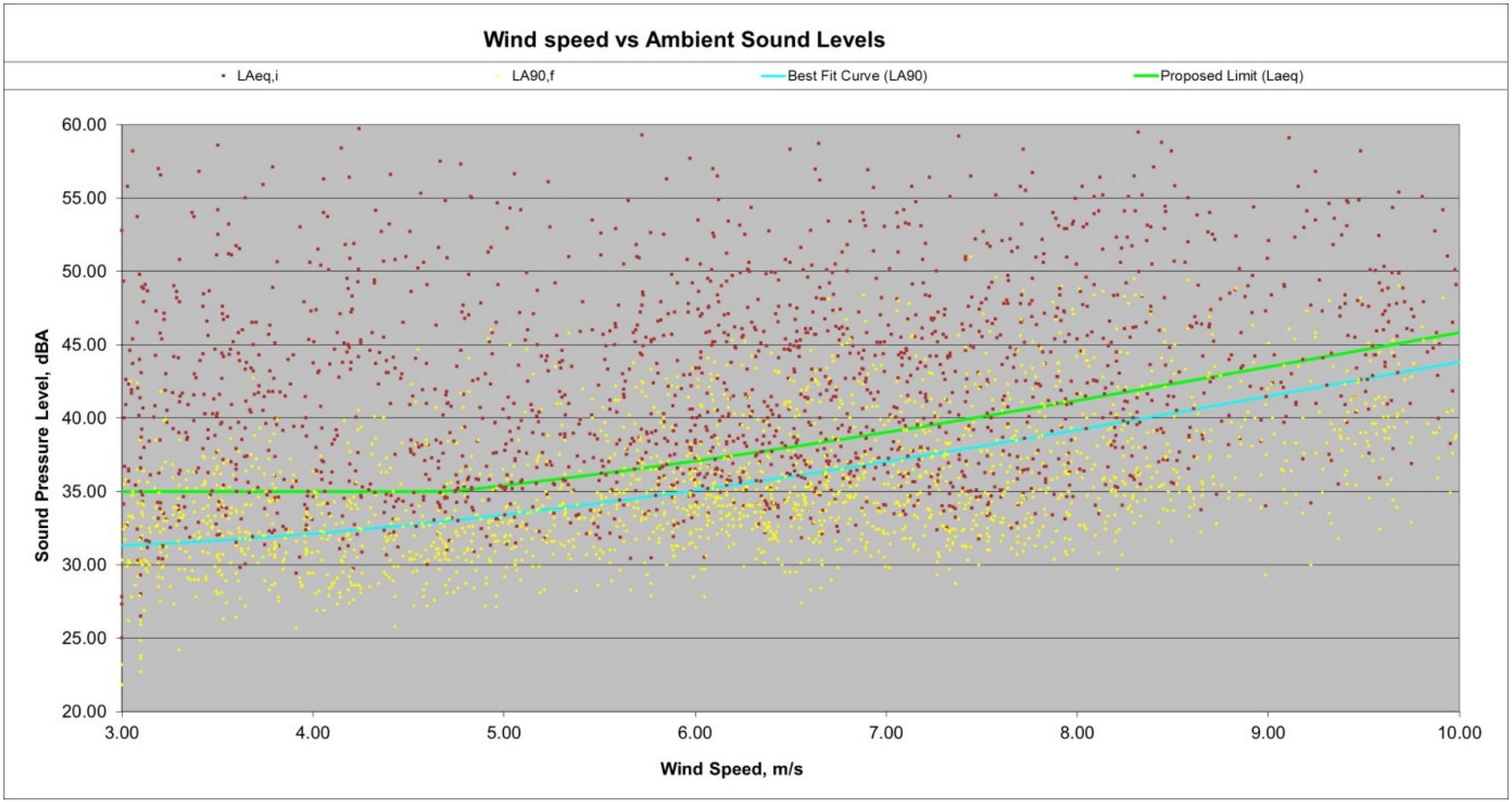


Figure 12.3: Ambient Sound Measurements and Noise Criteria Curve considering Wind Speeds (illustrative)

12.1.6 Expression of the Noise Impacts

Noise impacts can be expressed in terms of the increase in present ambient noise levels caused by noise emissions from the proposed project or as total noise rating levels. Sound or noise levels generally refers to a level as measured using an instrument, whereas the noise rating level refers to a calculated sound exposure level to which various corrections and adjustments was added.

This study made use of the total noise rating levels as a means of defining the potential magnitude of a noise level. This is using contours of constant noise rating levels to illustrate the projected noise levels in the area during the EIA phase noise study.

For the purpose of Scoping, predicted noise rating levels are based on Table 12.1 and Table 12.2.

Table 12.1 Potential Maximum Noise Levels Generated by Construction Equipment (for illustration Purposes)

Equipment Description[31]	Impact Device?	Maximum Sound Power Levels (dBA)	Operational Noise Level at given distance considering potential **maximum** noise levels (Cumulative as well as the mitigatory effect of potential barriers or other mitigation not included – simple noise propagation modelling only considering distance) (dBA)											
			5 m	10 m	20 m	50 m	100 m	150 m	200 m	300 m	500 m	750 m	1000 m	2000 m
Auger Drill Rig	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Backhoe	No	114.7	89.7	83.7	77.6	69.7	63.7	60.1	57.6	54.1	49.7	46.2	43.7	37.6
Chain Saw	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Compactor (ground)	No	114.7	89.7	83.7	77.6	69.7	63.7	60.1	57.6	54.1	49.7	46.2	43.7	37.6
Compressor (air)	No	114.7	89.7	83.7	77.6	69.7	63.7	60.1	57.6	54.1	49.7	46.2	43.7	37.6
Concrete Batch Plant	No	117.7	92.7	86.7	80.6	72.7	66.7	63.1	60.6	57.1	52.7	49.2	46.7	40.6
Concrete Mixer Truck	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Concrete Pump Truck	No	116.7	91.7	85.7	79.6	71.7	65.7	62.1	59.6	56.1	51.7	48.2	45.7	39.6
Concrete Saw	No	124.7	99.7	93.7	87.6	79.7	73.7	70.1	67.6	64.1	59.7	56.2	53.7	47.6
Crane	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Dozer	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Drill Rig Truck	No	118.7	93.7	87.7	81.6	73.7	67.7	64.1	61.6	58.1	53.7	50.2	47.7	41.6
Drum Mixer	No	114.7	89.7	83.7	77.6	69.7	63.7	60.1	57.6	54.1	49.7	46.2	43.7	37.6
Dump Truck	No	118.7	93.7	87.7	81.6	73.7	67.7	64.1	61.6	58.1	53.7	50.2	47.7	41.6
Excavator	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Flat Bed Truck	No	118.7	93.7	87.7	81.6	73.7	67.7	64.1	61.6	58.1	53.7	50.2	47.7	41.6
Front End Loader	No	114.7	89.7	83.7	77.6	69.7	63.7	60.1	57.6	54.1	49.7	46.2	43.7	37.6
Generator	No	116.7	91.7	85.7	79.6	71.7	65.7	62.1	59.6	56.1	51.7	48.2	45.7	39.6
Generator (<25KVA)	No	104.7	79.7	73.7	67.6	59.7	53.7	50.1	47.6	44.1	39.7	36.2	33.7	27.6
Grader	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Impact Pile Driver	Yes	129.7	104.7	98.7	92.6	84.7	78.7	75.1	72.6	69.1	64.7	61.2	58.7	52.6
Jackhammer	Yes	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Man Lift	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Mounted Impact Hammer	Yes	124.7	99.7	93.7	87.6	79.7	73.7	70.1	67.6	64.1	59.7	56.2	53.7	47.6
Paver	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6

[31] Equipment list and Sound Power Level source: http://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook09.cfm

Equipment Description[31]	Impact Device?	Maximum Sound Power Levels (dBA)	Operational Noise Level at given distance considering potential **maximum** noise levels (Cumulative as well as the mitigatory effect of potential barriers or other mitigation not included – simple noise propagation modelling only considering distance) (dBA)											
			5 m	10 m	20 m	50 m	100 m	150 m	200 m	300 m	500 m	750 m	1000 m	2000 m
Pickup Truck	No	89.7	64.7	58.7	52.6	44.7	38.7	35.1	32.6	29.1	24.7	21.2	18.7	12.6
Pumps	No	111.7	86.7	80.7	74.6	66.7	60.7	57.1	54.6	51.1	46.7	43.2	40.7	34.6
Rivit Buster/Chipping Gun	Yes	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Rock Drill	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Roller	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Sand Blasting (single nozzle)	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Scraper	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Sheers (on backhoe)	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Slurry Plant	No	112.7	87.7	81.7	75.6	67.7	61.7	58.1	55.6	52.1	47.7	44.2	41.7	35.6
Slurry Trenching Machine	No	116.7	91.7	85.7	79.6	71.7	65.7	62.1	59.6	56.1	51.7	48.2	45.7	39.6
Soil Mix Drill Rig	No	114.7	89.7	83.7	77.6	69.7	63.7	60.1	57.6	54.1	49.7	46.2	43.7	37.6
Tractor	No	118.7	93.7	87.7	81.6	73.7	67.7	64.1	61.6	58.1	53.7	50.2	47.7	41.6
Vacuum Excavator	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Vacuum Street Sweeper	No	114.7	89.7	83.7	77.6	69.7	63.7	60.1	57.6	54.1	49.7	46.2	43.7	37.6
Ventilation Fan	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Vibrating Hopper	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Vibratory Concrete Mixer	No	114.7	89.7	83.7	77.6	69.7	63.7	60.1	57.6	54.1	49.7	46.2	43.7	37.6
Vibratory Pile Driver	No	129.7	104.7	98.7	92.6	84.7	78.7	75.1	72.6	69.1	64.7	61.2	58.7	52.6
Warning Horn	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Welder/Torch	No	107.7	82.7	76.7	70.6	62.7	56.7	53.1	50.6	47.1	42.7	39.2	36.7	30.6

Table 12.1: Potential Equivalent Noise Levels Generated by Various Equipment (for illustration purposes)

Equipment Description	Equivalent (average) Sound Levels (dBA)	Operational Noise Level at given distance considering equivalent (average) sound power emission levels (Cumulative as well as the mitigatory effect of potential barriers or other mitigation not included – simple noise propagation modelling only considering distance) (dBA)											
		5 m	10 m	20 m	50 m	100 m	150 m	200 m	300 m	500 m	750 m	1000 m	2000 m
Bulldozer CAT D10	111.9	86.9	80.9	74.9	66.9	60.9	57.4	54.9	51.3	46.9	43.4	40.9	34.9
Bulldozer CAT D11	113.3	88.4	82.3	76.3	68.4	62.3	58.8	56.3	52.8	48.4	44.8	42.3	36.3
Bulldozer CAT D9	111.9	86.9	80.9	74.9	66.9	60.9	57.4	54.9	51.3	46.9	43.4	40.9	34.9
Bulldozer CAT D6	108.2	83.3	77.3	71.2	63.3	57.3	53.7	51.2	47.7	43.3	39.8	37.3	31.2
Bulldozer CAT D5	107.4	82.4	76.4	70.4	62.4	56.4	52.9	50.4	46.9	42.4	38.9	36.4	30.4
Bulldozer Komatsu 375	114.0	89.0	83.0	77.0	69.0	63.0	59.5	57.0	53.4	49.0	45.5	43.0	37.0
Bulldozer Komatsu 65	109.5	84.5	78.5	72.4	64.5	58.5	54.9	52.4	48.9	44.5	41.0	38.5	32.4
Diesel Generator (Large - mobile)	106.1	81.2	75.1	69.1	61.2	55.1	51.6	49.1	45.6	41.2	37.6	35.1	29.1
Dumper/Haul truck - CAT 700	115.9	91.0	85.0	78.9	71.0	65.0	61.4	58.9	55.4	51.0	47.5	45.0	38.9
Dumper/Haul truck - Terex 30 ton	112.2	87.2	81.2	75.2	67.2	61.2	57.7	55.2	51.7	47.2	43.7	41.2	35.2
Dumper/Haul truck - Bell 25 ton (B25D)	108.4	83.5	77.5	71.4	63.5	57.5	53.9	51.4	47.9	43.5	40.0	37.5	31.4
Excavator - Cat 416D	103.9	78.9	72.9	66.8	58.9	52.9	49.3	46.8	43.3	38.9	35.4	32.9	26.8
Excavator - Hitachi EX1200	113.1	88.1	82.1	76.1	68.1	62.1	58.6	56.1	52.6	48.1	44.6	42.1	36.1
Excavator - Hitachi 870 (80 t)	108.1	83.1	77.1	71.1	63.1	57.1	53.6	51.1	47.5	43.1	39.6	37.1	31.1
Excavator - Hitachi 270 (30 t)	104.5	79.6	73.5	67.5	59.6	53.5	50.0	47.5	44.0	39.6	36.0	33.5	27.5
FEL - CAT 950G	102.1	77.2	71.2	65.1	57.2	51.2	47.6	45.1	41.6	37.2	33.7	31.2	25.1
FEL - Komatsu WA380	100.7	75.7	69.7	63.7	55.7	49.7	46.2	43.7	40.1	35.7	32.2	29.7	23.7
General noise	108.8	83.8	77.8	71.8	63.8	57.8	54.2	51.8	48.2	43.8	40.3	37.8	31.8
Grader - Operational Hitachi	108.9	83.9	77.9	71.9	63.9	57.9	54.4	51.9	48.4	43.9	40.4	37.9	31.9
Grader	110.9	85.9	79.9	73.9	65.9	59.9	56.4	53.9	50.3	45.9	42.4	39.9	33.9
JBL TLB	108.8	83.8	77.8	71.8	63.8	57.8	54.3	51.8	48.3	43.8	40.3	37.8	31.8
Road Transport Reversing/Idling	108.2	83.3	77.2	71.2	63.3	57.2	53.7	51.2	47.7	43.3	39.7	37.2	31.2
Road Truck average	109.6	84.7	78.7	72.6	64.7	58.7	55.1	52.6	49.1	44.7	41.1	38.7	32.6
Vibrating roller	106.3	81.3	75.3	69.3	61.3	55.3	51.8	49.3	45.8	41.3	37.8	35.3	29.3
Water Dozer, CAT	113.8	88.8	82.8	76.8	68.8	62.8	59.3	56.8	53.3	48.8	45.3	42.8	36.8
Wind turbine (Vestas V90 maximum)	108.0	83.0	77.0	71.0	63.0	57.0	53.5	51.0	47.5	43.0	39.5	37.0	31.0

12.2 Baseline Environment

12.2.1 Existing Ambient Sound Levels

Noise levels were previously measured during site visits for the Mainstream Noupoort WEF (constructed) as well as the Flagging Trees WEF (project terminated after the Scoping phase). 10-minute sound level measurements indicated a complex area, where traffic from the N9 and N10 does influence the soundscape during the day, although the area is very quiet at night. Additional longer-term measurements will be gathered with field work.

12.2.2 Noise Sensitive Developments

An assessment of the area was done using the DEAT's Environmental Potential Atlas, with available topographical maps used to identify potential Noise-sensitive Developments in the area (within area proposed, as well as potential NSD's up to 2km from boundary of facility).

The assessment indicated that there are a number of such developments that occur in the area, which are indicated on Figure 12.4.

12.3 Preliminary Assessment

12.3.1 Construction Phase

Projected impacts from the construction phase will be modelled once more information regarding the duration of construction phase and equipment specifications are known. Therefore the construction phase will only be dealt with in more detail during the Environmental Noise Impact Assessment phase.

During the EIA phase, construction activities such as the development of borrow pits, concrete batching plant, foundation preparation, the digging of trenches and increased traffic (deliveries and movement on-site) will be considered. The construction phase will take into cognisance of a worst-case scenario (simultaneous activities close to a NSD(s)).

Based on information in Tables 12.1 and 12.2, potential equivalent noises would be significantly higher than 45 dBA, although if there are a number of simultaneous activities the noise levels could be 3 – 10 dBA higher and maximum noises could be higher than 65 dBA.

A preliminary noise impact for the construction phase is presented in the following tables.

Impact Phase: Construction Phase (Daytime)							
Impact description: Increase in sound levels at the dwellings of receptors during the day. These noises may be intrusive and increase annoyance with the project.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	L	L	H	Negative	M	L	L
With Mitigation	L	L	L	Negative	L	L	L
Can the impact be reversed?			Yes – Impact will stop once activities stop.				
Will impact cause irreplaceable loss or resources?			No – The increase in noise levels can increase annoyance levels with the project but will not result in the loss of any resource or an irreplaceable loss.				
Can impact be avoided, managed or mitigated?			Yes. Refer below.				
Mitigation measures: • Route construction traffic as far as practically possible from potentially sensitive receptors;							

• Ensure a good working relationship between the developer and all potentially sensitive receptors. Communication channels should be established to ensure prior notice to the sensitive receptor if work is to take place close to them. Information that should be provided to the potential sensitive receptor(s) include: • Proposed working times; • How long the activity is anticipated to take place; • What is being done, or why the activity is taking place; • Contact details of a responsible person where any complaints can be lodged should there be any issue of concern. • When working near (within 500 m – potential construction of access roads and trenches) to a potential sensitive receptor(s), limit the number of simultaneous activities to the minimum as far as possible; • When working near to potentially sensitive receptors, coordinate the working time with periods when the receptors are not at home where possible. Technical solutions to reduce the noise impact during the construction phase include: • Using the smallest/quietest equipment for the particular purpose. For modelling purposes the noise emission characteristics of large earth-moving equipment (typically of mining operations) were used, that would most likely over-estimate the noise levels. The use of smaller equipment therefore would have a significantly lower noise impact; • Ensuring that equipment is well-maintained and fitted with the correct and appropriate noise abatement measures.

Impact to be addressed/ further investigated and assessed in Impact Assessment Phase?	Yes – See the following table (Noise Impact Assessment for night-time activities).

Impact Phase: Construction Phase (Night-time):							
Impact description: Increase in sound levels at the dwellings of receptors during the night. These noises may increase annoyance with the project, and some receptors may find the noise intrusive. The noises (especially high maximum noises with an impulsive character) may impact on the peace of mind and even the sleeping patterns of receptors.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	M	L	H	Negative	M	L	M
With Mitigation	M	L	L	Negative	L	L	M
Can the impact be reversed?	Yes – Impact will stop once activities stop.						
Will impact cause irreplaceable loss or resources?	No – The increase in noise levels can increase annoyance levels with the project but will not result in the loss of any resource or an irreplaceable loss.						
Can impact be avoided, managed or mitigated?	Yes, with mitigation.						
Mitigation measures: • As per the mitigation options listed above, as well as a condition that night-time construction activities should not be allowed closer than 2000 m from any potential noise-sensitive receptors.							
Impact to be addressed/ further investigated and assessed in Impact Assessment Phase?	Yes – Night-time activities close to receptors could result in noisy activities that will increase annoyance levels to the point where people will start to complain about the noise impact.						

12.3.2 Operational Phase: Estimated Impact and Important Concepts

Projected impacts from the operational phase will be modelled once the layout and specifications about the wind turbine are available during EIA Phase.

It is assumed that the closest wind turbine will be further than 500 m from the closest receptor. Potential equivalent noises would be around 43 dBA. 45 dBA is the noise limit used in a number of countries, with a disturbing noise anything that exceeds the ambient sound level with more than 7 dBA. In a quiet area the ambient sound level (residual noise level) could be 30 – 35 dBA and exceeding this level is in non-compliance with the National Noise Control Regulations.

The daytime period (working day) will not be considered for the operational phase as sounds generated by the wind turbines is generally masked by other noises from a variety of sources, including activities in and around the dwellings of surrounding potentially noise-sensitive developments.

At times, when a quiet environment is desired (at night for sleeping, weekends etc.), noise levels are more critical. The time period investigated therefore would be a quieter period, normally associated with the 22:00 – 06:00 timeslot. Therefore the preliminary noise impact assessment will focus on the operational noise levels created by the wind turbines at night-time.

Possible Impact or Risk: Operation (Night-time)							
Impact Description: Increase in sound levels at the dwellings of receptors at night. These noises may be intrusive and increase annoyance with the project or potentially disturb the quality of living for the surrounding stakeholders.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	M	M	M	Negative	M	L	M
With Mitigation	M	M	L	Negative	L	L	M
Can the impact be reversed?	Yes – Impact will stop once activities stop.						
Will impact cause irreplaceable loss or resources?	No – The increase in noise levels can increase annoyance levels with the project but will not result in the loss of any resource or an irreplaceable loss.						
Can impact be avoided, managed or mitigated?	Yes – See mitigation measures below.						
Mitigation measures: • Redesign of the layout to allow a larger buffer zone between the potentially affected receptors (buffer can only be defined once the noise source are defined). • The use of a wind turbine that has a lower noise emission level, or the use of quieter wind turbines around the potentially affected receptors. • The operation of wind turbines in a quieter mode, or the operation of the wind turbines around the potentially affected receptors in a quieter mode (selection of a wind turbine that offers the use of different noise reduction levels strategies during operation).							
Impact to be addressed/ further investigated and assessed in Impact Assessment Phase?	Yes – Night-time operation close to receptors could result in noise levels that will increase annoyance levels to the point where people will start to complain about the noise impact.						

12.3.3 Cumulative Impacts

The proposed Phezukomoya WEF is bordered to the north by the Mainstream Noupoort WEF. Wind turbines generally have a cumulative impact on the acoustic environment when they are located closer than 2000 m from each other. Considering the location of the existing wind turbines as well as the location of the closest NSD to these turbines, the potential of a cumulative noise impact is very low. Potential cumulative impacts will be investigated in more detail during the EIA phase.

12.4 Summary

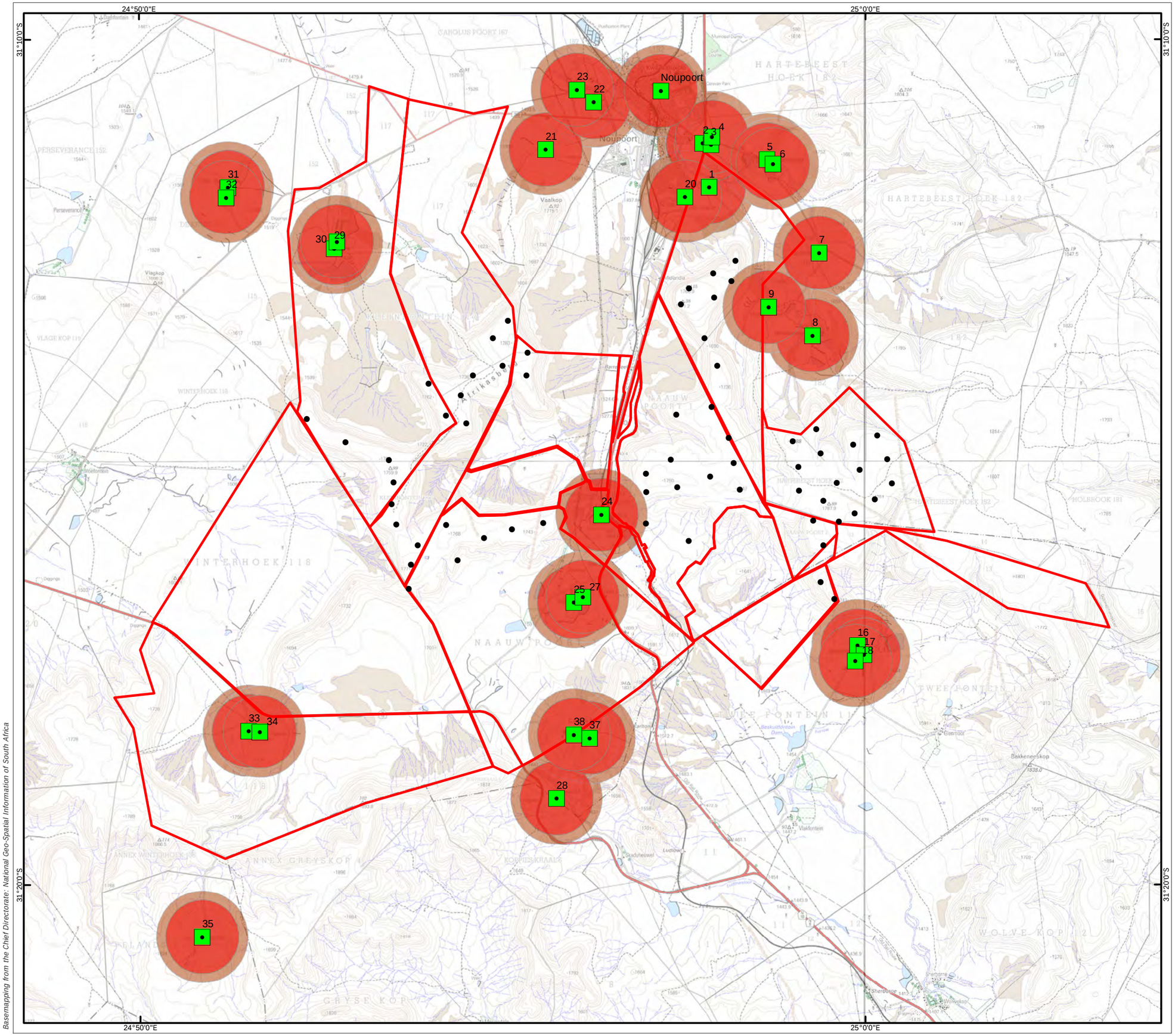
This scoping noise assessment is based on a desktop assessment as well as a basic predictive model (worst-case scenario) to identify potential issues of concern.

This assessment indicated that the proposed development could have a noise impact on the surrounding area. The main factors that will determine the potential impact is the distance that the turbines will be from a noise sensitive development (NSD), and the total number of turbines that could cumulatively impact on this NSD.

With a minimum setback of 800 m the potential noise impacts are expected to be low, however this will be confirmed during the EIA phase when the following information is available:

- The prevailing night-time background sound levels (to be undertaken during site visit in EIA phase);
- The locations of the turbines; and
- The full specifications of the turbines (noise reports as per IEC 61400-11 or similar).

In a quiet area the ambient sound level (residual noise level) could be 30 – 35 dBA and exceeding this level is in non-compliance with the National Noise Control Regulations. However, as the wind turbines will only operate during periods when the wind is blowing, this fixed noise limit is not feasible. The EIA report will further motivate for a nighttime noise limit of 45 dBA as per the MoE level and the IFC limits.



Basemapping from the Chief Directorate: National Geo-Spatial Information of South Africa

InnoWind

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- Site Boundary
- Proposed Turbine Position
- Potential Noise Sensitive Development
- 800 m Buffer (Minimum)
- 1000 m Buffer (Maximum)

1:80 000 Scale @ A3

0 1.5 3 km

N

Produced: AA Reviewed: SC Approved: AB	Ref: 2245/REP/017 Date: 06/04/2017

Potential Noise-sensitive Developments
Figure 12.4

Phezukomoya Wind Energy Facility
Draft Scoping Report

13 LANDSCAPE AND VISUAL ASSESSMENT

13.1 Methodology

A desktop Scoping Phase Visual Impact Assessment (VIA) has been undertaken. The visual environment has been characterised in terms of land use, topography and vegetation cover. The area's visual character and its potential to absorb visual impacts has been assessed. Digital information from spatial databases such as the National geo-spatial information (NGI) and the South African National Biodiversity Institute (SANBI) have provided information on land use and vegetation cover.

Potential visual issues have been determined based on the characterisation of the visual environment and inherent visual sensitivity of the area. Receptor locations and routes that are potentially sensitive to visual intrusion have been identified to ascertain if a more focussed assessment would need to be undertaken in the EIA Phase.

Once the Draft Scoping Report has been made available to the public for review, consultation with I&APs will be used to establish how the proposed development will be perceived by various receptor locations and the degree to which the impact will be regarded as negative.

13.1.1 Visual Sensitivity

In order to assess the visual sensitivity of the area, a matrix based on the characteristics of the receiving environment was used. The visual sensitivity of the area is divided into three categories:

- High: A new development such as a wind farm would likely be perceived negatively by receptors in this area - it would be considered a visual intrusion and may elicit opposition from receptors;
- Moderate: Presence of receptors, but due to the nature of the existing visual character of the area and likely value judgements of receptors, there would be limited negative perception towards the new development as a source of visual impact; or
- Low: The introduction of a new development would not be perceived as negative and there would be little opposition towards it.

13.1.2 Viewshed Analysis

GIS technology was used to undertake a viewshed analysis for the proposed turbine layout and a viewshed analysis was undertaken from each turbine location. The worst-case scenario (maximum turbine height of 225 m) was assumed when undertaking the analysis. The resulting viewshed indicates the geographical area from where the proposed WEF would be visible, i.e. the zone of visual influence.

This analysis is based entirely on topography (relative elevation and aspect) which is an important factor that should be considered when determining the area of visual influence for a development.

13.1.3 Identification of Sensitive Visual Receptors[32]

A sensitive receptor location is a location from where receptors would potentially be adversely impacted by a proposed development. This includes a subjective factor on behalf of the viewer (i.e. whether the viewer would consider the impact as a negative impact). The adverse impact is often associated with the alteration of the visual character of the

[32] Note that a **receptor location** is a site from where the proposed WEF farm may be visible, but the receptor may not necessarily be adversely affected by visual intrusion associated with the development. Such receptors include commercial activities and movement corridors that are not tourism routes. **Sensitive receptor locations** include sites that are likely to be adversely affected and include tourism facilities, scenic sites and residential dwellings in natural settings.

area in terms of the intrusion of the wind farm into a 'view', which may affect 'sense of place'.

- The identification of sensitive receptors is undertaken through consideration of the:
- visual character of the area - visually scenic areas and areas of visual sensitivity;
- presence of leisure-based and nature-based tourism;
- presence of sites / routes valued for their scenic quality and sense of place;
- presence of homesteads / farmsteads where the development may influence the typical character of their views; and
- feedback from I&APs during the EIA.

Distance bands assign zones of visual impact as the visibility of the proposed development diminishes exponentially over distance. The proposed development would be more visible to receptors located within a short distance and these receptors would experience a higher adverse visual impact than those located at a moderate or long distance from the proposed development. The degree of visual impact experienced will vary from one inhabitant to another, as it is largely based on the viewer's perception.

13.1.4 Factors Influencing Visual Impact

General factors which influence visual impact include the:

- subjective experience of the viewer which is dependent on age, gender, activity preferences, time spent within the landscape and the traditions of the viewer (can be positive or negative);
- existing visual environment – natural scenic qualities versus anthropogenic environments;
- type of visual receptor – transient or permanent receptors would change the intensity of a visual impact; and
- viewing distance as the visibility of an object decreases exponentially as one moves away from the source of impact.

13.2 Assumptions and Limitations during the Scoping Phase

- Topographical maps and Google Earth imagery were used to identify potential receptors within the study area (i.e. 8 km from the proposed turbine locations). At desk-top level, assumptions are made in terms of visual intrusion of the proposed WEF from each receptor location and the sensitivity of the receptor.
- Given the nature of the receiving environment and height of the proposed turbines, the study area/visual assessment zone is assumed to encompass a zone of 8 km (not factoring in the curvature of the earth's surface) from the proposed WEF. Distance is a critical factor when assessing visual impacts and although the WEF may still be visible beyond 8 km, the degree of visual impact would diminish considerably and the need to assess the impact on potential receptors beyond this distance would not be warranted.
- In assessing the potential visual impacts for the proposed 132 kV power line, the study area or visual assessment zone is assumed to encompass a zone of 5 km from the proposed development – i.e. all areas within a 5 km radius of the power line alternatives.
- Due to the varying scales and sources of information, as well as the fact that only 20 m contours were available to establish the Digital Terrain Model (DTM) maps and visual models may have minor inaccuracies. As such, only large scale topographical variations have been taken into account and minor topographical features or small undulations in the landscape may not be depicted on the DTM.
- A viewshed analysis was undertaken from each turbine location based on the preliminary layout available at the time of undertaking the visual study. The worst-case scenario (maximum turbine height of 225 m) was assessed. Other infrastructure was

not factored into the viewshed analysis. Screening provided by any existing infrastructure and tall wooded vegetation were also not factored into the analysis. Detailed topographic data was not available for the broader study area and the viewshed analysis does not consider localised topographic variations which may constrain views. The viewshed analysis should therefore be seen as a conceptual representation or a worst-case scenario.

- The visual sensitivity analysis was undertaken based purely on topographic data available for the broader study area. Localised topographic variations, existing infrastructure and / or vegetation which may constrain views were not factored into the analysis. The analysis does not take into account differing perceptions of the viewer which largely determine the degree of visual impact being experienced. This sensitivity analysis should therefore be seen as a conceptual representation or a worst-case scenario.
- No feedback regarding the visual environment has as yet been received from the public participation process. Feedback from the public during the review period of the Draft Scoping Report (DSR) will be incorporated into the study during EIA Phase.
- No ground-truthing was undertaken for this Scoping Phase study. The visual sensitivity of each receptor location will need to be further explored during the EIA Phase.
- At the time of undertaking the visual study, no information was available regarding the type and intensity of lighting required. The night-time environment will be assessed during the EIA Phase.
- Only a preliminary layout of the proposed development was available for this study and no visualisation modelling or three dimensional simulations have been compiled. Should this be required by stakeholder / I&AP feedback, it shall be produced during the EIA Phase.

13.3 Baseline Environment

13.3.1 Topography

The mixed nature of the terrain across the study area has differing visual implications. Areas of flat relief, plains and the higher-lying grassy plateaux, are characterised by wide ranging vistas, typically to the point at which surrounding hills / koppies enclose the visual envelope or local landscape (i.e. these hills form part of the horizon and areas beyond these hills cannot be seen). An example of this is from the town of Noupoort, where the hills that rise up from the plains to the east of the town frame the view, giving a relatively limited viewshed, whereas a much wider viewshed exists to the north of the town as the flat relief extends for quite a distance. Vistas in the hillier and higher-lying terrain can be more open or more enclosed, depending on the position of the viewer. Within some of the more incised valleys, the viewshed can be limited, whereas from the higher-lying ridge tops or slopes, a much wider view is available. The same is true of objects placed in different elevations and landscape settings, with objects placed on high-elevation slopes or ridge tops being highly visible, and those placed within valleys or enclosed plateaux being visible from a more restricted area.

A map showing the potential visual influence of the proposed WEF is provided in Figure 13.1. It is evident that the area in which the Phezukomoya turbines are proposed mostly comprises areas of high visibility.

13.3.2 Vegetation

The aridity of the area has restricted vegetation to low shrubs distributed uniformly across the landscape, except in areas of disturbance where patches of bare earth occur. In certain areas, tall exotic trees/other typical garden vegetation have been established especially around some farmsteads.

The natural short vegetation cover offers no visual screening. Tall exotic trees may effectively screen the proposed development from farmhouses, where these trees occur in close proximity to the farmhouse and are located directly in the way of views to the site.

13.3.3 Land Use

Low density livestock rearing on relatively large farm properties is the dominant activity in the region although small areas along valley bottoms have been cultivated and as such mostly natural vegetation exists across the vast majority of the study area.

The visual assessment zone has a very low density of rural settlement, with a few scattered farmsteads. Built form is limited to isolated farmsteads, gravel access roads, ancillary farm buildings, telephone lines, fences and the remnants of abandoned workers' dwellings.

The closest built-up area is the town of Noupoort approximately 7 km north of the proposed development site. The N9 national route and a railway line, both running in a north-south direction, as well as the N10 national route and the R389 running in an east-west direction, traverse the proposed development site.

A portion of the newly constructed Noupoort Wind Farm encroaches into the north-eastern sector of the proposed development site. Comprising some 35 wind turbines with associated infrastructure, this development has resulted in some transformation of the natural environment.

High levels of human transformation are evident in the vicinity of Noupoort and to the north east of the development site where the Noupoort Wind Farm has been established.

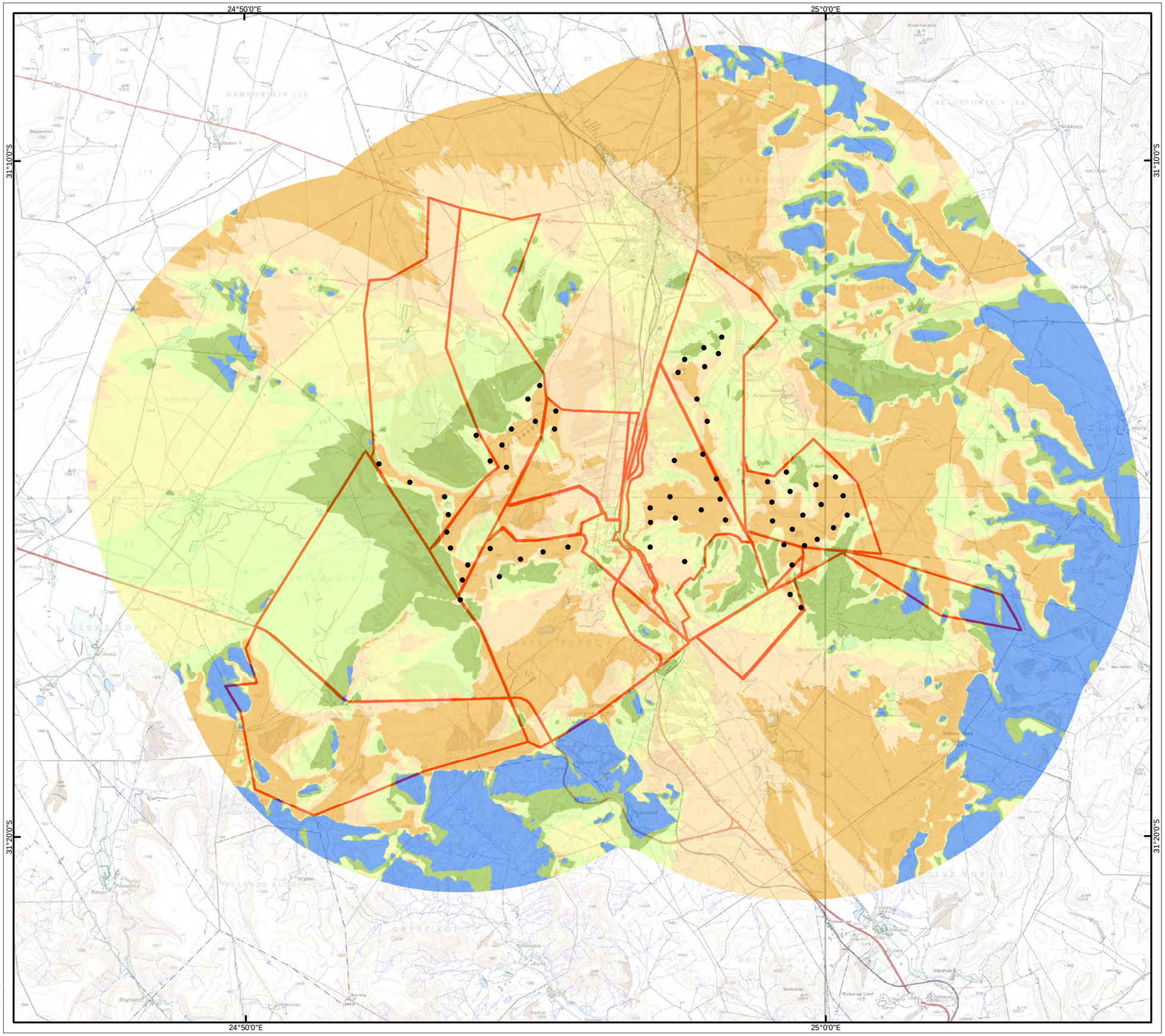
13.3.4 Visual Character

Visual character reflects the level of transformation from a completely natural setting. Varying degrees of human transformation of a landscape would engender differing visual characteristics to that landscape, with a highly modified urban or industrial landscape being at the opposite end of the scale to a largely natural undisturbed landscape. Visual character is also influenced by the presence of built infrastructure such as buildings, roads and other objects such as telephone or electrical infrastructure.

Built infrastructure across much of the visual assessment zone is limited to a low density of gravel access roads, boundary fences, farm buildings other farming infrastructure, such as windmills and an already operational WEF. The low density of human settlement and associated low level of change to the natural environment has resulted in a largely rural or pastoral visual character with an existing WEF present. In this context, the introduction of a WEF in the area could be considered to be a further degrading factor, even though an operational WEF is already present.

Divergence from this rural character occurs in the area around the small town of Noupoort which has an urban visual character with housing, schools, hospitals and churches, as well as relatively large railway shunting yards. The small population of the town, and its limited spatial extent entail that it is firmly set within a rural setting, and the rapid change from the edge of the town to rangeland or commonage contributes to the limited spatial extent of its particular urban visual character.

Significant alteration to the rural or pastoral visual character is also evident in the north-eastern sector of the visual assessment zone, where the newly established Noupoort Wind Farm has introduced a more industrial-type visual character. In addition, several other renewable energy facilities (solar and wind) are proposed to be located within relatively close proximity to the proposed Phezukomoya WEF, and these will further alter visual character assuming that all are constructed.



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Phezukomoya Site Boundary

Proposed Turbine Location

Potential Visual Influence

0 - Not visible

1 - Least visisble

2

3

4

5 - Most visible

1:100,000 Scale @ A3

N

0 2 4 km

Produced: AA Reviewed: SC Approved: AB	Ref: 2245/REP/018
	Date: 05/06/2017

Viewshed Analysis
Figure 13.1

Phezukomoya Wind Energy Facility
Draft Scoping Report

Basemapping from the Chief Directorate: National Geo-Spatial Information of South Africa

The scenic quality of the landscape is an important factor that contributes to visual character. Visual appeal is often associated with unique natural features or distinct variations in form. The hilly or mountainous terrain which occurs in the area is considered to be an important feature that would increase scenic appeal and visual interest.

The greater area surrounding the proposed development site is an important component when assessing visual character. The area can be considered to be typical of a Karoo or "platteland" landscape that would characteristically be encountered across the high-lying dry western and central interior of South Africa. Much of South Africa's dry Karoo interior consists of wide open, uninhabited spaces sparsely punctuated by widely scattered farmsteads and small towns. Traditionally the Karoo has been seen by many as a dull, lifeless part of the country, however this perception has changed over the last few decades, with the launch of tourism routes within the Karoo.

The typical Karoo landscape can also be considered a valuable Karoo 'cultural landscape' in the South African context. Introducing this type of development could be considered to be a degrading factor in this context.

13.3.5 Visual Sensitivity

The table below outlines the factors used to rate the visual sensitivity of the study area. The ratings are specific to the visual context of the receiving environment within the study area.

Table 13.1: Environmental factors used to define visual sensitivity of the visual assessment zone.

FACTORS	**RATING**									
	1	2	3	4	5	6	7	8	9	10
Pristine / natural character of the environment	■	■	■	■	■	■	■			
Presence of sensitive visual receptors	■	■	■	■						
Aesthetic sense of place / scenic visual character	■	■	■	■	■					
Value to individuals / society	■	■	■							
Irreplaceability / uniqueness / scarcity value	■	■	■	■	■	■				
Cultural or symbolic meaning	■	■	■							
Scenic resources present in the study area	■	■	■	■	■	■	■			
Protected / conservation areas in the study area	■									
Sites of special interest present in the study area	■	■								
Economic dependency on scenic quality	■									
Local jobs created by scenic quality of the area	■									
International status of the environment	■									
Provincial / regional status of the environment	■	■	■							
Local status of the environment	■	■	■	■	■					
**Scenic quality under threat / at risk of change	■	■	■	■	■	■	■	■		

**Any rating above '5' will trigger the need to undertake an assessment of cumulative visual impacts.

Low						**Moderate**								**High**
10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**120**	**130**	**140**	**150**

Based on the above, the study area is rated as having a moderately-low visual sensitivity. This is mainly owing to the rural / pastoral character of the area. An important factor

contributing to the visual sensitivity of an area is the presence or absence of visual receptors that may value the aesthetic quality of the landscape and depend on it to produce revenue and create jobs. Relatively few potentially sensitive receptors are present within the study area. Although no formal protected areas or leisure / nature-based tourism activities exist within the study area, the area would still be valued as a typical Karoo cultural landscape and for its scenic mountainous terrain (heritage cultural value).

Other renewable energy facilities (solar and wind) are proposed within relatively close proximity to the proposed development, one of which is already operational. An assessment of the cumulative impact that will be experienced from each potentially sensitive receptor will be undertaken during EIA Phase, once sensitive receptor locations are confirmed.

13.3.6 Potentially Sensitive WEF Receptors

Based on the height and scale of the project, the radii chosen to assign zones of visual impact for the proposed WEF are as follows:

- <= 2 km (high impact zone);
- 2 – 5 km (moderate impact zone); and
- 5 km – 8 km (low impact zone).

A total of 34 potentially sensitive receptors were identified within the visual assessment zone for the WEF (Figure 13.2). Five of these are located in the low impact zone, 21 are in the medium impact zone and eight are located in the high impact zone. These receptors are regarded as potentially sensitive visual receptors, as the proposed development would likely alter natural vistas experienced from these dwellings. Many of the local farmers that own farmsteads within the application site and on the surrounding farms form part of the project and would benefit financially from the proposed development. This is likely to offset the visual impact experienced by these landowners and reduce any negative sentiments they may have towards the development. These farmsteads will be identified in the EIA phase when the impact on each receptor is investigated further.

Roads along which people travel are regarded as sensitive receptors. The N9 national route traverses the study area in a north-south direction, passing through a scenic area as it approaches the town of Noupoort. This road is considered the primary sensitive receptor road through the area. Proposed turbine locations are all situated on a high-lying plateau on either side of the N9 and are likely to be highly visible to motorists travelling along this road.

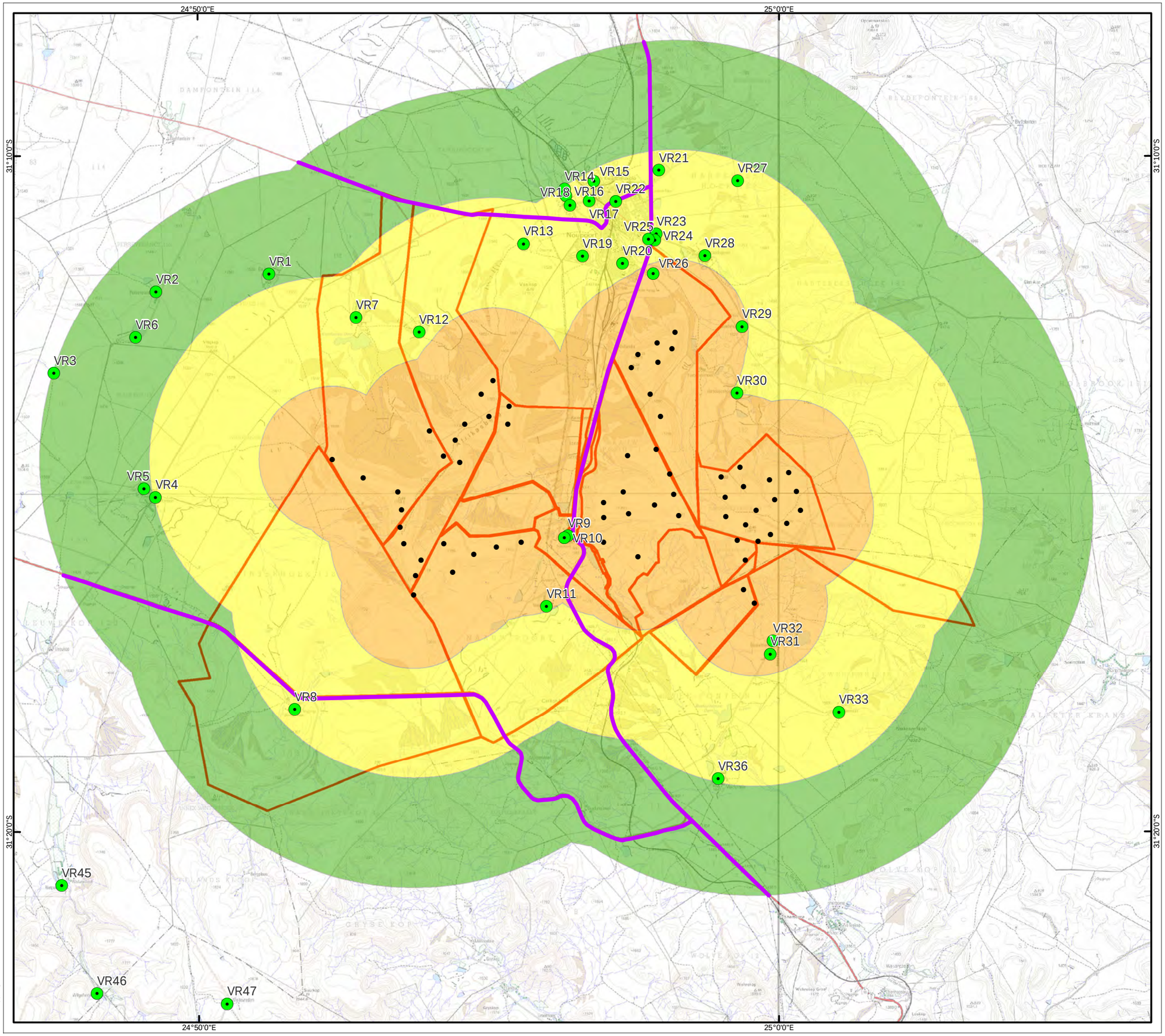
The N10 passes through the southern section of the proposed development site in an east-west direction. This is a national road linking Port Elizabeth with Upington and the Namibian border to the west. Turbines situated on higher-lying plateaux are likely to be highly visible to motorists travelling along this road.

Another potentially sensitive receptor road is the R389 provincial (un-surfaced) road that runs from Noupoort in a westerly direction providing a link to the N1 and the town of Hanover. In the setting of flat Karoo plains, turbines placed on the high plateau on the development site would be highly visible to motorists travelling along this road.

13.3.7Potentially Sensitive Grid Connection Receptors

Given the length of the proposed power line and the likely height of the associated towers, the radii chosen for the zones of visual impact are as follows:

- <= 500 m (high impact zone)
- 501 m – 2 km (moderate impact zone)
- 2 km – 5 km (low impact zone)



Basemapping from the Chief Directorate: National Geo-Spatial Information of South Africa

InnoWind

ARCUS

- Phezukomoya Site Boundary
- Proposed Turbine Location
- Sensitive Receptor Road
- Potentially Sensitive Receptor

Zone of Potential Visual Influence

- High (<2 km)
- >2 km - 5 km
- >5 km

1:100,000 Scale @ A3

N

0 2 4 km

Produced: AA Reviewed: SC Approved: AB	Ref: 2245/REP/018
	Date: 05/06/2017

Potentially Sensitive
Recpetor Locations
Figure 13.2

Phezukomoya Wind Energy Facility
Draft Scoping Report

A total number of eight receptors have been identified within the visual assessment zone for the proposed 132 kV power line all of which are scattered farmsteads / homesteads which house the local farmers as well as their farm workers. Four of these are located in the low impact zone for the preferred and alternative grid routes. Four are in the moderate impact zone of the preferred grid route, and three in the moderate impact zone of the alternative grid route. One falls into the high impact zone of the alternative alignment. These receptors are regarded as potentially sensitive visual receptors as they are located within a mostly rural setting and the proposed development will likely alter natural vistas experienced from these dwellings.

Motorists travelling along the N9 and the N10 roads could be visually exposed to the proposed 132 kV power line although this will need to be confirmed during the site visit during EIA Phase.

13.4 Preliminary Visual Sensitivity Analysis

Using GIS-based visibility analysis sectors of the site were determined that would be visible to the highest number of receptors in the study area. The analysis took into account all potentially sensitive receptors identified (Figure 13.2) as well as points along the receptor roads at 500 m intervals. The areas visible to the highest number of receptors were rates as areas of High sensitivity and should preferably be excluded from turbine development (Figure 13.3). The analysis does not take into account differing perceptions of the viewer which largely determine the degree of impact experienced. It should therefore be seen as a conceptual presentation or a worst-case scenario which rates visibility in relation to potentially sensitive receptors.

13.5 Preliminary Assessment

The EIA process requires that an overall rating for visual impact be provided during the Scoping Phase to allow the visual impact to be assessed alongside other environmental parameters for the construction and operation of the WEF and its associated infrastructure.

Preliminary mitigation measures have determined based on best practice and literature reviews. In the EIA Phase, further mitigation measures will be determined based on visual impact assessments which have been conducted for renewable projects in the area.

Potential visual impacts, identified through this Scoping Phase visual assessment will need to be explored in further detail during the EIA Phase. The extent of visual impact on identified potentially sensitive receptors will also be confirmed.

The following potential visual impacts may occur as a result of the establishment of a WEF:

- The natural visual character of the surrounding area could be altered as a result of numerous proposed wind turbines being erected (operation phase).
- Locating the WEF on the higher plateau could result in the development being highly visible for great distances, thus altering the relatively untransformed rural sense of place within the surrounding area (operation phase).
- The visual intrusion of the proposed development could adversely affect residences and farmsteads/ homesteads surrounding the proposed WEF (operation phase).
- Motorists travelling on the N9, N10 and R389 provincial road, could be adversely affected by the visual intrusion of the proposed WEF (operation phase).
- People residing within close proximity of proposed wind turbines could be negatively impacted as a result of shadow flicker, although this is unlikely due to the lack of dwellings in close proximity to the proposed development site.
- Vehicles and trucks travelling to and from the proposed site on the gravel access roads would increase dust emissions during both the construction and operational phases.

The increased traffic on the gravel roads and the dust plumes could create a visual impact and may evoke negative sentiments from surrounding viewers.

- Surface disturbance during construction would expose bare soil which could visually contrast with the surrounding environment. In addition, temporarily stockpiling soil during construction may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact.
- Security and operational lighting at the wind farm could result in light pollution and glare, which could be an annoyance to surrounding viewers. The visual impact of lighting on the nightscape is largely dependent on the existing lighting present in the surrounding area at night. The night scene in areas where there are numerous light sources will be visually degraded by existing light pollution and therefore additional light sources are unlikely to have a significant impact on the nightscape. In contrast, introducing light sources into a relatively dark night sky will impact on the visual quality of the area at night. The impact would largely depend on the location of the proposed development in relation to existing light sources, the illumination fixtures utilised and the intensity of the lighting required for the proposed development.
- Aviation lighting placed on top of each wind turbine would create a network of red lights in the night-time sky and could potentially alter the night-time visual environment.

The following potential visual impacts may occur as a result of the construction of a 132 kV power line:

- The proposed power line would introduce a foreign linear element into the landscape which could alter the natural visual character of the surrounding area should these power lines traverse natural areas where other existing infrastructure is not present.
- Motorists travelling on the N9 and N10, could be adversely affected by the visual intrusion of the proposed power line.
- The proposed power line could be highly visible for great distances, if located on ridgelines, plateaus or diagonally down mountain slopes. This would result in the power line breaking the horizon. This could also result in access tracks being constructed and servitudes being cleared which would likely 'create a prominent linear feature or 'scar' that texturally contrasts sharply with the natural hillside vegetation.
- The visual intrusion of the proposed power line could adversely affect farmsteads located in close proximity to the power line in natural settings where other existing infrastructure is limited. In these natural areas, the power line would contrast with the surrounding area and may change the visual character of the landscape. The proposed WEF would significantly alter the visual character once constructed, lessening the visual impact of the proposed power line on surrounding farmsteads.

Impact Phase: Construction of WEF (Visual impacts during the decommissioning phase are potentially similar to those during the construction phase).

Potential impact description:
Large construction vehicles and equipment will alter the natural character of the area, exposing visual receptors to visual impacts associated with construction. The construction activities may be perceived as an unwelcome visual intrusion, particularly in more natural, undisturbed settings. Vehicles and trucks travelling to and from the proposed site on gravel access roads are also expected to increase dust emissions. The increased traffic on gravel roads and the resultant dust plumes could create a visual impact and may evoke negative sentiments from surrounding viewers. Surface disturbance during construction would also expose bare soil which could visually contrast with the surrounding environment. Additionally, temporarily stockpiling soil during construction may alter the landscape. Wind blowing over these disturbed areas could therefore result in dust which would have a visual impact.

	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	M	L	M	Negative	M	M	M
With Mitigation	M	L	M	Negative	M	M	M

Can the impact be reversed?	YES – negative effects of construction will cease once construction is complete.
Will impact cause irreplaceable loss or resources?	YES – there will be marginal loss of resources.
Can impact be avoided, managed or mitigated?	YES – mitigation measures can reduce impacts.
Mitigation measures: • Carefully plan to reduce the construction period. • Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. • Make use of existing gravel access roads where possible. • Ensure that dust suppression techniques are implemented on all access roads, especially those leading up steep slopes.	
Impact to be addressed/ further investigated and assessed in Impact Assessment Phase?	YES – the amended layout would need to be investigated.

Impact Phase: Construction of 132kV powerline (Visual impacts during the decommissioning phase are potentially similar to those during the construction phase).

Potential impact description:
Underground cables, on-site switching station, access roads and building infrastructure, large construction vehicles and equipment could exert a visual impact by altering the visual character of the surrounding area, exposing sensitive visual receptor locations to visual impacts. The construction activities may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. Vehicles and trucks travelling to and from the proposed site on gravel access roads are also expected to increase dust emissions. The increased traffic on the gravel roads and the resultant dust plumes could create a visual impact and may evoke negative sentiments from surrounding viewers. Surface disturbance during construction would also expose bare soil which could visually contrast with the surrounding environment. In addition, temporarily stockpiling soil during construction may alter the landscape and wind blowing over these disturbed areas could result in dust which would have a visual impact.

	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	M	L	M	Negative	M	M	M
With Mitigation	M	L	M	Negative	M	M	M

Can the impact be reversed?	YES – the negative effects of construction will cease once construction is complete.
Will impact cause irreplaceable loss or resources?	YES – there will be marginal loss of resources.
Can impact be avoided, managed or mitigated?	YES – mitigation measures can reduce impacts.
Mitigation measures: • All reinstated cable trenches should be re-vegetated with the same vegetation that existed prior to the cable being laid. • Carefully plan to reduce the construction period. • Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. • Maintain a neat construction site by removing rubble and waste materials regularly. • Make use of existing gravel access roads where possible. • Ensure that dust suppression techniques are implemented on all access roads	
Impact to be addressed/further investigated and assessed in Impact Assessment Phase?	YES – the amended layout would need to be investigated.

Impact Phase: Operation of WEF

Potential impact description:
The proposed Phezukomoya WEF could exert a visual impact by altering the visual character of the surrounding area and exposing sensitive visual receptor roads and locations to visual impacts. The development may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. Maintenance vehicles may need to access the WEF via gravel access roads and are expected to increase dust emissions in doing so. The increased traffic on the gravel roads and the dust plumes could create a visual impact and may evoke negative sentiments from surrounding viewers. Security and operational lighting could result in light pollution and glare, which could be an annoyance to surrounding viewers.

	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	M	M	H	Negative	M	H	M
With Mitigation	M	M	M	Negative	M	H	M
Can the impact be reversed?	YES – if the WEF is decommissioned.						
Will impact cause irreplaceable loss or resources?	YES – there will be marginal loss of resources.						
Can impact be avoided, managed or mitigated?	YES – mitigation measures can reduce impacts.						

Mitigation measures:

- Areas of 'High Sensitivity' should be precluded from the turbine development.
- No turbines should be placed within 1 km of the N9, N10 and R389 provincial road.
- Where possible, fewer but larger turbines with a greater output should be utilised rather than a larger number of smaller turbines with a lower capacity.
- Turbines should be painted plain white. Bright colours or obvious logos should not be permitted.
- Turbines should be repaired promptly, as they are considered more visually appealing when the blades are rotating (or at work).
- If required, turbines should be replaced with the same model, or one of equal height and scale. Repeating elements of the same height, scale and form can result in unity and lessen the visual impact that would typically be experienced in a chaotic landscapes made up of diverse colours, textures and patterns.
- Light fittings for security at night should reflect the light toward the ground and prevent light spill.
- Ensure that dust suppression techniques are implemented on all access roads.

Impact to be addressed/ further investigated and assessed in Impact Assessment Phase?	YES - Further assessment will be required in the EIA Phase to investigate the sensitivity of the receptor locations to visual impacts associated with the proposed development and to quantify the impacts that would result.

Impact Phase: Operation of 132kV powerline

Potential impact description:

The 132kV overhead power line, underground cables, on-site switching station, access roads and building infrastructure could create a visual impact by altering the visual character of the surrounding area. The development may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. Maintenance vehicles may need to access the infrastructure via gravel access roads and may increase dust emissions. Increased traffic on gravel roads and resultant dust plumes could create a visual impact and may evoke negative sentiments from surrounding viewers. Security and operational lighting at the associated infrastructure could result in light pollution and glare, which could be an annoyance to surrounding viewers.

	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	M	M	M	Negative	M	H	M
With Mitigation	M	M	M	Negative	M	H	M
Can the impact be reversed?	YES – if the WEF and power lines and other infrastructure are decommissioned.						
Will impact cause irreplaceable loss or resources?	YES – there will be marginal loss of resources.						
Can impact be avoided, managed or mitigated?	YES – mitigation measures can reduce impacts.						

Mitigation measures:

- Light fittings for security at the on-site switching station at night should reflect the light toward the ground and prevent light spill.
- Where practically possible, the operations and maintenance buildings should not be illuminated at night.
- Power lines should be aligned to run parallel to existing power lines and other linear infrastructure, if possible.
- Power lines should be aligned to avoid ridgelines and steep slopes, if possible.
- Cables should be buried underground where possible.
- The operation and maintenance buildings should be painted with natural tones that fit with the surrounding environment. Non-reflective surfaces should be utilised where possible.
- Ensure that dust suppression techniques are implemented on all access roads.

• Select the alternatives that will have the least impact on visual receptors.	
Impact to be addressed/ further investigated and assessed in Impact Assessment Phase?	YES - Further assessment will be required in the EIA Phase to investigate the sensitivity of the receptor locations to visual impacts associated with the proposed development and to quantify the impacts that would result.

13.5.1 Cumulative Impacts

Renewable energy facilities and their potential for large scale visual impacts could significantly alter the sense of place and visual character in the study area if all are constructed. For the purpose of this study, renewable energy developments within a 35 km radius of the Phezukomoya WEF application site were identified (Figure 2.1). The cumulative visual impact experienced by each visual receptor will depend on the number of existing or proposed developments within an 8 km radius of the receptor location, as beyond the 8 km radius, the visual impact of the development would diminish to an insignificant level.

Scattered farmsteads within the study area are regarded as potentially sensitive visual receptor locations. Some of these are located within 8 km of the existing and proposed renewable energy developments in the wider area. The operational Noupoort Wind Farm, two proposed WEFs and one proposed solar photovoltaic energy facility are located within the visual assessment zone. Receptors will experience visual impacts from the operational Noupoort Wind Farm, as well as further impacts should the other two additional wind farms and the Phezukomoya WEF also be constructed.

The degree of visual impact would be considered to be insignificant from approximately 5 km away from the proposed solar PV facility. This facility would still impact cumulatively on some receptors, as the solar PV facility is located on the southern and northern boundary of the Phezukomoya WEF application site. The receptors and cumulative impacts will need to be investigated further during the EIA Phase when fieldwork is undertaken.

The renewable energy facilities would also impact on the pastoral visual character of the study area, if all are constructed. The proposed Phezukomoya WEF, in combination with the operational Noupoort Wind Farm and additional two WEFs proposed within the study area (if constructed) could potentially be viewed as one very large development, which significantly alters the character of the area. The newly established Noupoort Wind Farm has already introduced industrial-type elements into the landscape making the area less sensitive to change as a result of introducing further renewable energy facilities into the area.

Impact Phase: Operation							
Potential impact description: Cumulative visual impacts are considered within a 35 km radius of the Phezukomoya WEF application site. Potentially sensitive visual receptor locations within 8 kms of some of the additional proposed renewable energy developments in the wider area will experience some visual impacts if these additional developments are all constructed. The additional renewable energy facilities would also impact on the pastoral visual character once constructed.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	H	M	M	Negative	M	M	M
With Mitigation	M	M	M	Negative	M	M	L
Can the impact be reversed?	YES – if the developments are decommissioned.						
Will impact cause irreplaceable loss or resources?	YES – there will be marginal loss of resources.						
Can impact be avoided, managed or mitigated?	YES – mitigation measures can reduce impacts.						
Mitigation measures:							

• Where possible, fewer but larger turbines with a greater output should be utilised rather than a larger number of smaller turbines with a lower capacity. • Similar turbines should be used for all the WEFs in the area and all turbines should be painted plain white, as this is a less industrial colour. Bright colours or obvious logos should not be permitted. • Light fittings for security at night should reflect the light toward the ground and prevent light spill. • Ensure that dust suppression techniques are implemented on all access roads. • Light fittings on site should reflect the light toward the ground and prevent light spill. • Where practically possible, buildings on site should not be illuminated at night. • Power lines should be aligned to run parallel to existing power lines and other linear infrastructure, where possible. • The operation and maintenance buildings should be painted with natural tones that fit with the surrounding environment. Non-reflective surfaces should be utilised where possible. • Select the alternatives that will have the least impact on visual receptors.	
Impact to be addressed/ further investigated and assessed in Impact Assessment Phase?	YES - Further assessment will be required in the EIA Phase to investigate the sensitivity of the receptor locations to visual impacts associated with the proposed developments and to quantify the impacts that would result. Mitigation measures proposed by the visual assessments undertaken by other specialists for the proposed renewable energy developments within an 8km radius will be investigated and included where necessary.

13.5.2 Comparative Assessment of Alternatives

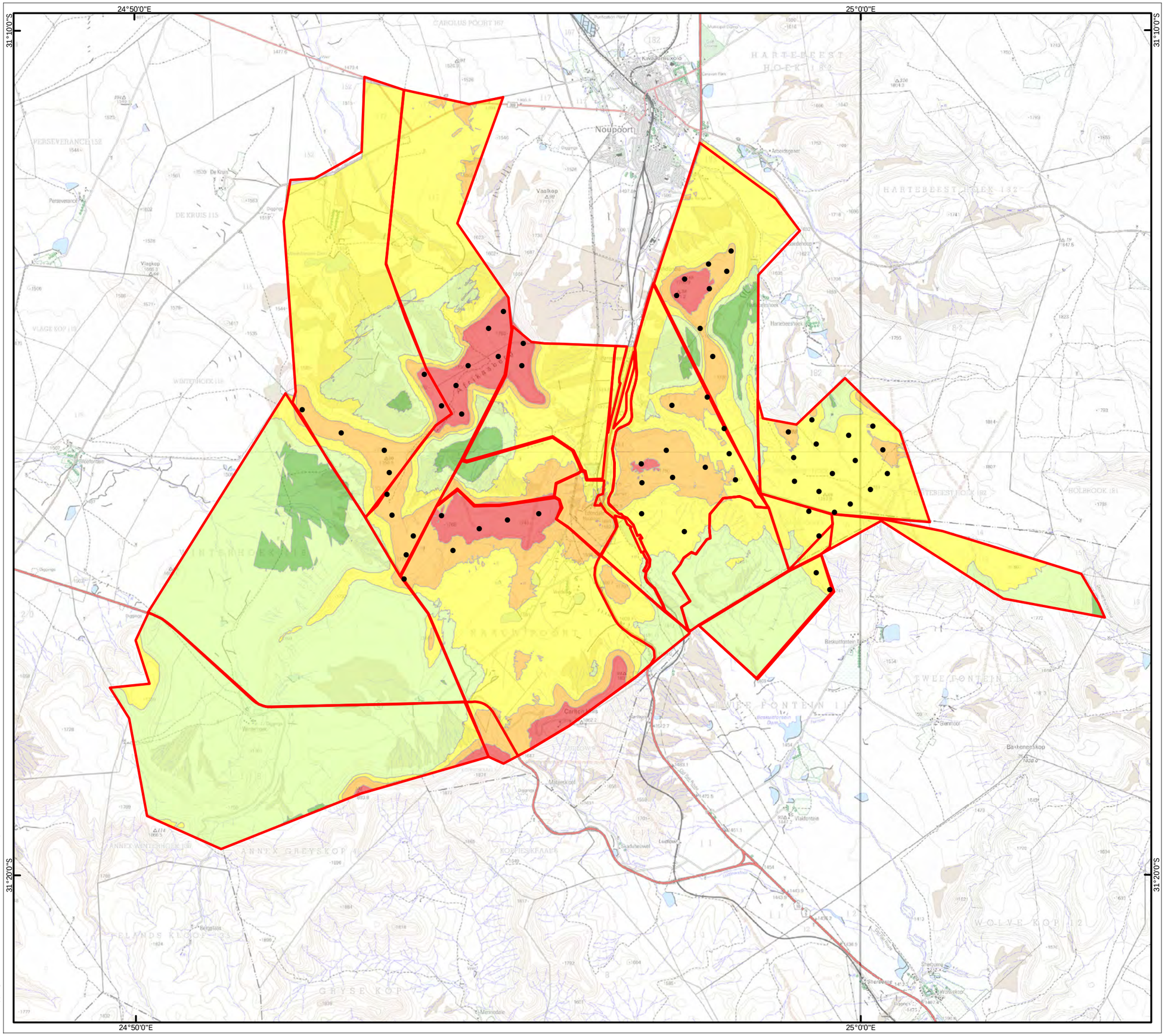
As previously mentioned, two power line route alternatives are being assessed during the EIA.

The degree of visual impact of each alternative has been determined based on the following factors:

- The location of the power line in relation to areas of high elevation, especially ridges, koppies or hills;
- The location of the power line in relation to sensitive receptor locations; and
- The location of the power line in relation to areas of natural vegetation (clearing a strip of vegetation under the power line servitude worsens visibility).

As the 'Alternative Route Alignment' is closer to sensitive receptor locations and also in close proximity to the N9 receptor road, the preferred route from a visual perspective is the 'Preferred Route Alignment'.

In the EIA Phase, a preferred layout will be assessed based on results of Scoping Phase constraints mapping. The areas of 'High Sensitivity' should be precluded from turbine development area.



InnoWind

ARCUS

- Proposed Turbine Location
- Phezukomoya Site Boundary

Visual Sensitivity

- High
- Medium-High
- Medium
- Medium-Low
- Low

1:80,000 Scale @ A3

N

0 1.5 3 km

Produced: AA Reviewed: SC Approved: AB	Ref: 2245/REP/020
	Date: 05/06/2017

Visual Sensitivity
Figure 13.3

Phezukomoya Wind Energy Facility
Draft Scoping Report

14 CULTURAL HERITAGE, ARCHAEOLOGY AND PALAEONTOLOGY ASSESSMENT

14.1 Methodology

The study is a desktop assessment that did not involve field work. The study area is known to the specialist who has completed a number of other studies nearby including being a staff member of the Zeekoe Valley Archaeological project and a co-excavator with Prof Brit Bousman at Blydefontein in the nearby Kikvorsberge. The heritage character of the area can therefore be reasonably anticipated.

In term of written sources, a number of heritage studies have taken place in the region as well as the Zeekoei Valley Archaeological Survey which has generated numerous scientific publications on Karoo archaeology.

14.1.1 Assessing Heritage in the Context of Wind Energy Developments

WEFs have increased exponentially throughout the world in response to the international energy crisis and climate change. Initially, communities enthusiastically accepted the presence of WEFs, however web-based research of international experience has indicated that they are not without controversy. The impacts of clusters of massive wind turbines on cultural landscape can be severe, both in physical terms and with respect to the intangible and aesthetic qualities of a given locality. In terms of landscapes and heritage in South Africa, there are no pro-active detailed local regional studies that can be consulted which make objective and standardised assessment of impacts quite difficult. It is generally recognised that high negative impacts can occur, although the heritage authorities generally recognise the desirability of clean energy and the need to build clean energy facilities in landscapes that can tolerate them. Heritage sites are contextually sensitive to any form of development – this is particularly the case with a heritage site or place that is well known, well used and publically celebrated.

Due to the turbine size, visual impacts are not mitigatable (they are generally visible from 10 km or further depending on conditions) in the majority of landscapes. The point at which a wind turbine may be perceived as being “intrusive” in terms of the aesthetics of an area is a subjective judgment, which is value-laden depending on individual backgrounds, perceptions and values. It can be anticipated that the presence of such facilities close to wilderness and heritage areas would impact many of the intangible and aesthetic qualities for which an area is valued, or could be potentially valued in the future. Circumstances are variable as in certain landscape forms, the graceful shapes of the turbines and the sculptured twist of the rotors are perceived to be aesthetically pleasing. In essence, the perception of whether a wind turbine is an acceptable presence in a landscape depends greatly on context, setting, landscape character and an individual’s aesthetic values.

The degree of physical landscape disturbance caused during the construction of turbines is such that the destruction of archaeological and palaeontological heritage can be a high likelihood. In the assessment of impacts of WEFs, it is necessary to assess both physical damage to heritage caused by the establishment of infrastructure, as well as focus on the way that such a facility could change the aesthetic and intangible values of the cultural landscapes in which the physical heritage resources exist.

14.1.2 Landscape and Setting

Landscapes are heritage resources of national or regional or local importance in terms of rarity and representivity. The UNESCO Operational Guidelines for the World Heritage

Convention (1995)[33] identified three main types of cultural landscapes derived from the following characteristics:

a. The clearly defined landscape designed and created intentionally. This embraces garden and parkland landscapes constructed for aesthetic reasons

b. The organically evolved landscape. This results from an initial social, economic, administrative, and/or religious imperative and has developed its present form by association with and in response to its natural environment. Such landscapes reflect that process of evolution in their form and component features. They fall into two sub-categories:

c. A relict (or fossil) landscape is one in which an evolutionary process came to an end at some time in the past, either abruptly or over a period. Its significant distinguishing features are, however, still visible in material form.

d. A continuing landscape is one which retains an active social role in contemporary society closely associated with the traditional way of life, and in which the evolutionary process is still in progress. At the same time it exhibits significant material evidence of its evolution over time.

e. The associative cultural landscape included by virtue of the powerful religious, artistic or cultural associations of the natural element rather than material cultural evidence which may be insignificant or even absent[34]

Also criteria that have been considered locally[35] (assessment checklist) are:

Design quality
The landscape should represent a particular artistic or creative achievement or represent a particular approach to landscape design

Scenic quality
The landscape should be of high scenic quality, with pleasing, dramatic or vivid patterns and combinations of landscape features, and important aesthetic or intangible qualities (vividness, intactness, unity)

Unspoilt character/authenticity/integrity
The landscape should be unspoilt, without visually intrusive urban, agricultural or industrial development or infrastructure. It should thus reveal a degree of integrity and intactness

Sense of place
The landscape should have a distinctive and representative character, including topographic and visual unity and harmony

Harmony with nature
The landscape should demonstrate a good example of the harmonious interaction between people and nature, based on sustainable land use practices

Cultural tradition
The landscape should bear testimony to a cultural tradition which might have disappeared or which illustrates a significant stage in history or which is a good example of traditional human settlement or land use which is representative of a culture/s

[33] http://whc.unesco.org/archive/opguide02.pdf.

[34] Extract from paragraph 39 of the Landscape Operational Guidelines for the Implementation of the World Heritage Convention.

[35] N. BAUMANN, S WINTER, H AIKMAN (2005): "The horns of a dilemma; housing and heritage" in VASSA Guidelines for Proceedings from a Workshop Studies and debates in Vernacular Architecture in the Western Cape.

Living traditions
The landscape should be directly and tangibly associated with events or living traditions with ideas or with beliefs, with artistic and literary works of high significance

The study area lies within a rural context. In terms of the UNESCO guidelines it is a natural evolving landscape. In terms of the assessment checklist, the landscape is largely intact as a natural landscape, intrusions within the last 60 years are moderate, and therefore it may be considered reasonably authentic.

14.2 Baseline Environment

14.2.1 Heritage Indicators

14.2.1.1 The Karoo as a cultural landscape

The central Karoo is mostly used for sheep, some cattle and game farming. Overgrazing since the advent of formal farming in the 19th century has caused some changes to the landscape in terms of the composition of vegetation.

The project area has the qualities of an intact natural area. In areas where transformation has taken place – sheet erosion and donga formation has had an impact. The settlements and farms represent a comparatively ephemeral imposition of the landscape of colonial settlement. The flood zones of major watercourses have been transformed by agriculture.

Aside from these comparatively moderate interventions, the Karoo remains dominated by its wilderness qualities. The heritage of the Karoo is essentially a series of layers of events (or landscapes) that has become superimposed on the land surface. The earliest of these is the Karoo palaeontology – an ancient landscape that was deposited as a result of a vast inland sea. The shores and swamps of this landscape were abundant with ancient species of fish, plants, invertebrates and early mammal-like reptiles. After the breakup of Gondwanaland, the Karoo took on the geology that has resulted in its particular character. Millions of years later it was home to successions of early human occupation. Stone Age occupations of the Early, Middle and Later Stone age left half a million years of human made debris on the land surface. Superimposed on the Karoo landscape one more is the history of European colonisation and the wars that went with it.

14.2.1.2 The paleontological landscape

The Karoo is a massive palaeontological landscape consisting of multiple layers of sediments that contain an array of fossils ranging from fish, early vertebrates, plant remains and trace fossils. Generally the Karoo fossils predate the age of the life forms popularly known as dinosaurs by some scores of millions of years. The vertebrates of these times are known as early mammal-like reptiles which were ancestral to dinosaurs, hence the Karoo palaeontological sequence has contributed on a world scale to understanding the development of life forms on the planet. The project area lies in a mosaic of highly fossiliferous areas within the Karoo.

The flat plains of the Nama Karoo are underlain by a series of shale and mudstone strata which represent some 400 million years of depositional events. The basal rocks of the Karoo sequence are known as the Dwyka formation which was deposited by a wet based glacier during the Permo-Carboniferous glaciation. This was followed by the deposition of the Ecca formation which is made up of sediments deposited in a shallow lake that covered what is now the interior of Southern Africa. Ecca shales form many of the large flat plains of the Northern Karoo. The best known depositional event of the Karoo sequence is the laying down of the Beaufort shales about 230 million years ago. These shales are rich in a stratified sequence of fish, reptilian and amphibian remains that lie fossilized in Permian and Triassic period swamp deposits.

At the end of the Triassic period a series of geological upheavals took place with the fragmentation of the Gondwanaland continent. These were largely responsible for giving the Karoo its characteristic landscape (Plate 14.1). Triassic period volcanic activity took place over an extended period of time beginning at 187 million years ago. During this time the horizontal volcanics of the Drakensberg were laid down and the shales of the Karoo were penetrated by dolerite intrusions and extrusions in the form of vertical dykes and horizontal sills following the bedding planes of the shales. These geological structures give rise to a very characteristic topography with general occurrences of mesas, hillocks and sharp ridges.

In the study area, extruding dolerite dykes and hillocks exposed through differential erosion are dominant features of the landscape giving rise to the vast flat plains of mudstones dolerite outcrops and hills that are so characteristic of this area. These igneous events resulted in the formation of Hornfels a fine grained black rock with a conchoidal fracture. Hornfels is formed when a dolerite intrusion takes place and bakes the surrounding mudstone to a metamorphic form. Millions of years later prehistoric peoples exploited hornfels exposures for raw material for making artefacts – a staple resource in the Karoo for hundreds of thousands of years.

14.2.1.3 The pre-colonial cultural landscape

The pre-colonial archaeology of the Karoo is visible, prolific and in good condition. A comprehensive survey of a 5000 square kilometre catchment area (the Valley of the Zeekoei River from the Sneeuberg Mountains to the Gariep River Valley) which lies immediately west of the project area revealed the presence of some 10 000 archaeological sites representing a history of human occupation that dates back at least 250 000 years (or more). Of the 10 000 sites recorded and identified to industry (phases), some 6000 were attributable to the Late Stone Age.

Artefacts of both the Early and Middle Stone Age are widespread and may generally be described as an ancient litter that occurs at a low frequency across the landscape. Where definable scatters of Early and Middle Stone Age material occur, they are considered to be significant heritage sites. More intensive occupation of the Karoo started around 13 000 years ago during the Later Stone Age, which is essentially the heritage of Khoisan groups who lived throughout the region.

The latest phase of occupation of the Great Karoo is a period known as the Late Stone Age. This represents the heritage of the Khoekhoen (historically known as “Hottentot” by early writers) and San (popularly known as Bushman) people of South Africa. The direct descendants of these groups make up a significant proportion of the population today. This heritage is represented by two industries (phases). These are the Interior Wilton which is characterised by a microlithic stone artefact industry characterised by lightly patinated hornfels (indurated shale stone) and the later Smithfield industry characterised by specific classes of stone artefacts and the presence of grass tempered ceramics.

The scarcity of natural caves and shelters in the Karoo landscape has resulted in the majority of archaeological sites being open occurrences of stone artefacts, ostrich eggshell fragments and occasionally, pottery. Bone remains are rarely preserved in open contexts.

The most recent archaeological remains relating to the San have been historically described as the “Smithfield Industry”, and are found from the Free State to the Northern and Eastern Cape. The Smithfield typically contains flaked lithics (on unpatinated blue-black hornfels), grinding equipment, bored stones, and potsherds (typically relating to bowl-shaped pots with stamp impressed decoration). Formal stone tools include end scrapers. Also associated with the Late Stone age of the Karoo are rare rock paintings which occur in the few caves and shelters to be found in the dolerites, however more plentiful are engraved rocks and stones and stone surfaces.

After 1000 years BP (before present) people who were herding sheep/goats and possibly cattle, made an incursion into Karoo and established a new economic order based on transhumant pastoralism. The presence of herding people is represented by stone walled structures that occur throughout the Karoo. They have been recorded within the Zeekoei River Valley, between De Aar and Victoria West (within this project study area) and even in the inhospitable high Karoo near Sutherland and on the West Coast.

The spatial distribution of Late Stone Archaeological sites in the Karoo is quite patterned. People needed to be close to water so rivers, pans and springs played an important role in influencing where people lived. The climate of the Karoo also played a key role. The winters can be extremely cold with temperatures dropping well below zero, made worse by freezing winds. The summers in contrast are harsh, hot and rainfall is unreliable. Almost all Late Stone Age sites are situated at the bottom of the breaks of dolerite dykes, in sheltered areas on the crests of dolerite dykes, as well as in dolerite mazes and outcrops. So too, are the stone circles and circle complexes built by Khoekhoen groups after 1000 AD which are almost always built on the edges of low ridges and dykes. The higher ridges provided a view, some security, loose stones with which to build kraals and screens and allowed people to be elevated above the frost levels in winter. Definable sites of the Late Stone Age are sparse on the vast flat shale plains as these areas offered little protection from the wind and collect frost in winter. Similarly sites tend to be rare on exposed hilltops and very high ridges. Hence, natural features such as rock outcrops and dolerite dykes played a significant role for Late Stone Age people.

The archaeology of the Karoo intact and observations allow archaeologists to postulate the territorial boundaries of different groups of people based on the variations on the decorative motifs on pottery. Evidence indicates that once herding groups settled in the Karoo, their presence was continuous until the incursion of the European trekboere in the 1700's.

Earlier archaeological sites (ESA and MSA) may also be found associated with natural foci, however indications are that the location of this kind of material is more widely broadcast. Distinct foci are few and in places scatters of dispersed and eroded material may be found over vast expanses of landscape.

14.2.1.4 The landscape of colonial settlement

The indigenous people of the Karoo waged a bitter war against colonial expansion as they gradually lost control of their traditional land. The most determined indigenous resistance to trekboer expansion occurred when they entered the harsh environment of the escarpment of the interior plateau (namely Hantam, Roggeveld and Nieuweveld and Sneeuberg Mountains). Similarly trekboer settlers found their progress onto the upper escarpment halted at the Sneeuberg close to the project area.

The San launched an almost successful campaign to drive them out. Numerous place names throughout the Karoo such as Oorlogspoort and Oorlogskloof are testimony to the skirmishes of the late 18th century. The colonists fought back by establishing the "Kommando" system – the "hunting" of San was officially sanctioned in 1777 and in some instances, bounties were obtainable from the local landrost (on presentation of body parts). The Drostdy of Graaff Reinet (the northernmost regional center of the time) played a significant role in this long and bitter war which eventually saw the almost complete destruction of the Karoo San.

The advent of the early European Settlers into the Great Karoo is one which is largely un-documented. These European pastoralists were highly mobile; trekking between winter and summer grazing on and off the escarpment. Land ownership was informal, and only became regulated after the implementation of the quitrent system of the 19th century used by the Government to control the lives and activities of the farmers.

The Europeans moved onto land associated with water sources or perennial fountains. Many of the early settlers first attempted to cultivate wheat, and to all accounts were successful at first. Almost all historic ruins of farm houses have associated trapvloere – floors where wheat was winnowed in all likelihood for domestic use. The San resisted the presence of the Europeans. The San saw their traditional territories and hunting areas diminishing, the vast game herds of the Karoo dwindled. The San used every opportunity to impede the progress of the Europeans by raiding lonely farms, murdering the occupants and stealing stock. The Europeans were allowed by law to shoot San males on sight and take women and children into servitude.

By 1770 the Karoo was the furthest frontier of the Cape Colony. By 1820 after the suppression of the San, the Karoo was quickly divided into quitrent or loan farms, the process of land seizure from the indigenous inhabitants was formalized through a government regulated process of formal land grants. Even in the early 19th century there were tracts of landscape simply known as "crown land" – much of this was marginal being away from rivers and fountains. It was on these patches of crown land that the last surviving groups of San eked out an existence. As the land parcels that were available to them diminished, they found themselves with little option other than to work as herdsmen and servants for the colonists.

The two major regional centres in the area, Beaufort West and Graaff Reinet were established as administrative centres to exert hegemony over the activities of the Trekboere who were prone to behave as free agents without governance. Of the two centres, Graaff Reinet, is the oldest being establish under the Dutch rule at the Cape as a legal and administrative centre.

Noupoort was established in the 1870's as a railway junction when the Union Railway Company established the railway system. It was a railway village until 1942 when it gained a formal municipality. It continues to play an important role in the functioning of the railway system but is not a tourist destination of consequence.

14.2.1.5 History of the farms

Indications are that most of the farms in the study area would have started as loan farms.

A loan farm was given out after a person petitioned the government for permission to use a piece of land. They paid tithes to the government for the use but it was not generally recorded in title deeds with surveyor's diagrams. Many of these loan farms were circular in shape because of a custom that allowed the farmer to take a measurement from a central spot, such as a homestead, spring or rock formation. The walking-off distance was regarded as about 750 roods, amounting to an area of around 3000 morgen. Weak springs are at the centres of most of loan farms indicates the importance of even the most meagre water resources on this landscape. The formal granting of title deeds only took place in the early 19th century, however judging by the kinds of artefacts and structures found on the landscape, many of the farms were established informally long before land was formally granted or loaned.

14.3 Preliminary Assessment - WEFs

Impact Phase: Construction
Potential impact Description: Impacts on palaeontology, human-made and landscape aspects associated with development of WEFs. In terms of impacts to heritage, archaeological sites which are highly context sensitive are most vulnerable to the alteration of the land surface. The best way to manage impacts to archaeological material is to avoid impacting them. This means micro-adjusting turbine positions where feasible, or routing access roads around sensitive areas. If primary avoidance of the heritage resource is not possible, then some degree of mitigation can be achieved by systematically removing the archaeological material form the landscape. This is generally considered a second best approach as the process that has to be used is exacting and time-consuming, and

therefore expensive. Furthermore the NHRA requires that archaeological material is stored indefinitely, which has cost implications and places an undue burden on the limited museum storage space available in the province. It is also during the construction phase that impacts to palaeontological heritage may be expected. Blasting and cutting of roads, digging of the turbine foundations are the areas where fossil bearing rock may be impacted and fossil material physically destroyed.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	L	H	M	Negative	M	M	M
With Mitigation	L	H	L	Negative/ Positive	M	M	M
Can the impact be reversed?	NO - destruction of heritage material is not reversible as it can never be authentically replaced.						
Will impact cause irreplaceable loss or resources?	YES - If not mitigated, certain archaeological and palaeontological resources are not replaceable. Setting and landscape impacts are not replaceable.						
Can impact be avoided, managed or mitigated?	YES – archaeological sites can be avoided or subject to rescue excavation. Similar applies to palaeontological resources. NO – Landscape impacts on this scale are difficult to mitigate, however the visual assessment is will suggest adjustments that will help.						
Mitigation measures: • Archaeological sensitivity must be identified in the EIA phase. Avoidance or rescue excavation may be required. • Palaeontological sensitivity must be identified in the EIA phase. Avoidance or rescue excavation may be required as well as monitoring during road cuttings and excavation of bases. • Mitigation of large scale impacts to scenery and setting are marginally possible. • Existing farm tracks be re-used or upgraded to minimise the amount of change to un-transformed landscape. • During the detailed planning phase, drawings of proposed road alignments, infrastructure and near-final turbine positions should be submitted to an archaeologist for review and field-proofing. Micro-adjustment of alignments and turbine positions is likely to be sufficient to achieve adequate mitigation. • During the EIA phase the population of heritage sites in and around the study area must be sampled so that the findings can inform planning decisions.							
Impact to be addressed/ further investigated and assessed in Impact Assessment Phase?	YES – Archaeology and palaeontology and rock paintings must be assessed as well as buildings, ruins. Landscape must be graded.						

Impact Phase: Operational
Potential impact description: Operation impacts on palaeontology, human-made and landscape aspects associated with development of the WEFs. In terms of Oberholzer's (2005)[36] classification of development activities, construction of wind turbines is a major industrial activity and therefore a category 5 development. Category 5 developments in natural landscapes tend to have a very high visual impact. This implies that there would be a significant change to the sense of place and character of the site. • Due to the size of the turbines the visual impacts are largely not easily mitigated (they are visible from 10 km) in virtually all landscapes. • Turbines are in continuous motion which creates a visual impact than that caused by static objects and buildings. • Shadow flicker – an impact particular to wind turbines, comprises very large moving shadows created by the giant blades when the sun is low on the horizon. Such shadows can extend considerable

[36] OBERHOLZER B, 2005. Guidelines for involving visual and aesthetic specialists in EIA processes. Department of Environment Affairs and Tourism.

distances from the turbine. Continuous shadow flicker will have an impact on the sense of place of a heritage site.
- Visual impact of road cuttings into the sides of slopes will affect the cultural, natural and wilderness qualities of the area.
- Residual impacts can occur after the cessation of operations. The large concrete turbine bases can remain buried in the ground indefinitely. Bankruptcy or neglect by a wind energy company could result in turbines standing derelict for years creating a long-term eyesore.
- Changes to the way in which the area is used by people can result. If the intangible qualities of a place are affected such that it becomes an undesirable place to visit or reside, the sustainable use of local tourism amenities may diminish.

	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	M	H	H	Negative	H	M	M
With Mitigation	M	H	L	Negative	M	M	M

Can the impact be reversed?	NO – class 5 industrial developments in a wilderness landscape cannot be fully successfully mitigated, however careful siting of turbines could lower impacts.
Will impact cause irreplaceable loss or resources?	YES – permanent impact to landscape quality.
Can impact be avoided, managed or mitigated?	Moderately - turbines are generally too massive to mitigate landscape impacts. Careful positioning may offer moderate benefits in terms of visual impact, however landscape and setting impacts will be generally immitigable.
Mitigation measures: • VIA may indicate measures that can be applied to decrease the visual impact.	
Impact to be addressed/ further investigated and assessed in Impact Assessment Phase?	YES – the landscape qualities of the site must be graded as this will help express the degree of impact in regional and local terms.

14.4 Preliminary Assessment– Grid Connection

The impact of the proposed Phezukomoya grid connections would be of lesser intensity than those associated with the WEF itself. The footings for the towers are shallower and the service road is normally a simple track. It is possible that archaeological sites could be disturbed, but the rather shallower excavations mean the palaeontological impacts would be less.

14.5 Cumulative Impacts

Cumulative impacts in the Great Karoo are a concern. There are at least five proposals for renewable energy facilities within a 35 km radius of the site. However it must be considered that not all of these will be approved and successful in the REIPPP. The combined effect of WEFs will impact the aesthetic qualities of the region, which will diminish the value of the landscape as an aesthetic resource and potentially affect its future in terms of conservation related enterprises.

The grid connection lines would cause an aesthetic impact for up to a 5 km radius which means that there could be a potential for cumulative impacts close to regional substations where grid connections converge. The presence of a certain amount of infrastructure in the area such as the N9 and the electrical and linear infrastructure of the railway system are 20th century clutter which means that the presence of additional transmission lines are unlikely to be out of place in the local environment.

14.6 Summary

In terms of human-made heritage, that is, archaeology and the built environment, the impact is likely to be neutral or negative. There are a few benefits that will accompany the project such as job creation for and around the community of Noupoort; also the project will have economic benefits for local businesses and service providers (e.g. accommodation for workers during construction); and as an addition, the project will have a small positive benefit in that the data that is collected during the assessment or mitigation thereafter contributes to the general pool of research data.

The landscape qualities of the site are likely to be negatively impacted as a result in the physical changes to the appearance and character of the area, that is, it will lose its sense of isolation and much of its sense of wilderness, which will affect its future amenity value in conservation and heritage terms.

The successful detection of fossiliferous material on site during and before construction can be of benefit to science as these areas have the potential to contribute new knowledge. In contrast the destruction of fossil material during excavation or blasting constitutes a permanent and irreversible negative impact, especially if rare or unique specimens are lost.

At the scoping stage, there are no indications that there are any red flag issues attached to the Phezukomoya proposed WEF site, however there will be scenic impacts from the N9 and railway line. Noupoort is not known as a tourist town, so impacts in heritage terms to local tourism are anticipated to be moderate.

15 SOCIO-ECONOMIC ASSESSMENT

15.1 Methodology

The approach to the study is based on the Western Cape Department of Environmental Affairs and Development (DEA&DP) *Planning Guidelines for Social Impact Assessment*. 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 scoping level study involved:

- A review of socio-economic data;
- A review of relevant planning and policy frameworks for the area;
- A review of information from similar studies; and
- A literature review of social issues associated with wind energy facilities.

The identification of potential social issues associated with the proposed WEF is based on a review of relevant documentation and experience with similar projects in South Africa.

15.2 Assumptions and Limitations

15.2.1 Identification of Area for the Wind Energy Facility

The identification of the proposed site was informed by technical information relating to local climatic conditions in the area, specifically wind conditions, local topography and land availability.

15.2.2 Strategic Importance of the Project

The strategic importance of promoting renewable energy is supported by the national and provincial energy policies.

15.2.3 Fit with Planning and Policy Requirements

Legislation and policies reflect societal norms and values. The legislative and policy context therefore plays an important role in identifying and assessing the potential social impacts associated with a proposed development. In this regard, a key component of the SIA process is to assess the proposed development in terms of its fit with key planning and policy documents. As such, if the findings of the study indicate that the proposed development in its current format does not conform to the spatial principles and guidelines contained in the relevant legislation and planning documents, and there are no significant or unique opportunities created by the development, the development cannot be supported.

However, it is acknowledged that the location of wind energy facilities is informed by technical requirements, specifically wind conditions.

15.2.4 Identification and Assessment of Social Issues

The identification and initial assessment of social issues is based on the specialist's experience with SIAs for approximately forty WEF projects in South Africa. In this regard it is assumed that the key social issues are likely to be similar. However, it should be noted that the comments on the social impacts contained in the Social Scoping Report represent preliminary comments and will be confirmed during the assessment phase.

15.2.5 Demographic Data

For the purpose of the scoping report, the Census 2011 Municipal Fact Sheet publication was mainly referred to, and information in this report is therefore at local municipal level. More detailed (Ward level) information will be sourced during the EIA phase.

15.2.6 Consultation with Affected Communities

At this stage in the process there has been no interaction by the SIA Consultants with communities and other affected parties that live in the area. However, the specialist has worked on other wind energy projects and the issues identified by the affected parties in these projects are, in many instances, likely to be similar to those for the associated with the WEF site. Detailed consultation will be undertaken during the assessment component of the SIA.

15.3 Baseline Environment

15.3.1 Legislative and Policy Context

Legislative and policy context plays an important role in identifying and assessing the potential social impacts associated with a proposed development. In this regard, a key component of the SIA process is to assess the proposed development in terms of its fit with key planning and policy documents.

For the purposes of the meeting the objectives of the SIA the following national, provincial and local level policy and planning documents were reviewed, namely:

15.3.1.1 National

- National Energy Act (2008);
- White Paper on the Energy Policy of the Republic of South Africa (December 1998);
- White Paper on Renewable Energy (November 2003);
- Integrated Resource Plan (IRP) for South Africa (2010-2030);
- The National Development Plan (2011);
- New Growth Path Framework (2010); and
- National Infrastructure Plan (2012).

15.3.1.2 Provincial

- Northern Cape Provincial Growth and Development Strategy (2004-2014);
- Northern Cape Climate Change Response Strategy; and
- Northern Cape Spatial Development Framework.

15.3.1.3 District and Local

- Pixley ka Seme District Municipality Integrated Development Plan (Review 2014/15); and
- Umsobomvu Municipality Integrated Development Plan (Review 2014/15).

The detailed review is included in the specialist's report in Volume 2 of this Draft Scoping Report, and the findings have indicated that renewable energy is strongly supported at a national and local level. At a national level the White Paper on Energy Policy (1998) notes:

- Renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future; and,
- The support for renewable energy policy is guided by a rationale that South Africa has a very attractive range of renewable resources, particularly solar and wind and that renewable applications are in fact the least cost energy service in many cases; more so when social and environmental costs are taken into account.

The development of and investment in renewable energy is also supported by the National Development Plan (NDP), New Growth Path Framework and National Infrastructure Plan, which all make reference to renewable energy. At a provincial level, the development of renewable energy is supported by the Northern Cape Provincial Growth and Development Strategy and Northern Cape Provincial Spatial Development Framework. The PKSDM IDP also highlights the importance of renewable energy for the area.

The provincial and local policy and planning documents also make reference to the importance of tourism and the region's natural resources. Care therefore needs to be taken to ensure that the development of large renewable energy projects, such as the proposed facility, does not impact on the region's natural resources and the tourism potential of the Province.

15.3.2 Administrative Context

The study area is located within the Umsobomvu Local Municipality (ULM) (NC072) (Figure 15.1). The ULM is one of the eight B-Municipalities that constitute the Pixley ka Seme District Municipality (PKSDM) (NC7). The District Municipality also includes one District Management Area (DMA) (NCDMA07) located in the north-western region of the District. The District Municipality is neighboured by three provinces, namely Free State on the northern side, Eastern Cape on the eastern side and the Western Cape on the southern side. Within the Northern Cape the district is neighboured by Frances Baard, Siyanda and the Namakwa Districts. The UM is approximately 6819 km² in size (~7% of the greater PKSDM) and is situated in the south-eastern part of the PKSDM. Colesberg is the administrative centre of the ULM and was named after Sir Lowry Cole - governor of the Cape of Good Hope 1828 - 1833. The town of Colesberg is located on the N1 in the Great Karoo, approximately halfway between Johannesburg and Cape Town. Colesberg is also located on the N9, which provides a link to Port Elizabeth to the south. The other two urban centres in the UM are Noupoort and Norvalspont, a small settlement located near the Gariep Dam.

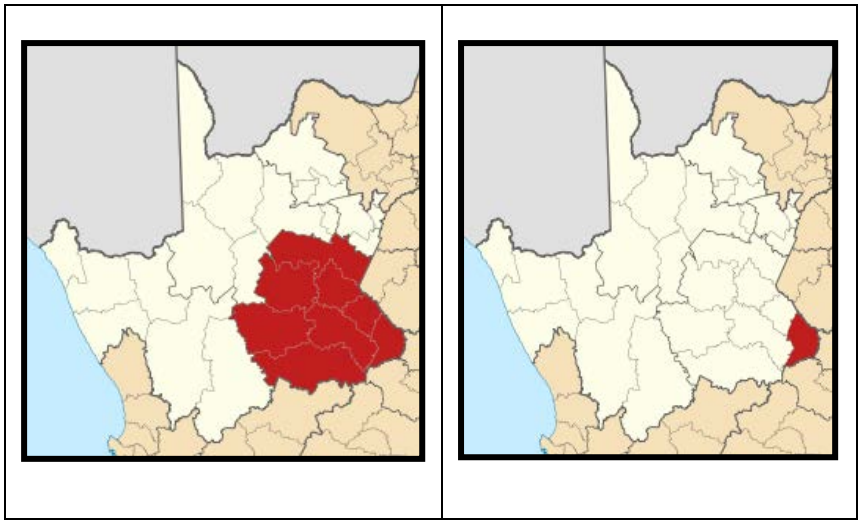


Figure 15.1: The location of Umsobomvu Local Municipality (Left) and Pixley ka Seme District Municipality (Right) within the Northern Cape Province (white) (Source: Wikipedia).

15.3.2.1 Provincial Context[37]

The proposed WEF and its grid connection are located in the Northern Cape Province, which is the largest province in South Africa and covers an area of 361,830 km^2, and constitutes approximately 30% of South Africa. The province is divided into five district municipalities (DM), namely, Pixley ka Seme, Frances Baard, Namakwa, ZF Mgcawu[38], and John Taola Gaetsewe[39], twenty-six Category B municipalities and five district management areas. The site itself is located in the Umsobomvu Local Municipality.

Population

Despite having the largest surface area, the Northern Cape has the smallest population of 1 145 861 (Census 2011) or 2.28% of the population of South Africa. The population has increased from 991 919 in 2001. Of the five districts, Frances Baard has the largest population of 382 086. The other districts and their respective populations are ZF Mgcawu (236 783), John Taola Gaetsewe (224 799), Pixley ka Seme (186 351) and Namakwa (115 842). In terms of age, 30.1% are younger than 15 years of age and 64.2% fall within the economically active age group of 15-64 years of age (Census 2011). The female proportion makes up approximately 52.7% of the total with males making up the remaining 47.3% (Census 2011).

Education

Based on the information contained in the NCPSDF the average adult education attainment levels in the Northern Cape are lower than the adult education attainment levels of South Africa as a whole. Approximately 19.7% of the Northern Cape adults have no schooling in comparison to South Africa's 18.1%. The Northern Cape has the second lowest percentage of adult individuals (5.5%) that obtained a tertiary education in South Africa. The LED Strategy for the Northern Cape indicates that Pixley ka Seme has the lowest adult education attainment levels in the Northern Cape with 27.3% of the adult population having no form of schooling, whilst John Taolo Gaetsewe is second with 25.4% having no schooling. The highest number of the adult population with tertiary education (6.4%) is located in Frances Baard.

The Northern Cape also has the smallest portion (11.1%) of highly skilled formal employees in South Africa and Gauteng has the highest (14.3%). Linked to this the Northern Cape has the second largest portion of semi and unskilled formal employees in the country. A lack of skilled people often results in both the public and the private sector being unable to implement planned growth strategies and achieve the desired productivity, service delivery and service quality (NCSDF, 2012).

Economic development

Over the past 8 years there has been little to no variance in the Human Development Index (HDI) figures for the Northern Cape, indicating no increase or decrease in the overall standard of living40. This trend is unlikely to change in the foreseeable future, mainly due

[37] The information in this section is based on the Northern Cape Provincial Growth and Development Strategy 2004-2014. This document does not include 2011 Census Data. Where possible data from the 2011 Census and the NCSDF 2012 has been used to update the information.

[38] The ZF Mgcawu DM was previously referred to as the Siyanda DM.

[39] The John Taola Gaetsewe DM was previously referred to as the Kgalagadi DM.

[40] The Human Development Index (HDI) was developed by the United Nations Development Programme (UNDP) based on the philosophy that the goal of development was to ensure that individuals live long, informed and comfortable lives. The HDI consists of three components: Longevity, which is measured by life expectancy at birth; Educational attainment, which is measured by two education variables, namely adult literacy and combined gross primary, secondary and tertiary enrolment ratio, and; Income, which is measured by gross domestic product (GDP) per capita. Performance in each dimension is expressed as a value between 0 and 1, and the HDI index gives an internationally accepted measure of the wellness (quality of life) of the population of the

to the marginal economic base of the poorer areas, and the consolidation of the economic base in the relatively better-off areas. It is important to note that the HDI for the Northern Cape (0.55) is substantially below the South African figure of 0.72. The HDI of 0.55 displays a pattern of semi-development, and there is a definite inequality between the different population groups, with the Whites having a higher development lifestyle than the African or Coloured groups.

The percentage of Northern Cape people living below the poverty line has decreased from 40% in 1995 to 27% in 2011, while the poverty gap has decreased from 11% in 1995 to 8% in 2011. The goal set by the province is to decrease the percentage of people living below the poverty line to 20% by 2015 NCSDF, 2012). The alleviation of poverty is one of the key challenges for economic development. Higher levels of economic growth are a key challenge for poverty eradication. Investment in people is pivotal to the eradication of poverty and inequality. Investment in people is also, to a large extent, about delivering social and economic infrastructure for education, welfare, health, housing, as well as transport and bulk infrastructure.

In terms of per capita income, the Northern Cape Province has the third highest per capita income of all nine Provinces. However, income distribution is extremely skewed, with a high percentage of the population living in extreme poverty. The measure used in the PGDS document to measure poverty is the percentage of people living below the poverty line or breadline is used[41]. The poverty line indicates a lack of economic resources to meet basic food needs. Graph 15-1 indicates the percentage of household income below the poverty breadline of R800 in the Northern Cape Province, the highest being Karoo at 48% and the lowest being Namakwa at 36%.

Economic sectors

The Northern Cape economy has shown significant recovery since 2000/2001 when it had a negative economic growth rate of -1.5% (LED Strategy). The provincial economy reached a peak of 3.7% in 2003/2004 and remained the lowest of all provinces. The Northern Cape is the smallest contributing province to South Africa's economy (only 2% to South Africa GDP per region in 2007).

The mining sector is the largest contributor to the provincial GDP, contributing 28.9% to the GDP in 2002 and 27.6% in 2008. The mining sector is also important at a national level. In this regard the Northern Cape produces approximately 37% of South Africa's diamond output, 44% of its zinc, 70% of its silver, 84% of its iron-ore, 93% of its lead and 99% if its manganese.

Agriculture and agri-processing sector is also a key economic sector. Approximately 2% of the province is used for crop farming, mainly under irrigation in the Orange River Valley and Vaalharts Irrigation Scheme. Approximately 96% of the land is used for stock farming, including beef cattle and sheep or goats, as well as game farming. The agricultural sector contributed 5.8% to the Northern Cape GDP per region in 2007 which was approximately R1.3 billion, and it employs approximately 19.5% of the total formally employed individuals (NCSDF, 2012). The sector is experiencing significant growth in value-added activities, including game-farming. Food production and processing for the local and export market is also growing significantly.

The main agricultural produce of the Northern Cape include:

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

[41] In terms of the poverty line, a person is considered poor if his or her consumption or income level falls below some minimum level necessary to meet basic needs. The minimum level is usually called the poverty line. In South Africa the poverty income level is set at R800/month.

- High-value horticultural products such as table grapes, sultanas and wine grapes, dates, nuts, cotton, fodder, and cereal crops are grown along the Orange River.
- Wheat, fruit, groundnuts, maize and cotton in the Vaalharts irrigation scheme in the vicinity of Hartswater and Jan Kempdorp.
- Vegetables and cereal crops at the confluence of the Vaal River and the Orange Rivers in the vicinity of Douglas.
- Wool, mohair, karakul, Karoo lamb, ostrich meat and leather, and venison throughout most of the province.

Economic development in the Northern Cape is hampered by the vastness of the area and the remoteness of its communities in rural areas. Development is also hampered by the low education and skills levels in the province. As a result unemployment in the Northern Cape presents a major challenge.

Employment

According to Statistics South Africa Labour (2012) the community and social services sector is the largest employer in the province at 29%, followed by the agricultural sector (16%), wholesale and retail trade (14%), finance (8%) manufacturing (6%) and mining (6%) etc.

15.3.2.2 Pixley Ka Seme Municipality and Ubuntu Municipality

Demographic Overview

As indicated in Table 15:1 the population of the PKSDM increased by from 166 547 in 2001 to 186 351 in 2011, which represents an increase of ~ 12%. The population of the ULM increased from 23 641 in 2001 to 28 376 in 2011 (~ 20%) over the same period. This represents an average annual increase of ~ 1.12% and 1.83% for the PKSDM and ULM respectively. The increase in the population in the PKSDM and ULM was linked to an increase in the 15-64 and 65 and older age groups. This is likely to reflect a situation where the majority of job seekers in the 15-64 age group are single males who have not settled down and started a family and increase in retirees settling in the area. In terms numbers, 87% of the ULM population is urbanised. The relatively higher increase in the population in the towns was due to farm workers moving to the towns. As expected, the number of households in both the PKSDM and ULM increased between 2001 and 2011. The size of the household sizes in both areas decreased marginally, namely from ~ 3.8-9 to 3.7-3.5.

The majority of the population is in the ULM was Black African (62.6%), followed by Coloured (30.6%) and Whites (5.7%) (Census, 2011). The dominant language within the Municipality is isiXhosa (~54.2%), followed by Afrikaans (~37.9%), Sesotho (1.9%) and English (~1.8%) (Census 2011). The ULM accounts for ~ 14% of the total population of the PKSDM. Colesburg, the largest town in the ULM, has a population of approximately 13 000. A negative growth rate is forecast for the rural population due to emigration. Therefore the statistics reveal the rapid migration to towns within the Municipality.

Table 15.1: Overview of Key Demographic Indicators for the PKSDM and ULM (Source: Compiled from StatsSA Census 2011 Municipal Fact Sheet).

	PKSDM		**ULM**	
ASPECT	**2001**	**2011**	**2001**	**2011**
Population	166 547	186 351	23 641	28 376
% Population <15 years	32.6	31.6	33.7	31.4
% Population 15-64	61.5	62.4	61.0	62.8
% Population 65+	5.9	6.1	5.3	5.8

Households	41 707	49 193	5 848	7 841
Household size (average)	3.8	3.7	3.9	3.5
Formal Dwellings %	84.7%	86.3%	81.8%	88.2%
Dependency ratio per 100 (15-64)	62.7	60.4	63.8	59.3
Unemployment rate (official) - % of economically active population	36.4%	28.3%	51.9%	33.0%
Youth unemployment rate (official) - % of economically active population 15-34	44.1%	35.4%	60.8%	40.4%
No schooling - % of population 20+	27.1%	14.6%	27.9%	16.3%
Higher Education - % of population 20+	5.7%	6.1%	5.5%	6.3%
Matric - % of population 20+	12.9%	20.5%	13.1%	23.1%

The dependency ratio in both the PKSDM and ULM decreased from 62.7 to 60.4 and 63.8 to 59.3 respectively. The decrease represents a positive socio-economic improvement by indicating that there are a decreasing number of people dependent the economically active 15-64 age group. 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. However, the dependency ratios for the PKSDM and ULM were higher than the ratio for the Northern Cape as whole, which was 55.7 in 2011.

In terms of percentage of formal dwellings, the number of formal dwellings in the PKSDM increased from 84.7% in 2001 to 86.3% in 2011. In the ULM the number of formal dwellings increased from 81.8 to 88.2% for the same period. This represents a positive socio-economic benefit for both the PKSDM and ULM. However, despite the increase in formal dwelling the ULM IDP indicate that there is housing backlog of ~ 2 000 houses in the ULM, with the majority (1 200) of the backlog located in Noupoort.

Employment

The official unemployment rate in both the PKSDM and ULM decreased for the ten year period between 2001 and 2011. In the PKSDM the rate fell from 36.4% to 28.2%, a decrease of 8.2%. In the ULM the unemployment rate decreased from a significantly high level of 51.9% in 2001 to 33.0% in 2011, a decrease of nearly 19%. Despite the decreases the unemployment levels in the PKSDM and ULM are still higher than the Northern Cape average of 27.4%. This highlights the limited employment opportunities in the area, specifically in the ULM. Youth unemployment in both the PKSDM and ULM also dropped over the same period. Youth unemployment in the both the PKSDM and ULM is still high however (35.4% and 40.4% respectively).

Household income

Based on the data from the 2011 Census, 13.5% of the population of the ULM have no formal income, 4.5% earn between 1 and R 4 800, 6.3% earn between R 4801 and R 9600 per annum, 21.1% between R9601 and 19 600 per annum and 21.7% between R19 600 and R38 200 per annum (Census 2011). The poverty gap indicator produced by the World Bank Development Research Group measures poverty using information from household per capita income/consumption. This indicator illustrates the average shortfall of the total population from the poverty line. This measurement is used to reflect the intensity of poverty, which is based on living on less than R3 200 per month for an average sized household. Based on this measure 67.1% of the ULMs population live below the poverty line. The low-income levels reflect the reliance on the agricultural sector and limited formal

employment opportunities in the ULM. The low income levels are a major concern given that an increasing number of individuals and households are likely to be dependent on social grants. The low income levels also result in reduced spending in the local economy and less tax and rates revenue for the district and local municipality.

Education

The education levels at both the district and local municipal level also improved, with the percentage of the population over 20 years of age with no schooling in the PKSDM decreasing from 27.1% to 14.6%. For the ULM there was a significant decrease from 27.9% to 16.3%. The percentage of the population over the age of 20 with matric also increased in both the PKSDM and ULM, from 12.9% to 20.5% in the PKSDM and 13.1 % to 23.1% in the ULM. However, despite this increase the figure for the PKSDM and ULM are still below the national (28.4%) level in 2011.

Municipal Services

As indicated in Table 15.2 the municipal service levels, with the exception of weekly access to refuse removal in the ULM, in the PKSDM and ULM all improved over the period 2001 to 2011. This represents a socio-economic improvement. The service levels in the PKSDM and ULM are, with the exception of households in the ULM that have piped water inside the dwelling and households that use electricity in the PKSDM, all higher than the provincial averages for the Northern Cape Province.

Table 15.2: Overview of access to Basic Services in the PKSDM and ULM (Source: Compiled from StatsSA Census 2011 Municipal Fact Sheet)

Municipal Services	**PKSDM**		**ULM**	
	2001	**2011**	**2001**	**2011**
% households with access to flush toilet	45.4	65.7	48.3	68.7
% households with weekly municipal refuse removal	67.8	72.6	76.6	76.3
% households with piped water inside dwelling	32.8	47.0	21.3	45.1
% households which uses electricity for lighting	75.1	85.1	80.6	86.7

Education

There are 8 primary schools and 6 secondary schools in the ULM. The IDP notes that while the actual number of schools is generally satisfactory there is an acute shortage in the remote rural areas of the Municipality. As a result children often have to walk long walking distances to access the available schools.

The key issues listed in the IDP include:

- Insufficient and accessibility to education facilities;
- Availability of qualified staff and quality of education facilities; and
- Education Facilities Umsobomvu Municipality (2013).

Health

The IDP indicates that there are 7 health facilities in the ULM. This total includes a hospital and clinic in Noupoort. The key issues identified include:

- Insufficient health facilities;
- Lack of public transport services for patients;
- Availability of medical staff;

- Lack of aftercare facilitates and support services to patients;
- Lack of 24 hour health services and emergency services;
- Lack of hospice for aged and terminal ill; and
- Support of AIDs/HIV patients.

Safety and security

The IDP indicates that there are 4 police stations in the ULM, one of which is located in Noupoort. There is also a Magistrates Court in Noupoort. Even though the crime rate in the region is low if compared to other areas in South Africa, some issues were raised regarding the safety and securities. These include:

- Police need to be more visible;
- Police stations are not accessible to greater community- Lowryville, Eurekaville, Kwazamuxolo;
- Shortage of police resources;
- Not enough police stations;
- Shortage of human resources;
- High level of unemployment; and
- Youth delinquency.

15.4 Preliminary Assessment

15.4.1 Construction Phase Social Impacts

15.4.1.1 Potential positive impacts

Based on the findings of the SIAs undertaken for other WEFs the potential positive social impacts are likely to include:

- Creation of employment and business opportunities, and opportunity for skills development and on-site training;
- Benefits associated with providing technical advice on wind energy to local farmers and municipalities; and
- Potential for providing improved cell phone reception.

The tables provided below reflect a preliminary assessment of impacts. A detailed assessment will be undertaken for the EIA Phase.

Impact Phase: Construction							
Potential impact description: Creation of employment and business opportunities.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	M	L	M	Positive	M	M	H
With Mitigation	H	L	H	Positive	M-H	H	H

Impact Phase: Construction							
Potential impact description: Potential benefit for local farmers and municipalities associated with providing advice on installation of small-scale wind energy technology to supplement their energy needs.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	N/A	N/A	N/A	N/A	Neutral	N/A	N/A
With Mitigation	M	M	L	Positive	L	H	M

Impact Phase: Construction							
Potential impact description: Potential benefit for local farmers in terms of improving security on the farms in the area and also enabling local farmers to contact doctors etc. in the event of emergencies.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	N/A	N/A	N/A	N/A	Neutral	N/A	N/A
With Mitigation	M	M	L	Positive	L	H	M

15.4.1.2 Potential Negative Impacts

Based on the findings of the SIAs undertaken for other WEFs the potential negative social impacts are likely to include:

- Impacts associated with the presence of construction workers on local communities;
- Impacts related to the potential influx of job-seekers;
- Increased risks to livestock and farming infrastructure associated with the construction related activities and presence of construction workers on the site;
- Increased risk of grass fires associated with construction related activities;
- Noise, dust, waste and safety impacts of construction related activities and vehicles;
- Impact on productive farmland;
- Impact on tourism.

Impact Phase: Construction							
Potential impact description: Potential impacts on family structures and social networks associated with the presence of construction workers.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	M	L	M	Negative	M	M	H
With Mitigation	M	L	L	Negative	L	M	H

Impact Phase: Construction							
Potential impact description: Potential impacts on family structures, social networks and community services associated with the influx of job seekers.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation/ Enhancement	M	L	L	Negative	L	M	M
With Mitigation/ Enhancement	M	L	L	Negative	L	M	M

Impact Phase: Construction							
Potential impact description: Potential risk to safety of farmers and farm workers, livestock and damage to farm infrastructure associated with the movement of construction workers on and to the site.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	M	L	M	Negative	M	M	H
With Mitigation	M	L	L	Negative	L	M	H

Impact Phase: Construction							
Potential impact description: Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of grass fires.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	M	L	M	Negative	M	M	H
With Mitigation	M	L	L	Negative	L	M	H

Impact Phase: Construction							
Potential impact description: Potential dust and safety impacts and damage to road surfaces associated with movement of construction related traffic to and from the site.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	M	L	M	Negative	M	M	H
With Mitigation	M	L	L	Negative	L	M	H

Impact Phase: Construction							
Potential impact description: The activities associated with the construction phase, such as establishment of access roads and the construction camp, movement of heavy vehicles and preparation of foundations for the WEFs and power lines will damage farmlands and result in a loss of farmlands for grazing.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	M	L	L	Negative	L	M	H
With Mitigation	M	L	L	Negative	L	M	H

In summary, the findings of the SIAs undertaken for other WEFs indicate that the significance of the potential negative impacts associated with the Construction Phase with mitigation tend to be Low Negative. The majority of the potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented. In addition, if the majority of the low and semi-skilled construction workers can be sourced from the local area the potential risk posed by construction workers to local family structures and social networks can be effectively reduced.

15.4.2 Operational Phase Social Impacts

15.4.2.1 Potential Positive Impacts

Based on the findings of the SIAs undertaken for other WEFs the potential positive social impacts are likely to include:

- Creation of employment and business opportunities and support for local economic development;
- Benefits associated with the establishment of a Community Trust; and
- The establishment of renewable energy infrastructure.

Impact Phase: Operational							
Potential impact description: Creation of employment and business opportunities associated with the operational phase.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	M	M	L	Positive	L	M	H

With Mitigation	M	M	M	Positive	M	H	H

Impact Phase: Operational							
Potential impact description: Establishment of a community trust funded by revenue generated from the sale of energy. The revenue can be used to fund local community development.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	M	H	M	Positive	M	M	H
With Mitigation[42]	M	H	H	Positive	H	H	H

Impact Phase: Operational							
Potential impact description: Promotion of clean, renewable energy							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation[43]	H	H	L	Positive	M	H	H
With Mitigation	H	H	H	Positive	M	H	H

15.4.2.2 Potential Negative Impacts

Based on the findings of the SIAs undertaken for other WEFs the potential negative social impacts are likely to include:

- The visual impacts and associated impact on sense of place; and
- Potential impact on tourism.

Impact Phase: Operational							
Potential impact description: Visual impact associated with the proposed WEF and the potential impact on the areas rural sense of place.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	M	M	H	Negative	H	M	M
With Mitigation	M	M	M	Negative	M	M	M

The potential visual impact on the area's sense of place is frequently raised as a key issue. The specialist's experience with this issue is that a number of people have also commented positively on a number of wind energy facilities that have been established in the last 12-24 months, such as the facilities located near Vredenburg, Caledon and Humansdorp in the Western and Eastern Cape respectively. All of these facilities are clearly visible from the roads in the area, including the N2 in the case of Caledon and Humansdorp. Some observers have however commented that the turbines have a negative impact on the visual quality of the landscape. The visual impact and the significance thereof associated WEF on the areas sense of place is therefore likely to vary from individual to individual.

[42] Assumes effective management of Community Trust.
[43] Assumes that the proposed WEF will not be established.

Impact Phase: Operational							
Potential impact description: Potential impact of the WEF on local tourism.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	M	M	L	Negative	L	M	H
With Mitigation	M	M	L	Negative	L	M	H

The proposed WEF may also attract visitors to the area. The significance of this positive impact is also likely to be minor.

15.4.3 Assessment of Powerlines

The visual impacts associated with the proposed power line routes typically tend to be lower than the visual impacts associated with the wind turbines. The social impacts associated with the proposed power lines are therefore unlikely to have a material bearing in the final decision regarding the proposed WEF. The significance with careful route selection is therefore likely to be low negative. This will however be confirmed during the assessment phase and will depend on the location of the lines relative to potentially sensitive social receptors, such as farm houses etc.

Impact Phase: Operational							
Potential impact description: Potential visual impact and impact on sense of place associated with power lines.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	M	M	M	Negative	M	M	M
With Mitigation	M	M	L	Negative	L	M	M

15.4.4 Assessment of Decommissioning Phase

Typically, the major social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income. This has implications for the households who are directly affected, the communities within which they live, and the relevant local authorities. However, in the case of WEFs the total number of permanent jobs associated with the operational phase is in the region of 20-30. Given the relatively low number of people employed during the operational phase the decommissioning of the facility is unlikely to have a significant negative social impact on the local community. The potential impacts associated with the decommissioning phase can also be effectively managed with the implementation of a retrenchment and downscaling programme.

Impact Phase: Decommissioning							
Potential impact description: Social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	M	M	M	Negative	M	M	H
With Mitigation	M	L	L	Negative	L	M	H

15.4.5 Potential Health Impacts

The potential health impacts typically associated with WEFs include, noise, shadow flicker and electromagnetic radiation. The findings of a literature review undertaken by the

Australian Health and Medical Research Council published in July 2010 indicate that there is no evidence of wind farms posing a threat to human health. The research also found that wind energy is associated with fewer health effects than other forms of traditional energy generation, and may therefore in fact result in the minimization of adverse health impacts for the population as a whole. Based on these findings the significance of the potential health risks posed by the proposed WEF is likely to be of low significance.

15.4.6 Cumulative Impacts

15.4.6.1 Cumulative Impact on Sense of Place

The Australian Wind Farm Development Guidelines (Draft, July 2010) indicate that the cumulative impact of multiple wind farm facilities is likely to become an increasingly important issue for wind farm developments in Australia. The key concerns in terms of cumulative impacts are linked to visual impacts and the impact on rural, undeveloped landscapes.

The Scottish Natural Heritage (2005) describes a range of potential cumulative landscape impacts associated with wind farms on landscapes. The relevant issues raised by the Scottish Natural Heritage Report include:

- Combined visibility (whether two or more wind farms will be visible from one location).
- Sequential visibility (e.g. the effect of seeing two or more wind farms along a single journey, e.g. road or walking trail).
- The visual compatibility of different wind farms in the same vicinity.
- Perceived or actual change in land use across a character type or region.
- Loss of a characteristic element (e.g. viewing type or feature) across a character type caused by developments across that character type.

The guidelines also note that cumulative impacts need to be considered in relation to dynamic as well as static viewpoints. The experience of driving along a tourist road, for example, needs to be considered as a dynamic sequence of views and visual impacts, not just as the cumulative impact of several developments on one location. The viewer may only see one wind farm at a time, but if each successive stretch of the road is dominated by views of a wind farm, then that can be argued to be a cumulative visual impact (National Wind Farm Development Guidelines, DRAFT - July 2010).

Research on wind farms highlights the visual and cumulative impacts on landscape character. The paper notes that given that aesthetic perceptions are a key determinant of people's attitudes, and that these perceptions are subjective, deeply felt and diametrically contrasting, it is not hard to understand why the arguments become so heated. Because landscapes are often an important part of people's sense of place, identity and heritage, perceived threats to familiar vistas have been fiercely resisted for centuries. The paper also identifies two factors that are important in shaping people's perceptions of wind farms' landscape impacts. The first of these is the cumulative impact of increasing numbers of wind farms. The research found that if people regard a region as having 'enough' wind farms already, then they may oppose new proposals. The second factor is the cultural context. This relates to people's perception and relationship with the landscape. In the South African context, many South Africans have a strong connection with and affinity for the large, undisturbed open spaces that are characteristic of the South African landscape.

The significance of the potential cumulative impact will be assessed in more detail during the assessment phase and will also be informed by the findings of the Visual Impact Assessment (VIA).

Impact Phase: Cumulative							
Potential impact description: Cumulative visual impact associated with the establishment of a WEF on the on the areas rural sense of place and character of the landscape.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	H	H	M	Negative	H	M	M
With Mitigation	M	M	M	Negative	M	M	M

15.4.6.2 Cumulative Impact on Local Services and Accommodation

The establishment of the proposed Phezukomoya WEF and the other renewable energy facilities in the area will place pressure on local services, specifically medical, education, safety and security and accommodation. This pressure will be associated with the influx of workers to the area associated with the construction and operational phases of renewable energy projects proposed in the area. The presence of non-local workers during both the construction and operation phase will also place pressure on property prices and rentals. As a result, local residents, such as government officials, such as municipal workers, school teachers, and the police, may no longer be able to buy or afford to rent accommodation in Noupoort and Colesburg. This issue will be assessed in detail as part of the assessment phase.

Impact Phase: Cumulative							
Potential impact description: The establishment of a number of renewable energy facilities in the ULM will place pressure on local services, specifically medical, education and accommodation.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	M	M	M	Negative	M	M	M
With Mitigation	M	M	M	Negative	L	M	M

15.4.6.3 Cumulative Impact on Local Economy

In addition to the potential negative impacts, the establishment of the proposed WEF and other renewable energy projects in the area has the potential to result in significant positive cumulative socio-economic opportunities for the region, which, in turn, will result in a positive social benefit. These include creation of employment and business opportunities. The Community Trusts associated with each project will also create significant socio-economic benefits for the ULM. However, in order to maximise the benefits these trusts will need to be properly managed.

Impact Phase: Cumulative							
Potential impact description: The establishment of a number of renewable energy facilities in the region will create employment, skills development and training opportunities, creation of downstream business opportunities.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	M	H	M	Positive	M	M	H
With Mitigation	H	H	M	Positive	H	M	H

15.4.6.4 Assessment of No-Development Option

South Africa currently relies on coal-powered energy to meet more than 90% of its energy needs. As a result, South Africa is one of the highest per capita producers of carbon emissions in the world and Eskom, as an energy utility, has been identified as the world's second largest producer carbon emissions. The no-development option would represent a lost opportunity for South Africa to supplement is current energy needs with clean, renewable energy. Given South Africa's position as one of the highest per capita producer of carbon emissions in the world, this would represent a negative social cost. However, at a provincial and national level, it should be noted that the proposed WEF development is not unique. In this regard, a significant number of other renewable energy developments are currently proposed in the Northern Cape and other parts of South Africa. Foregoing the proposed establishment of the WEF would therefore not necessarily compromise the development of renewable energy facilities in the Northern Cape Province and or South Africa. However, the socio-economic benefits for local communities Noupoort and the ULM would be forfeited.

Impact Phase: All Phases							
Potential impact description: The no-development option would result in the lost opportunity for South Africa to supplement is current energy needs with clean, renewable energy and a lost opportunity for the town of Noupoort and the ULM.							
	Extent	**Duration**	**Intensity**	**Status**	**Significance**	**Probability**	**Confidence**
Without Mitigation	M	H	L	Negative	M	M	H
With Mitigation[44]	H	H	M	Positive	H	M	H

15.5 Summary

While it is not traditionally the function of the scoping level study to attach significance ratings and weigh up the overall impact, based on the findings of the SIAs undertaken by the specialist for other WEFs, the potential positive social impacts, including the creation of employment and business opportunities during both the construction and operational phase, the establishment of a Community Trust and the generation of renewable energy, are likely to outweigh the potential negative social impacts. This finding is also likely to apply to the proposed Phezukomoya WEF.

In addition, the majority of the potential negative impacts associated with the construction and operational phase are likely to be rated as Low Negative with mitigation. The majority of potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented.

[44] Assumes establishment of a Community Trust that is well managed.

16 PUBLIC PARTICIPATION

Throughout this process, stakeholders have been and will be encouraged to communicate with the PPP team to raise issues, ask questions or make suggestions. Registration of I&APs will continue throughout the process as well.

16.1 Key Stakeholders

At this stage of the process, a number of key stakeholders have been identified and included on the project database. These key stakeholders include (but are not limited to) the following:

- Ratepayers' associations;
- Local farmers' associations;
- Local tourism organisations covering this part of the Karoo.
- CapeNature;
- ESKOM;
- Northern Cape Department of Environmental Affairs and Nature Conservation (DENC);
- South African Bat Assessment Advisory Panel (SABAAP);
- National and Provincial Department of Water Affairs;
- Local bird clubs or interested bird watchers;
- BirdlifeSA;
- Department of Mineral Resources;
- National and Provincial Department of Agriculture, Forestry and Fisheries (DAFF);
- South African Heritage Resources Agency (SAHRA);
- South African National Roads Agency (SANRAL)
- South African Weather Service;
- Sentech (state owned enterprise operating in the broadcasting signal distribution and telecommunications sectors);
- Department of Communications; and
- Air Traffic and Navigation Services SOC Limited (ATNS).

Additional relevant stakeholders will be identified during the PPP. Refer to Appendix B which includes a copy of the latest I&AP database and a telephonic record of ongoing attempts to contact more stakeholders.

16.2 Tasks undertaken thus far

- Placing notification advertisements of the proposed project in one local (*The Advertiser*) and one regional newspapers (*The Herald*) on 22 April and 29 April 2016– in English and Afrikaans. Refer to Appendix B for copies of the advertisements.
- Placement of five A3 posters (in English and Afrikaans) in public areas in the town of Noupoort. Refer to Appendix B for photographs of these posters, and a map indicating the location of where the posters were placed.
- Placement of five A1 posters (in Afrikaans and English) on the boundaries of the WEF and grid connection sites. Refer to Appendix B for photographs of these posters.
- Distribution of the initial notification letters, the Background Information Document (BID) (in English and Afrikaans) and comment sheets to surrounding landowners, occupiers of the site and surrounds, the municipal councillors of the areas and relevant organs of state on 11 May 2016. Refer to Appendix B for copies of the notification letters and the BIDs.

Public Review of the Draft Scoping Report will take place from **the 22 August 2017 to 20 September July 2017** in the Noupoort Public Library, and on the Arcus company website.

16.3 Synopsis of Key Issues

Comments received from the public during the review of the Draft Scoping Report will be collated into an Issues Trail (Issues and Responses Report), which will document the issues raised and provide project team responses to the comments received. The Issues Trail is reflected as Appendix B. The original comments are included in Appendix B. A summary of issues raised thus far are reflected in Table 16.1 below.

The issues raised will be investigated, assessed and addressed in the EIA Phase of the proposal. Refer to the Issues Trail for the project team responses to the comments received (Appendix B).

Table 16.1: Summary of Issues Raised and Project Team Responses

I&AP	Comment	Respondent	Response
Stefan Cramer SAFCEI Science advisor 29/04/2016	Request for documentation of the work done so far.	EAP	Sent BID, and notified that the draft scoping report would be made available to the public soon.
Thandeka Nohoyeka Transnet Chief property technician Geospatial: central region 03/05/2016	Request for locality maps to determine how far/near the project will be from Transnet land in the Eastern Cape.	EAP	Replied and Sent Locality Maps
Jacoline Mans Designation: Chief Forester (NFARegulation) Directorate: Forestry Management (Other Regions) Northern Cape Department of Agriculture, Forestry and Fisheries 04/05/2016	1. The 2 X 140 MW proposed Wind Energy Facilities (WEF), Phezukomoya and San Kraal, are located approximately 62km south of Colesberg and 8km South East of Noupoort in the Northern Cape, bordering the Eastern Cape. The impacts on NFA listed protected trees should be assessed (if any) and avoided as far as possible. Where impacts cannot be avoided, the developer must apply for and obtain a valid Forest Act License prior to disturbance of protected trees. The Forest Act License application must be submitted to the DAFF after obtaining a positive Environmental Authorisation and Preferred Bidder Status, but at least 3 months prior to construction to allow sufficient time for processing of the license. 2. The proposed developments may also need a Flora Permit from the Provincial Department of Environment and Nature Conservation (DENC) for destruction of common indigenous, protected or specially protected plant species under the Northern Cape Nature Conservation *Act,* Act 9 of 2009 (NCNCA). Also assess potential impacts TOPS or CITES listed plant species. 3. Please send a hard copy of Environment Impact Assessment reports to this office for comments. Alternately send an electronic copy.	EAP	Acknowledged receipt of comments provided, notified them they will receive Copies of the Reports, and be kept Informed on project updates.
Nicole Abrahams	Request for Locality map of both projects	EAP	Sent Locality Maps

I&AP	Comment	Respondent	Response
SANRAL (western region) 26/04/2016			
Siphiwe Phakathi Professional Town and Regional Planner Environmental Planning Services Department of Rural Development and Land Reform 10/05/2016	In order to comment on the above mentioned projects, the Department would need to know the exact locations (the actual farm portions). Please urgently provide.	EAP	Sent Background Information Document for the two proposed Wind Energy facilities, sent KML of both projects and landowner farm portions. Additionally, Sent KML files, highlighting the Site Boundaries and exact locations of the two projects.
Leonard S Shaw Specialist : Network Transformation and Planning 05/05/2016	Dear applicant, For Telkom to determine if we are an affected party we need the area of the study area. Please note that no Figure 1 is present in either of the submitted document. To enable us to reply promptly can you supply and electronic file (e.g KML polygon) of the study area.	EAP	Sent Background Information Document for the two proposed Wind Energy facilities: Additionally, Sent KML files, highlighting the Site Boundaries and exact locations of the two projects.
Lizell Stroh SA Civil Aviation Authority Obstacle Specialist PANS-OPS (Procedures for Air navigation Services – Aircraft Operations) Air Navigation Services 05/05/2016	Good day I don't find the two mentioned wind farms on our database could you please indicate to the client to get a wind farm application in as soon as possible. • Kindly provide a .kml (Google Earth) file reflecting the footprint of the proposed development site including the proposed overhead electric power line route that will evacuate the generated power to the national grid. • Also indicate the highest structure of the project & the overhead electric power transmission line.	EAP	Sent BID's and KML's Notified that the project is in scoping phase and as soon as more information is available she will be updated. Attachments were saved and noted.
Leonard S Shaw Specialist : Network Transformation and Planning 11/05/2016	The San Kraal site is clear I have attached a file with the radio links for your reference. Please check that turbines clear radio links by 300m.	EAP / InnoWind	Replied- Comment noted, and file saved. The request for clearance will be adhered to during design of layout phase.
Ms Rene de Kock SANRAL- statutory control	SANRAL confirmed receipt of BID asked to be provided with locality plan indicating the site in relation to the national road. If access is required from the N9 the owner must apply for written permission from SANRAL.	EAP / InnoWind	Replied- locality maps sent, comments and requirements noted and will be passed on tom client. I&AP will be notified during the course of the EIA process of any changes/developments.

I&AP	Comment	Respondent	Response
16/05/2016			
John Geeringh Senior consultant Environmental Management ESKOM 13/05/2016	ESKOM- attached requirements for works near Eskom infrastructure. Request for KMZ files of the proposed developments, land portions and substations, line routes and turbine layouts.	EAP / Innowind	Replied- comments and requirements noted, and will be passed on to the client. Informed that the project is in Scoping phase, therefore layout plans not available yet, but will be informed as the EIA process progresses.
Natasha Higgitt Heritage Officer: Archaeology, Paleontology and Meteorites Unit South African Heritage Resources Agency (SAHRA) 12/05/2016	Thank you for notifying SAHRA of the Proposed Developments. Please note that SAHRA does not accept hardcopy, emailed or posted submissions. Please ensure that an application is created on the South African Heritage Resources Information System (SAHRIS) and all documents are uploaded to the case file. Please follow the step-by-step tutorial videos on the SAHRIS homepage (http://sahra.org.za/sahris/). Please inform me when this has been completed and I will process the case. Please note that SAHRA has a 21 working day turnaround time, so please ensure that documents are submitted to us within the relevant review periods to ensure that all comments are received within your project time frames.	Arcus	Thank-you for your comments provided. As an identified I&AP you will be notified when the Draft Environmental Impact Assessment Reports are finalised these will be uploaded onto SAHRIS, and Natasha Higgitt will be notified.
Ms Rene de Kock SANRAL- statutory control 24/05/2016	Thank-you for your email dated 16 May 2016: The South African National Roads Agency SOC Limited (SANRAL) has the following comments: 1.) If abnormal loads have to be transported by road to the site, a permit needs to be obtained from the provincial government Northern Cape (PGNC) 2.) For safety reasons, SANRAL requires turbines to be located not less than 1.5X the turbine height, inclusive of the blade tip height from the road reserve fence. 3.) Access from the national road to the site will be taken from existing roads, which could be either gravel farm roads or public roads. 4.) SANRAL requires detail plans for approval of any alteration or upgrading measures that will be required at an access-intersection with the N9 & N10 national roads. The plans must be produced by an ECSA registered consulting engineer. All costs associated with any alteration or upgrading measures will be for the applicant's account.	Arcus/ Innowind	Thank-you for your comments provided, which have been noted and passed onto the client. These Requests will be incorporated into the EIA and BA processes. As an I&AP you will be kept informed of the project progress which is currently in the scoping phase.

I&AP	Comment	Respondent	Response
Karoo News Group Anonymous Party 01/06/2016	Please register the Karoo News Group as a I &AP for both WEF and supporting grid infrastructure applications Please advise where the information is available as it is not on Arcus website Please confirm who the applicant is and that these are 2 separate EIA applications	Arcus	Thank-you for your enquiry, you have been added to the I&AP database as requested and will therefore receive updates regarding the two proposed projects. We are currently finalising the draft scoping reports, as soon as these are complete and open to public review you will be notified. The two proposed Wind Energy Facilities (WEFs) are separate projects with a shared public participation process. The applicant is InnoWind (Pty) Ltd. I have attached the Background Information Documents for both San Kraal WEF and Phezukomoya WEF, these are also available in Afrikaans upon request.
Karoo News Group Anonymous Party 21/07/2016	Dear 'Sandkraal' (No contact person has been mentioned in this email?) -Please confirm that there will be a cumulative impact assessment undertaken which considers both WEF applications and their impacts as well as all other energy projects and applications that will have an impact on this area? -Please confirm that Van Rooyen will undertake a cumulative impacts assessment for all priority Avian species con sidering all impacts as per NEMA requirements -Please confirm the heritage impacts assessment will consider the cumulative impact on the Karoo's sense of place at this site -Please also be advised that the site lies on a very important Interval on the Southern Great Escarpment and that the Scoping needs to consider this context. -Please advise who is the EAP as it is not in the BID document Sincerely KNG	Arcus	Thank you for your email received on 21st July 2016 . Please supply us with the name and contact details of a representative of your group so that the group's registration may be completed on the Interested and Affected Party database. In response to your query, the following can be confirmed: • A cumulative impact assessment will be undertaken which considers both WEF applications and their impacts as well as any other energy projects in the area; • The bird specialist will undertake a cumulative impacts assessment for all priority Avian species as per the NEMA requirements; • Both the heritage and visual impact assessments will consider the cumulative impact on the Karoo's sense of place. These reports will take the location of the sites on the Southern Great Escarpment into consideration. • The EAP is Ashlin Bodasing, SA Team Leader of Arcus Consulting. As a registered I&AP, you will be kept up to date with the progress of these proposals. Please do not hesitate to contact us should you have any further queries or concerns.
Karoo News Group Anonymous Party 01/08/2016	You have already registered the Karoo News Group – see email below *"Thank-you for your enquiry, you have been added to the I&AP database as requested and will therefore receive updates regarding the two proposed projects."* Please provide a list of 'other projects in the area that will be included in the various cumulative impact assessments	Arcus	Thank you for your e-mail received 01 August 2016 regarding the proposed San Kraal and Phezukomoya Wind Energy Facilities. The Draft Scoping Report for each project will detail all other projects that will be included in the cumulative assessment. You will be notified as soon as the Draft Scoping Report becomes available for you to review and comment on.

I&AP	Comment	Respondent	Response
	The bird specialsist will need to do a cumulative impacts assessment that takes in all likely and existing impacts. Please provide detail We would like the avaina consultant also to use the Southern Great Escarpments in its context for migrating birds as well as semigrating birds species There has also been a request for a study on the negative impacts on property value in the area outside of the site. The EAP is aware of the negative impacts as she was the EAP in another Karoo site Sincerely KNG		Details of the avifaunal assessments will also be given in the Draft Scoping Report. The avifaunal specialist will take the location of the site on the Southern Greta Escarpment and migrating species into consideration. The issue of property values will be addressed in the EIA Phase of the project. As a registered I&AP, you will be kept up to date with the progress of these proposals. Please do not hesitate to contact us should you have any further queries or concerns.
Karoo News Group Anonymous Party **31/08/2016**	Dear Arcus Yes you already have mentioned that you will be a doing a cumulative impact assessment for all relevant studies for your 2 projects however you are missing the point. What is required and is quite clear in the agreements is that a spatial cumulative impact assessment for priority species is a requirement This would mean that 1. all renewable energy developments in the Noupoort area need to be considered 2. cumulative impacts assessments are required that assess all renewable energy impacts on the Great Escarpment Please confirm that the above will be assessed Sincerely KNG		Thank you for your comment which has been forwarded to the avifaunal specialist for his consideration in the EIA process. Your comment has also been included in the Issues & Response Trail and will be included in the Scoping Report.

17 SUMMARY OF FINDINGS

The DSR has provided a description of the proposed Phezukomoya WEF, and alternatives. It has also discussed the need and desirability of the proposed project. The DSR has documented the environmental and planning context for the proposed WEF, the WEF site's baseline environment and it has provided preliminary specialist assessments for the following areas of study:

- Geology, Soils and Agricultural Potential;
- Flora and Fauna (Terrestrial Ecology);
- Avifauna;
- Bats;
- Freshwater and Wetlands;
- Cultural Heritage, Archaeology and Palaeontology;
- Noise;
- Landscape and Visual; and
- Socio-economy.

The specialist reports document the assessment of preliminary environmental impacts that may be experienced within the realms of both the biophysical and social environments. All specialist reports are included in Volume 2 of this report.

This section summarizes the Scoping Phase by providing an evaluation of the preliminary environmental impacts of this proposal. In doing so, it draws on the information gathered as part of the process, and the knowledge gained by the environmental assessment practitioners whilst undertaking the EIA.

17.1 Preliminary Significance Assessment

Table 17.1 summarises the social and biophysical impacts identified in terms of their degrees of significance, both before and after mitigation. Note that the assessed significance of these impacts may change during the Impact Assessment Phase, as more detail regarding the proposed WEF, their design and layout, becomes available.

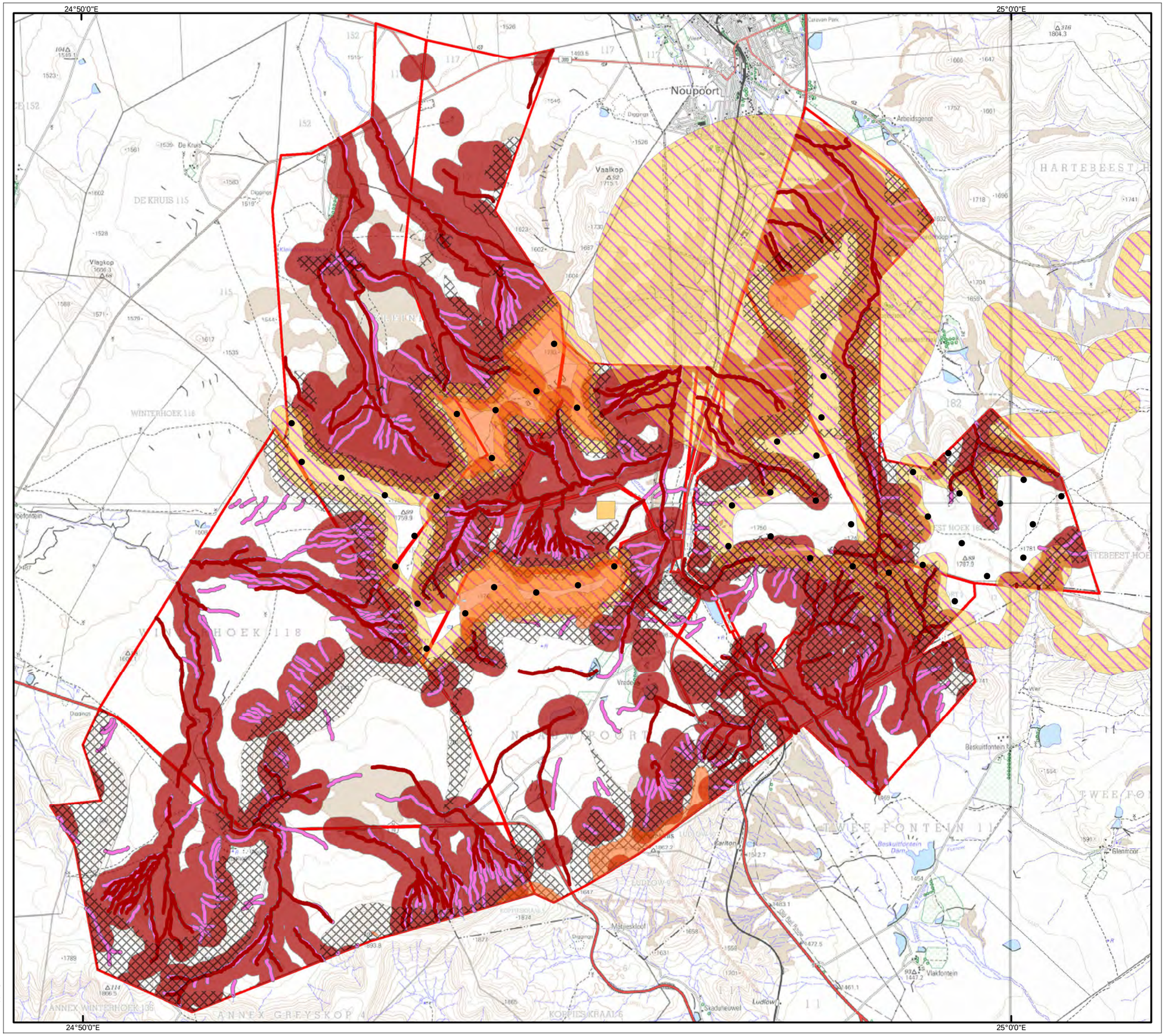
Table 17.1: Summary of Scoping Phase Preliminary Impacts

Section	Discipline	Impact	Significance Before Mitigation	Significance after Mitigation
7.4.4	Soils	Loss of agricultural land.	M -	M -
7.4.4	Soils	Increased soil erosion hazard	M -	M neutral
8.3.4	Flora & Fauna	Impact on vegetation and listed plant species	H	M -
8.3.4	Flora & Fauna	Direct faunal impacts – Construction Phase	M-	M -
8.3.4	Flora & Fauna	Direct faunal impacts – Operational Phase	M -	M -
8.3.4	Flora & Fauna	Soil erosion risk following construction	H -	M -
8.3.4	Flora & Fauna	Alien plant invasion risk	M -	M -
8.3.4	Flora & Fauna	Cumulative impact on Critical Biodiversity Areas and broad-scaled ecological processes	H -	M -
9.4.4	Avifauna	Construction - Displacement of priority species due to construction activities at the wind development area.	M -	M -
9.4.4	Avifauna	Construction - Displacement of priority species due to construction activities	M -	L -

Section	Discipline	Impact	Significance Before Mitigation	Significance after Mitigation
		associated with the grid connection powerline.		
9.4.4	Avifauna	Operation - Displacement of priority species due to habitat destruction at the wind development site	M -	L -
9.4.4	Avifauna	Operation - Direct mortality of priority species due to collisions with the turbines at the wind development area.	H -	M -
9.4.4	Avifauna	Operation - Direct mortality of priority species due to collisions with the grid connection powerline at the wind development area.	H -	M -
9.4.4	Avifauna	Closure - Displacement of priority species due to dismantling activities at the wind development area	M -	M -
9.4.4	Avifauna	Closure - Displacement of priority species due to dismantling of the powerline.	M -	L -
10.4	Bats	Destruction of bat roosts due to earthworks and blasting	M -	L -
10.4	Bats	Loss of foraging habitat	M -	L -
10.4	Bats	Bat mortalities due to direct blade impact or barotrauma during foraging	H -	M –
10.4	Bats	Cumulative impact of bat mortalities due to direct blade impact or barotrauma	H -	M -
10.4	Bats	Artificial lighting	M -	L -
10.4	Bats	Loss of foraging habitat	M -	L -
11.3	Aquatic	Loss of riparian systems and water courses	M -	L -
11.3	Aquatic	Increase in surface water runoff from hard surfaces / new road crossings on riparian form and function	M -	L -
11.3	Aquatic	Increase in sedimentation and erosion within the development footprint	M -	L -
11.3	Aquatic	Impact on localized surface water quality	M -	L -
12.3.1	Noise	Construction (Day-time): Increase in sound levels at the dwellings of receptors during the day.	M -	L -
12.3.1	Noise	Construction (Night-time): Increase in sound levels at the dwellings of receptors during the night.	M -	L -
12.3.1	Noise	Operation (Night-time) Increase in sound levels at the dwellings of receptors at night.	M -	L -
13.4	Visual	Construction & decommission visual impact	M -	M -
13.4	Visual	Operation visual impact	M -	M -

Section	Discipline	Impact	Significance Before Mitigation	Significance after Mitigation
14.3	Heritage	Construction impacts on palaeontology, human-made and landscape aspects associated with development of the WEFs.	M -	M + or M -
14.3	Heritage	Operation impacts on palaeontology, human-made and landscape aspects associated with development of the WEFs.	H -	M -
15.4.1	Social	Construction: Creation of employment and business opportunities during the construction phase.	M +	H+
15.4.1	Social	Construction: Potential benefit for local farmers and municipalities associated with providing advice on installation of small-scale wind energy technology to supplement their energy needs.	Neutral	M+
15.4.1	Social	Construction: Potential benefit for local farmers in terms of improving security on the farms in the area and also enabling local farmers to contact doctors etc. in the event of emergencies.	Neutral	M+
15.4.1	Social	Potential impacts on family structures and social networks associated with the presence of construction workers.	M-	L-
15.4.1	Social	Potential impacts on family structures, social networks and community services associated with the influx of job seekers.	L-	L-
15.4.1	Social	Potential risk to safety of farmers and farm workers, livestock and damage to farm infrastructure associated with the movement of construction workers on and to the site.	M-	L-
15.4.1	Social	Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of grass fires.	M-	L-
15.4.1	Social	Potential dust and safety impacts and damage to road surfaces associated with movement of construction related traffic to and from the site.	M-	L-

Section	Discipline	Impact	Significance Before Mitigation	Significance after Mitigation
15.4.1	Social	The activities associated with the construction phase, such as establishment of access roads and the construction camp, movement of heavy vehicles and preparation of foundations for the WEFs and power lines will damage farmlands and result in a loss of farmlands for grazing.	M-	L-
15.4.2	Social	Operation: Creation of employment and business opportunities associated with the operational phase.	L+	M+
15.4.2	Social	Operation: Establishment of a community trust funded by revenue generated from the sale of energy. The revenue can be used to fund local community development.	H+	H+
15.4.2	Social	Operation: Promotion of clean, renewable energy.	M+	H+
15.4.2	Social	Operation: Visual impact associated with the proposed WEF and the potential impact on the areas rural sense of place.	M-	M-
15.4.2	Social	Operation: Potential impact of the WEF on local tourism.	L-	L-
15.4.2	Social	Operation: Potential visual impact and impact on sense of place associated with power lines.	M-	L-
15.4.4	Social	Decommissioning: Social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income.	M-	L-
15.4.6.1	Social	Cumulative visual impact associated with the establishment of a WEF on the on the areas rural sense of place and character of the landscape.	H-	M-
15.4.6.1	Social	Cumulative: The establishment of a number of renewable energy facilities in the ULM will place pressure on local services, specifically medical, education and accommodation.	M-	L-
15.4.6.1	Social	Cumulative: The establishment of a number of renewable energy facilities in the region will create employment, skills development and training opportunities, creation of	M+	H+



Basemapping from the Chief Directorate: National Geo-Spatial Information of South Africa

InnoWind

ARCUS

- Site Boundary
- Proposed Turbine Location
- High Visual Sensitivity
- High Ecological Sensitivity
- Drainage Buffer (No-Go)
- Phezukomoya Switching Station
- Avifaunal Constraint (No Turbine Area)
- 32 m Watercourse Buffer (No Go)
- High Bat Sensitivity (No-Go)

1:62,500 Scale @ A3

N

0 1 2 km

Produced: AT Reviewed: SC Approved: AB	Ref: 2245/REP/003 Date: 05/06/2017

Preliminary Environmental Sensitivity Map
Figure 17.1

Phezukomoya Wind Energy Facility
Draft Scoping Report

Section	Discipline	Impact	Significance Before Mitigation	Significance after Mitigation
		downstream business opportunities.		
15.4.6.4	Social	No-Go: The no-development option would result in the lost opportunity for South Africa to supplement is current energy needs with clean, renewable energy and a lost opportunity for the town of Noupooort and the ULM.	M-	H+

The following initial observations are made:

- At this preliminary scoping stage of the process, the majority of potential impacts of high or medium significance are mitigatable to a medium or low significance (Table 17.1).
- The SIA has found that the establishment of WEFs in this area is supported by national, provincial and local policies and planning documents.
- The public participation process has resulted in the collation of a number of issues, which are to be investigated, assessed and addressed in the EIA Phase.
- In terms of agricultural potential, the prevailing potential of the soils for rain-fed cultivation throughout most of the area is low to very low. The specialist notes that no further, more detailed investigation will be required for the EIA Phase.

17.2 Preliminary Environmental Sensitivity Map

A combined preliminary environmental constraints map was created using the specialists scoping phase findings (Figure 17.1). This map includes the initial proposed layout. Using this map a revised alternative layout is being created, taking all specialists recommendations into consideration. This revised turbine layout will be assessed as the preferred alternative in the EIA Phase.

17.3 Conclusion

Based on the preliminary assessment of impacts for the proposed development it can be concluded that at this stage of the process the project can proceed into the EIA phase. The specialist's assessments have identified areas of further investigation and these will be assessed in further detail during the EIA Phase, together with any additional impacts or concerns raised during the public participation process. A preliminary layout was produced and provided to specialists for consideration during the Scoping Phase. This layout will be revised during the EIA phase of the process to be informed by buffers and constraints provided by specialists (Figure 17.1). Any additional constraints and buffers recommended by the specialists during the EIA phase, will be taken into consideration and a final layout will be produced and submitted as part of the Final EIR.

Comments received from I&APs during the public participation comment period will be taken into consideration to inform the final scoping report and plan of study for EIA.

18 PLAN OF STUDY FOR EIA PHASE

Tasks for the EIA Phase will be undertaken in accordance the 2014 EIA Regulations, and in particular, Appendices 3 and 4 of R. 982 and Appendices 3 and 4 of R326 Environmental Impact Assessment Regulations, 2014, which lists the Contents of EIA Reports, and EMPrs.

The environmental impact assessment process will need to be undertaken in line with an approved plan of study for EIA Phase.

The EIA Phase will:

- Provide an overall assessment of the social and biophysical environments affected by the proposed project;
- Confirm the need and desirability of the project within the proposed location;
- Assess potentially significant impacts (direct, indirect and cumulative) associated with the proposed WEF and its grid connection;
- Identify and recommend appropriate mitigation measures for potentially significant environmental impacts; and
- Undertake an inclusive PPP to ensure that I&APs are afforded the opportunity to participate, and that their issues and/or concerns are recorded.

The findings from the PPP and the specialists' investigations shall be documented in the Environmental Impact Report and Environmental Management Programme (EMPr), the objectives of which will be to:

- determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
- describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
- determine the:
    - nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
    - degree to which these impacts-
        - can be reversed;
        - may cause irreplaceable loss of resources, and
        - can be avoided, managed or mitigated;
- identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment (best practicable environmental option);
- identify, assess, and rank the impacts that the activity will impose on the preferred location through the life of the activity;
- identify suitable measures to avoid, manage or mitigate identified impacts; and
- identify residual risks that need to be managed and monitored.

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

18.1 Plan of Study Requirements

As per Appendix 2 of the Environmental Impact Assessment Regulations 2014 R. 982 and R326 of April 2017 as promulgated in terms of the NEMA, a Plan of Study for EIA Phase must be included within the Scoping Report and it is to include the following:

"(i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;

(ii) a description of the aspects to be assessed as part of the environmental impact assessment process;

(iii) aspects to be assessed by specialists;

(iv) a description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists;

(v) a description of the proposed method of assessing duration and significance;

(vi) an indication of the stages at which the competent authority will be consulted;

(vii) particulars of the public participation process that will be conducted during the environmental impact assessment process; and

(viii) a description of the tasks that will be undertaken as part of the environmental impact assessment process;

(ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored."

18.2 Alternatives

Alternatives considered within this report include alternative site locations, renewable energy/energy technologies and the "no-go option".

The findings of the specialists' studies and the public participation process will continue to be used to inform the detailed layout design of the WEF. A preferred alternative turbine layout is being produced with the findings of the Scoping Phase specialist studies.

The approach is an iterative design process which will take cognisance of any potential significant impacts through avoidance through design, where possible. This will be referred to within the EIA Phase as mitigation to be embedded in the layout, or simply 'embedded mitigation'.

The significance of the impacts associated with the preferred alternative for the Phezukomoya WEF will be assessed in the specialist studies, as part of the EIA.

The 'no development' alternative, or 'no-go option' will also be further assessed during the EIA Phase.

18.3 Aspects to be assessed by Specialists and Methodologies Employed

The following specialist investigations and assessments shall be undertaken by the project team for the EIA Phase:

- Flora and Fauna (Terrestrial Ecology);
- Avifauna;
- Bats;
- Freshwater and Wetlands;
- Noise;
- Landscape and Visual;
- Cultural Heritage, Archaeology and Palaeontology; and

- Socio-economics.

The methodologies for each investigation are outlined below:

18.3.1 Fauna and Flora (Terrestrial Ecology)

The Scoping Phase study consisted of a desktop assessment and preliminary site visit. Additional refinement of the sensitivity map and understanding the potential impacts of the proposed development and revised layout will be required for the EIA phase. The EIA Phase study will consist of the following studies and activities for the proposed Phezukomoya WEF site:

- Refine the ecological sensitivity map of the site. Particular attention will be paid to the very high-lying parts of the site which are of limited extent and are of highest potential significance in terms of the impact of the development;
- Characterise the vegetation and plant communities present at the site in greater detail. 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 to identify and where necessary map different plant communities present at the site.
- 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 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.

18.3.2 Avifauna

The significance of the impacts will be re-assessed following a detailed 12 month pre-construction bird monitoring programme as part of the EIA phase. Note that this programme commenced in 2015 and monitoring has been completed.

The monitoring survey design and method shall be in line with the best practice guidelines[45]. The 12 month survey consists of four seasonal site visits by a team of observers, covering the full spatial extent of the WEF site. Monitoring at a control site will also be conducted.

The data collected from the surveys will be analysed by the avifaunal specialist and incorporated into an avifaunal impact assessment report which shall be compiled during the EIA Phase. It shall provide further detail regarding the baseline conditions at the proposed project site, confirm the anticipated impacts documented in this scoping report, and provide an updated impact assessment and significance rating.

The assessment of potential impacts on avifauna will be completed through the following stages:

[45] Jenkins, A.R., van Rooyen, C.S., Smallie, J.J., Harrison, J., Diamond, M. and Smit, H.A. 2011 amended 2012. Best Practice Guidelines for Avian Monitoring and Impact Mitigation at Proposed Wind Energy Development Sites in Southern Africa. BirdLife South Africa/Endangered Wildlife Trust.

- Describing the avifaunal baseline environment through survey (as described above) and desk study;
- Determining the value of the avifaunal receptors. This will be done primarily though the compilation of a list of focal species by considering factors such as abundance, behaviour on site, breeding and flight activity (i.e. by considering the survey results) as well as priority species status, Regional Red Data status and whether the species is endemic or not;
- Identifying and characterising the potential impacts on the focal species. Potential avifaunal impacts will be assessed to determine significance using a standard methodology, both before and after mitigation;
- Describing mitigation, compensation, enhancement and monitoring measures associated with the proposed project; and
- Collision risk modelling will be conducted if deemed necessary by the specialist.

18.3.3 Bats

The bat impact assessment will be conducted as per the following methodology:

- Describing the baseline environment for bats through survey methods and desk top study;
- Determining the sensitivity of the bats utilising published data sources;
- Identifying and characterising potential impacts of developing a WEF and its grid connection, considering the Magnitude, Extent, Duration and Reversibility of the impact;
- Feeding into the design of the proposed WEF and its grid connection;
- Determining the significance of impacts in line with the resultant design;
- Considering cumulative impacts in terms of other developments in the area, primarily WEF developments;
- Developing strategies where possible for mitigation of negative impacts, enhancement of positive impacts and recording monitoring measures. The latter will include management practices, which shall inform the EMPr; and
- Describing the residual effects, i.e., those remaining after mitigation, management and implementation of the EMPr.

In line with best practise guidelines for environmental assessments at proposed WEFs, 12 months of bat monitoring will be undertaken for the project. This monitoring commenced in July 2015 and was completed in July 2016. Using this data the revised layout will be assessed in an impact assessment report.

As noted above, the outcome of the EIA study will be a description of bat activity at the project, an evaluation of potential risks/impacts to bats (including cumulative impacts), recommendations for WEF and grid connection layout and design mitigation measures to reduce impacts, including an environmental management plan for the project.

18.3.4 Wetlands and Freshwater

The following methodology shall be followed and tasks completed during the EIA Phase:

- Site visit during the Winter/Spring season (when the effects of any rain can be seen and it is warm enough for plants to flower);
- Creation of maps depicting demarcated waterbodies delineated to a scale of 1:10 000 after a site visit has been conducted;
- The determination of the desktop ecological state of any aquatic systems, estimating their biodiversity, conservation and ecosystem function importance with regard ecosystem services;
- List recommendations for buffer zones and no-go areas around any delineated wetland areas based on the relevant legislation or best practice;

- Assess the potential impacts, based on the supplied methodology;
- Provide mitigation measures regarding project related impacts, including engineering services; and
- Provide relevant aspects necessary for the compiling the Environmental Management/Monitoring Plans.

18.3.5 Noise

The purpose of an environmental noise impact investigation and assessment is to determine and quantify the acoustical impact of, or on a proposed development. Work that will take place during the Environmental Noise Impact Assessment phase is defined in section 8 of SANS 10328:2008. The following will be included:

- Data as received from the applicant 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;
- The development of potential mitigation measures (if required) for inclusion into the Environmental Management Programme (EMPr); and
- Recommendations.

Sound emissions from the identified noise sources: Sound emission data as warranted by the wind turbine manufacturer would be used to calculate the potential noise emissions from the wind turbines. In the instance that this data is unavailable, sound emission data as measured and calculated in accordance with EIA 61400-11 (Wind turbine generator systems – Part 11: Acoustic noise measurements techniques) could be used.

The operating cycle and nature of the sound emission (impulsiveness, tonal character or potential low frequencies) would, where relevant, be considered when the expected rating level in the target area is calculated.

Determination of Rating levels: The Concawe model defined in SANS 10357:2004 (construction phase) as well as the propagation model defined in ISO 9613-2 (operational phase) will be used to calculate projected equivalent noise levels.

Other input parameters used would include:

- Atmospheric pressure of approximately 90 kPa;
- Air temperature of 20°C;
- Relative humidity of 80%;
- Prevailing wind direction as input into Concawe model as made available by developer;
- Layout of the proposed facility as provided by the developer;
- Study area in a grid of 100 x 100 meters. An average height is selected if the topography xyz-file is not available in the correct co-ordinate system. This output is used the develop 3D-soundscape maps of the projects equivalent noise environment;
- Height of turbine above sea level as well as height of wind turbine above surface level;
- Projected outside equivalent noise levels at Potentially Sensitive Receptors at height above sea-level (plus 1.5 meters); and
- 25% soft ground surface.

Assessment of the noise impact: The significance will be determined considering the defined magnitude of the noise level, the extent as well as the duration of the projected noise impact, as well as the probability that this impact may take place.

The magnitude of the noise impact will be assessed by considering:

- The total projected cumulative noise level compared to the appropriate acceptable rating levels as defined in Table 2 of SANS 10103:2008;
- The potential community response from Table 5 of SANS 10103:2008. In addition, other relevant and suitable literature may be consulted. In particular, the likely ambient sound levels due to wind induced noises, will be estimated at the wind speed under investigation and considered; and
- Projected noise levels considering the likely and projected ambient sound levels).

Likely ambient sound levels associated with wind speeds as well as the projected change in ambient sound levels would also be considered when estimating the probability that a NSD may be impacted on by increased noise levels.

Assessment of the noise impact - implementation of mitigation measures: Should the significance of the impact be medium or high, the potential significance will also be assessed, assuming that reasonable mitigation measures are implemented.

Environmental Noise Impact Report

The Environmental Noise Impact Report will include:

- the purpose of the investigation;
- a brief description of the planned development or the changes that are being considered;
- a brief description of the existing environment including, where relevant, the topography, surface conditions and meteorological conditions during measurements;
- the identified noise sources together with their respective sound pressure levels or sound power levels (or both) and, where applicable, the operating cycles, the nature of sound emission, the spectral composition and the directional characteristics;
- the identified noise sources that were not taken into account and the reasons as to why they were not investigated;
- the identified Potentially Sensitive Receptors and the noise impact on them;
- where applicable, any assumptions, with references, made with regard to any calculations or determination of source and propagation characteristics;
- an explanation, either by a brief description or by reference, of all measuring and calculation procedures that were followed, as well as any possible adjustments to existing measuring methods that had to be made, together with the results of calculations;
- an explanation, either by description or by reference, of all measuring or calculation methods (or both) that were used to determine existing and predicted rating levels, as well as other relevant information, including a statement of how the data were obtained and applied to determine the rating level for the area in question;
- the location of measuring or calculating points in a sketch or on a map;
- quantification of the noise impact with, where relevant, reference to the literature consulted and the assumptions made;
- alternatives that were considered and the results of those that were investigated;
- a list of all the interested or affected parties that offered any comments with respect to the environmental noise impact investigation (if comments are received);
- a detailed summary of all the comments received from interested or affected parties as well as the procedures and discussions followed to deal with them (if comments are received);
- conclusions that were reached;
- proposed recommendations including potential mitigation measures;
- any follow-up investigation which should be conducted at completion of the project as well as at regular intervals should the projects be commissioned so as to ensure that the recommendations of this report will be maintained in the future.

18.3.6 Cultural Heritage, Archaeology and Palaeontology

The following key issues would need to be investigated during the EIA Phase, through conducting the methodologies as listed below:

- Archaeology: The physical remnants of human activity need to be identified and assessed through physical site inspection, mapped and assigned field grades. This is a field intensive process, as there are no databases in existence that have enough detailed information that will allow the assessment to take place at desktop level.
- Palaeontology: The area is paleontologically sensitive. The SAHRIS palaeontological sensitivity mapping project has made a big contribution to preliminary desktop research in terms of the identification of potentially sensitive geology, however the detailed work has to be done through physical field assessment which will involve physical inspection of rock exposures. This will need to be done during the EIA process.
- Landscape and setting: The assessment of the landscape as a heritage resource will require the integration of findings of the visual impact assessment as well as consideration of the methods of landscape characterisation and grading to produce an integrated statement of impact for purposes of the EIA.

In the context of an EIA process, heritage resources are graded following the system[46] established in the guidelines for involving heritage practitioners in EIAs (Table 18:1). The system is also used internally by Heritage Authorities for making decisions about the future of heritage places, buildings and artefacts. The grading system was designed with structures in mind, but has been applied to archaeological sites, streetscapes and objects. The call has been made by the heritage authority to apply the system to landscapes. The decision making process used is based on a simple 3-phase process:

1. Decide what kind of landscape is involved (rural, natural wilderness, historical townscape or historical agricultural area) – establish its dominant characteristics taking cognisance of UNESCO guidelines and previous work;
2. Establish the value of the landscape in terms of its history, its aesthetic value and its value to a given community;
3. Consider the intactness of the landscape – has it been recently intruded upon by new development (60 years is the marker) and using the grading system as a guide suggest a field grading.

Table 18.1: Grading of Heritage Resources

Grade	Level of significance	Description
1	National	Of high intrinsic, associational and contextual heritage value within a national context, i.e. formally declared or potential Grade 1 heritage resources.
2	Provincial	Of high intrinsic, associational and contextual heritage value within a provincial context, i.e. formally declared or potential Grade 2 heritage resources.
3A	Local	Of high intrinsic, associational and contextual heritage value within a local context, i.e. formally declared or potential Grade 3A heritage resources.
3B	Local	Of moderate to high intrinsic, associational and contextual value within a local context, i.e. potential Grade 3B heritage resources.
3C	Local	Of medium to low intrinsic, associational or contextual heritage value within a national, provincial and local context, i.e. potential Grade 3C heritage resources.

The grading system is used to express the relative significance of a heritage resource. This is known as a field grading or a recommended grading. Official grading is done by a special

[46] Baumann, N. & Winter, S. 2005. Guideline for involving heritage specialists in EIA process. Edition 1. CSIR report No ENV-S-C 2005 053E. Provincial Government of the Western Cape: Department of Environmental Affairs and Developmental Planning.

committee of the relevant heritage authority; although heritage authorities rely extensively on field grading in terms of decision making.

18.3.7 Landscape and Visual

The focus of the EIA Phase VIA will be to undertake a detailed GIS-based assessment in order to quantify the magnitude and significance of the visual impacts of the proposed development during the day-time and night-time context. A new preferred layout will be assessed in the EIA Phase based on the results of scoping phase constraints mapping.

The location of potential sensitive receptors will be a focus of the investigation. Digital terrain models and viewsheds will be generated based on a revised layout plan, if necessary. This analysis will be conducted using ArcGIS software in conjunction with the Spatial Analyst and 3D Analyst extensions.

The assessment will rely on site visits to each potentially sensitive receptor location and roads to identify the extent of visual impact of the proposed development layout from these locations. A further assessment of the intensity of potential visual impact, expressed in terms of bands of differing visual significance will be undertaken. The fieldwork will also allow for the correction and refinement of the baseline information.

The overall significance of visual impacts associated with the proposed WEF will be assessed through a standard methodology. Measures to mitigate potential visual impacts will be identified, and if practical, layout alternatives within the application site will be considered and recommended to minimise the visual impact of the proposed development.

A separate rating matrix will be used to assess the visual impact of the proposed development on the sensitive receptor locations, as identified. This matrix is based on the distance of a receptor from the proposed development, the primary focus / orientation of the receptor, the presence of screening factors, the visual character and sensitivity of the area and the visual contrast of the development with the typical elements and forms in the landscape.

A detailed cumulative impact assessment will be undertaken to investigate the number of existing and proposed renewable energy developments that each sensitive receptor would be visually exposed to and quantify the cumulative impact that would result in combination with the construction of the proposed Phezukomoya WEF. Mitigation measures proposed by the visual assessments undertaken by other specialists for the proposed and existing renewable energy developments within a 35 km radius will be reviewed, consulted and included where they are deemed appropriate to the proposed Phezukomoya WEF.

I&APs will be consulted through the PPP being undertaken as part of the EIA process, in order to establish how the proposed development will be perceived from the various receptor locations.

The main deliverable of the study will be the generation of a spatial database and maps, indicating the zones of visual impact, as well as a detailed report indicating the findings of the study.

18.3.8 Socio-Economic Aspects

The identification and assessment of social impacts will be informed by the *Guidelines for specialist SIA input into EIA Processes* (adopted by DEA&DP in the Western Cape in 2007). The Guidelines are based on accepted international best practice guidelines. 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.;
- Identification and assessment of the key social issues and opportunities;
- Preparation of a Social Impact Assessment (SIA) Report, including identification of mitigation/optimisation and management measures to be implemented and
- Finalisation of the SIA Report.

The methodology for assigning significance ratings is to be supplied by the EAP.

In addition to the baseline socio-economic data for the area, the following project related information will be sourced and used to inform the SIA:

Construction Phase

- This phase includes construction of the WEF and all related infrastructure, such as transmission lines, access roads, office and warehouse components etc.
- Comments received from I&APs during the PPP;
- A draft illustration (plan) of the proposed lay-out(s) of the turbines (including an indication of the phasing sequence on the site), supporting structures and infrastructure;
- Duration of the construction phase (months);
- Number of people employed during the construction phase;
- Breakdown of number of people employed in terms or low skilled, semi-skilled and skilled;
- Estimate of the total wage bill for the construction phase and breakdown in % as per skills categories;
- Estimate of total capital expenditure for construction phase;
- Indication of where construction workers will be housed (on site or in nearest town?);
- Opportunities for 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 large components associated with the WEF and grid connection will be transported to the site and assembled;
- The size of the vehicles needed to transport the components and the routes that will be used to transport the large components to the site, and an estimate of the number of vehicle trips required and duration of each trip; and
- Information on the nature of the agreements with the affected landowners, specifically with regard to compensation for damage to land, infrastructure etc.

Operational Phase

- Operating budget per annum;
- Total number of people employed;
- Breakdown in terms of skills levels;
- Annual wage bill;
- Typical activities associated with the operational phase;
- Information on opportunities for skills development and training;
- Typical lifespan of proposed WEF plant;
- Information on the lease / rental agreements with local landowners and or communities, specifically with regard to issues relating to compensation for damage to infrastructure and loss of livestock etc. This information is required so as to indicate how local landowners and communities stand to benefit from the project; and
- Information of Community Trusts to be established as part of the project.

18.4 Significance Assessment Methodology

Specialists, in their terms of references, will be supplied with a standard method with which to determine the significance of impacts to ensure objective assessment and evaluation, while enabling easier multidisciplinary decision-making. The methodology[47] is outlined below.

The tables below, taken from the above guideline, indicates the categories for the rating of impact magnitude and significance.

The assessment methodology that will be used will be in accordance with the recently revised 2014 EIA Regulations (as amended). The significance of environmental impacts is a function of the environmental aspects that are present and to be impacted on, the probability of an impact occurring and the consequence of such an impact occurring before and after implementation of proposed mitigation measures.

18.4.1 Extent (Spatial-Scale)

L	M	H
Impact is localized within site boundary	Widespread impact beyond site boundary; Local	Impact widespread far beyond site boundary; Regional/national

18.4.2 Duration

L	M	H
Quickly reversible, less than project life, short term	Reversible over time; medium term to life of project	Long term; beyond closure; permanent; irreplaceable or irretrievable commitment of resources

18.4.3 Intensity (Severity)

Type of Criteria	Negative			Positive		
	H-	M-	L-	L+	M+	H+
Qualitative	Substantial deterioration, death, illness or injury, loss of habitat/diversity or resource, severe alteration or disturbance of important processes.	Moderate deterioration, discomfort, Partial loss of habitat/biodiversity/resource or slight or alteration	Minor deterioration, nuisance or irritation, minor change in species/habitat/diversity or resource, no or very little quality deterioration.	Minor improvement, restoration, improved management	Moderate improvement, restoration, improved management, substitution	Substantial improvement, substitution
Quantitative	Measurable deterioration Recommended level will often be violated (e.g. pollution)	Measurable deterioration Recommended level will occasionally be violated	No measurable change; Recommended level will never be violated	No measurable change; Within or better than recommended level.	Measurable improvement	Measurable improvement

[47] Adapted from T Hacking, AATS – Envirolink, 1998: An innovative approach to structuring environmental impact assessment reports. In: IAIA SA 1998 Conference Papers and Notes.

18.4.4 Probability of Occurrence

L	M	H
Unlikely; low likelihood; Seldom No known risk or vulnerability to natural or induced hazards.	Possible, distinct possibility, frequent Low to medium risk or vulnerability to natural or induced hazards.	Definite (regardless of prevention measures), highly likely, continuous High risk or vulnerability to natural or induced hazards.

18.4.5 Status of Impact

The specialist describes whether the impact is positive, negative or neutral for each parameter. The ranking criteria are described in negative terms. Where positive impacts are identified, the opposite, positive descriptions for criteria is used.

18.4.6 Degree of Confidence in Predictions

The degree of confidence in the predictions is stated, based on the availability of information and specialist knowledge.

18.4.7 Consequence: (Duration X Extent X Intensity)

By ranked the severity, duration and spatial extent, the overall consequence of impacts is determined using the following qualitative guidelines:

Intensity = L				
Duration	**H**			
	M			Medium
	L	Low		
Intensity = M				
Duration	**H**			High
	M		Medium	
	L	Low		
Intensity = H				
Duration	**H**			
	M			High
	L	Medium		
		L	M	H
		Extent		

Positive impacts are ranked in the same way as negative impacts, but result in high, medium or low positive consequence.

18.4.8Overall Significance of Impacts

Combining the consequence of the impact and the probability of occurrence provides the overall significance (risk) of impacts.

PROBABILITY					
	Definite Continuous	H	MEDIUM		HIGH
	Possible Frequent	M		MEDIUM	
	Unlikely Seldom	L	LOW		MEDIUM
			L	M	H
			CONSEQUENCE (from Table 5)		

18.5 Cumulative Impact Assessments

In accordance with the EIA Regulations, the EIA will also give consideration to 'cumulative impacts'. As stated in Section 2.8 the assessment of cumulative impacts is defined and will be assessed in the future baseline scenario, i.e. Cumulative impact of the proposed development = change caused by proposed development when added to the cumulative baseline (The cumulative baseline includes all other identified developments. In the cumulative assessment the effect of adding the proposed development to the cumulative baseline is assessed.)

In line with best practice, the scope of this assessment will include all operational, approved or current and planned renewable energy applications (including those sites under appeal), within a 35 km radius of the site (as a minimum).

The WEF sites that will be included in the assessment of cumulative impacts will be based on the knowledge and status of the surrounding areas at the time of finalising the Draft EIA Report.

It is proposed that each of the specialists will use existing publically available information for the developments that occur within 35 km of the proposed Phezukomoya WEF, in order to assess the cumulative impacts. Cumulative impacts that will be considered will be those residual impacts that remain medium to high post mitigation. It should be noted that this assessment will be highly qualitative and will be based on specialists' knowledge.

18.6 Consultation with the DEA

Table 18.2 depicts the tasks to be performed as part of the EIA Process. Should the process be modified significantly, the DEA and I&APs would be notified accordingly. The rows highlighted indicate at which point the DEA will be contacted as part of the EIA Process.

Table 18.2: Tasks to be performed as part of the EIA Process for the Phezukomoya WEF and its Grid Connection

Task/Point of Consultation with the DEA	Date
Public Review of Draft Scoping Report	June 2017
Submission of Application Form to the DEA	June 2017
Submission of a Final Scoping Report with the Plan of Study for EIA Phase.	July 2017
DEA accepts or rejects the FSR and Plan of Study for EIA Phase.	September 2017
Undertake Detailed Specialist Studies	September / October 2017
Compile Draft Environmental Impact Report (EIR) and Environmental Management Programme (EMPr) for public comment based on specialist information.	October 2017

Advertise Draft EIR and EMPr for public comment (& host public event)	October 2017
Receive public responses to the Draft EIRs and EMPr	November 2017
Submission of Final EIR and EMPr to DEA	December 2017 / January 2018
Issuing of the Environmental Decision	April / May 2018

18.7 EIA Phase Public Participation Process (PPP)

During the EIA phase the following tasks will be undertaken for public participation:

- Notification letters to be sent out to registered I&APs, key stakeholders, and organs of state to inform them of the availability of the Draft Environmental Impact Report (EIR) (30 days).
- A public event will be held in order to explain the findings of the EIR.
- An Issues Trail/Comments and Reponses Report shall be compiled, recording comments and/or queries received and the responses provided. This report will be forwarded to the competent authority (the DEA), and will be included in a Final EIR to be released to the public for a second 30 day review period.
- Authorisation/Decision
- Notification letters to all registered I&APs, key stakeholders, and organs of state to inform them of the decision by the DEA and the appeal procedure.
- Placement of advertisements in the same local and regional newspapers (in English and Afrikaans) to inform readers of the decision taken by the DEA.

Focus Group Meetings or One-on-One meetings shall be held if necessary throughout the EIA process. Furthermore, I&APs will also be able to register on the I&AP database throughout the duration of the EIA process. Once registered, I&APs will be informed about the progress of the proposal.

APPENDIX A: EAP CV AND COMMISSIONER OF OATHS

CURRICULUM VITAE

Ashlin Bodasing

Technical Director and Environmental Assessment Practitioner

Email: ashlinb@arcusconsulting.co.za Tel: +27 (0) 21 412 1529

Specialisms

- Environmental Impact Assessments
- Environmental Management Plans
- Environmental Feasibility Studies
- Environmental Due Diligence and Compliance
- Client Relationship Management

Summary of Experience

Ashlin Bodasing is a Technical Director at Arcus Consultancy Services South Africa (Pty) Ltd. She manages the Arcus South African office and the team based in Cape Town.
Having obtained her Bachelor of Social Science Degree (Geography and Environmental Management) from the University of Kwa-Zulu Natal; she has over eleven years' experience in the environmental consulting industry in southern Africa. She has gained extensive experience in the field of Integrated Environmental Management, environmental impact assessments and public participation. She has also been actively involved in a number of industrial and infrastructural projects, including electricity power lines and substations; road and water infrastructure upgrades and the installation of telecommunication equipment, green and brown field coal mines, as well as renewable energy facilities, both wind and solar. Ashlin has excellent Project Management experience and has gained major project experience in the development of Environmental Impact Assessments, Environmental Management Plans and the monitoring of construction activities. Her areas of expertise include project management, environmental scoping and impact assessments, environmental management plans, environmental compliance monitoring and environmental feasibility studies. Experience also includes International Finance Corporation Performance Standards and World Bank Environmental Guidelines environmental due diligence reviews. She has worked in Mozambique, Namibia, Botswana, Lesotho and Zimbabwe.

Professional History

2017 – Present – Technical Director, Arcus Consultancy Services South Africa
2015 - 2017 – Team Leader, Arcus Consultancy Services Ltd
2012 – 2015 – Lead Environmental Officer, Tweefontein Optimisation Project, Glencore / Xstrata Coal Mine, Witbank, Mpumalanga, South Africa (secondment)
2007-2015 - Senior Environmental Assessment Practitioner, Parsons Brinckerhoff Africa
2005-2007 – Environmental Consultant, WSP Environment and Energy

Ashlin spent over 2 years at the Glencore (previously Xstrata Coal SA) – Tweefontein Optimisation Project, as the sole environmental officer permanently on site overseeing all their construction projects, ensuring contractor compliance to EMP and Environmental Authorisations. This included the construction of the internal and external infrastructure packages. Roles include ensuring all construction and development are in line with the EIA and EMP for the project. Areas of responsibility include the Mine Infrastructure Area, the Explosives Magazine Area, construction of a secondary school, construction of residential houses, and the rail load out facility. Role also included review of environmental impact assessment applications and reports submitted to the department of environmental affairs for the project.

Qualifications and Professional Interests

- **University of Kwa-Zulu Natal, 2004**
  Bachelor of Social Science (Geography and Environmental Management)

Project Experience

<u>Environmental Impact Assessments</u>

- **San Kraal Wind Energy Facility, 2016- present**. Project Director (client liaison) and EAP.

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- **Phezukomoya Wind Energy Facility, 2016 – present**. Project Director (client liaison) and EAP.
- **Kolkies and Karee Wind Energy Facilities, 2016-2016**. Project Director (Client liaison) and EAP.
- **Komsberg East and West Wind Energy Facilities 2015-2016**. Project Director (Client Liaison) and EAP.
- **Umsinde Emoyeni Wind Energy Facilities – 2015- present.** Project Director (Client Liaison) and EAP.

Ecological Impact Assessments and Monitoring

- **Komsberg Wind Farms, 2015-2016.** Project Director (Client Liaison), coordination and management of ecologists (bird and bat), review of techncial and specialists impact assessments.
- **Kolkies and Karee Wind Energy Facilities 2015-2016.** Project Director (Client Liaison), coordination and management of bird and bat specialists and review of technical and impact assessment reports.
- **Umsinde Wind Energy Facilities, Additional Bird Monitoring**. Project Director. Coordination and management of bird specialists and review of technical reports.
- **Kap Vley Wind Energy Facility, Bird and Bat Pre-Construction Monitoring.** Project Director. Coordination and management of bird and bat specialists, review of technical reports.
- **Highlands Wind Energy Facility, Bird and Bat Pre-Construction Monitoring.** Project Director. Coordination and management of bird and bat specialists, review of technical reports.
- **Hopefield Wind Farm –Operational Monitoring.** Project Manager. Coordination and management of bird and bat specialists, review of technical reports.
- **Gouda Wind Farm – Operation Monitoring.** Project Director. Coordination and management of bird and bat specialists, review of technical reports.

Feasibility Studies and Due Diligence Reviews

- **Ecological due diligence for IFC PS6 – Wind Energy Developments:** Project Manager. Review and reporting on bird and bat specialist reports to IFC/World Bank Standards – Various sites across South Africa.
- **Power Plant – Ghana**. Project Manager Compilation of environmental due diligence for refinancing, IFC and World Bank Standards, on behalf of Botswana Development Corporation.
- **Ecological Feasibility Study.** Project Director. Review of the feasibility of a site for a wind energy facility in relation to bats.
- **Environmental Feasibility Study.** Project Director and EAP. Review of a proposed site for the development of industrial facility.

Previous Project Experience

Environmental Scoping and Impact Assessments and Project Management for:

- eThekwini Municipality
- Moreland Developments
- RBCH – Bulk Materials and Handling Facility
- SAPREF
- Mittal Steel Permit Amendment
- Transnet Projects
- ArcelorMittal South Africa
- MCA-Lesotho
- Talbot Group Holdings (Australian Mining Company)

- Ncondezi Energy – Mozambique

Environmental Management Plans and Compliance Monitoring

- Nongoma Road Monitoring – Compliance Monitoring
- eThekwini Municipality - Taxi Holding Areas: Canberra Road and Umgeni Road Compilation of the EMP; and Bi-monthly compliance monitoring (site visits) and reporting.
- EMP for Kwezi V3 - Kwamashu Fuel Tank Exemption
- eThekwini Municipality - Ridgeview Road – Compliance Monitoring
- eThekwini Municipality and Merz and Mclellen - Phoenix Overhead Transmission Lines – Compliance Monitoring
- eThekwini Municipality and Merz and Mclellen - E8546 E8699 Compliance Monitoring
- eThekwini Municipality and Merz and Mclellen - Environmental Assessment and EMP
- EMP for eThekwini Municipality - Parlock Switching Station

Training and Auditing

- Petronet Alien Plant Training - Compilation of the training material for alien plant identification and removal methods.
- eThekwini Municipality - Taxi Holding Areas – Canberra and Umgeni Road - Contactor and workforce training.
- eThekwini Municipality - Kingsway Road Taxi Rank - Contactor and workforce training.

Environmental Reviews / Terms of Reference

- Biotherm Energy - Environmental Project Manager: Independent review of environmental impact assessment reports and management plans compiled for 3 wind farms in the Western Cape and 2 PV Solar Plants in the Northern Cape, to ensure compliance to IFC and World Bank Standards.
- Government of Zimbabwe – Hwange Power Station - Environmental Project Manager: Compilation of the Terms of Reference for Environmental Management Plan and Environmental and Social Audit of the Hwange Power Plant in Zimbabwe.

Pre-Feasibility Studies

- Pre-feasibility studies for eThekwini Municipalit, Investec, Sekoko Coal Resources, Mulilo, Sekoko Mining and MCA-Lesotho for renewable energy, coal mines and power plants.

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF EAP AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number: NEAS	12/12/20/ or 12/9/11/L
Reference Number: Date Received:	DEA/EIA

Application for integrated environmental authorisation and waste management licence in terms of the-

(1) National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014; and

(2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 921, 2013

PROJECT TITLE

The Proposed Phezukomoya 315 MW Wind Energy Facility and Associated Grid Connection, Northern and Eastern Cape Provinces

Environmental Assessment Practitioner (EAP):	Arcus Consultancy Services Ltd Ashlin Bodasing		
Contact person:	Ashlin Bodasing		
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Professional affiliation(s) (if any)	N/A		

Project Consultant:	Ashlin Bodasing		
Contact person:	Ashlin Bodasing		
Postal address:	As above		
Postal code:	As above	Cell:	As above
Telephone:	As above	Fax:	As above
E-mail:			

4.2 The Environmental Assessment Practitioner

I, Ashlin Boobasing , declare that –

General declaration:

I act as the independent environmental practitioner in this application;
I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
I declare that there are no circumstances that may compromise my objectivity in performing such work;
I have expertise in conducting environmental impact assessments, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
I will comply with the Act, Regulations and all other applicable legislation;
I will take into account, to the extent possible, the matters listed in regulation **8** of the Regulations when preparing the application and any report relating to the application;
I have no, and will not engage in, conflicting interests in the undertaking of the activity;
I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
I will keep a register of all interested and affected parties that participated in a public participation process;
I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not;
all the particulars furnished by me in this form are true and correct;
will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Disclosure of Vested Interest (delete whichever is not applicable)

I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014;

I have a vested interest in the proposed activity proceeding, such vested interest being:

_____

_____

_____

_____

Signature of the environmental assessment practitioner:

Arcus Consultancy Services

Name of company:

05 May 2017

Date:

UNDERTAKING UNDER OATH/ AFFIRMATION

I, Ashlin Bodasing, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the environmental assessment practitioner

Arcus Consultancy Services

Name of company

05 May 2017

Date

Signature of the commissioner of oaths

5/5/2017

Date

Guinevere Abbi Blignaut
Commissioner of Oaths
Practising Attorney SA
ENSafrica
1 North Wharf Square
Loop Street Cape Town 8001

APPENDIX B: PUBLIC PARTICIPATION

1. Landowner and Surrounding Landowner Notifications
2. Background Information Document and Site Notices
3. Newspaper Adverts
4. Key I&AP Notifications
5. Issues Trail
6. I&AP Database
7. Contact with Landowners and Surrounding Landowner