FE KUDU WIND ENERGY FACILITY
EASTERN CAPE PROVINCE

Basic Assessment Report

October 2023

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PROJECT DETAILS

DFFE Reference	:	TBA
Title	:	Basic Assessment Process: FE Kudu Wind Energy Facility, Eastern Cape Province
Authors	:	Savannah Environmental Chantelle Geyer Karen Jodas Nicolene Venter
Specialists	:	Jamie Pote Marine Pienaar of Terra Africa Jenna Lavin of CTS Heritage Morné de Jager of Enviro Acoustic Research (EAR) Lourens du Plessis of LOGIS Dale Kindler of The Biodiversity Company Albert Froneman of AfriAvian Environmental Craig Campbell of ERM Iris Wink of iWink Consulting Tony Barbour and Schalk van der Merwe
Applicant	:	FE Kudu(Pty) Ltd
Report Status	:	Basic Assessment Report for Public Review
Date	:	October 2023

When used as a reference this report should be cited as: Savannah Environmental (2023) Basic Assessment Report for the FE Kudu Wind Energy Facility, Eastern Cape Province

PURPOSE OF THE BA REPORT AND INVITATION TO COMMENT

FE Kudu (Pty) Ltd has appointed Savannah Environmental as the independent environmental consultant to undertake the Basic Assessment (BA) for the FE Kudu Wind Energy Facility, Eastern Cape. The BA process is being undertaken in accordance with the requirements of the 2014 EIA Regulations promulgated in terms of the National Environmental Management Act (NEMA; Act No. 107 of 1998). The entire extent of the site falls within the Beaufort West (REDZ) and therefore the undertaking of a Basic Assessment (BA) process is applicable as per GNR114 of February 2018. This BA Report describes and assesses this proposed project and consists of the following chapters:

This BA Report consists of thirteen chapters, as follows:

» **Chapter 1** provides background to the proposed FE Kudu Wind Energy Facility and the basic assessment process.
» **Chapter 2** provides a description of the wind energy facility and the infrastructure associated with the facility.
» **Chapter 3** provides the site selection information and identified project alternatives.
» **Chapter 4** describes wind energy as a power generation option and provides insight to technologies for wind energy.
» **Chapter 5** outlines the strategic regulatory and legal context for energy planning in South Africa and specifically for the proposed facility.
» **Chapter 6** describes the need and desirability of the FE Kudu Wind Energy Facility within the project site.
» **Chapter 7** outlines the approach to undertaking the basic assessment process.
» **Chapter 8** describes the existing biophysical and socio-economic environment within and surrounding the project site.
» **Chapter 9** provides a sensitivity analysis of the project site and development footprint.
» **Chapter 10** provides an assessment of the potential issues and impacts associated with the wind energy facility and associated infrastructure and presents recommendations for the mitigation of significant impacts.
» **Chapter 11** provides an assessment of the potential for cumulative impacts.
» **Chapter 12** presents the conclusions and recommendations based on the findings of the BA Report.
» **Chapter 13** provides references used in the compilation of the BA Report.

The development (i.e. construction and operation) of FE Kudu Wind Energy Facility is subject to the requirements of the EIA Regulations of 2014 (as amended), published in terms of Section 24(5) of NEMA. Therefore, in terms of the EIA Regulations of 2014, promulgated under Section 24 and 24D of NEMA, various aspects of the project are listed as activities that may have a detrimental impact on the environment. The primary listed activity triggered is Activity 1 of Listing Notice 2 (GN R325) which relates to the development of facilities or infrastructure for the generation of electricity from a renewable resource where the generating capacity is 20MW or more.

The 30-day period for review is from 4 October 2023 to 3 November 2023. The report is available for public review at (https://savannahsa.com/public-documents/energy-generation/kudu-wind-energy-facility/). All comments received and recorded during the 30-day review and comment period will be included, considered, and addressed within the final BA Report to be submitted to the Competent Authority for consideration.

Comments should be submitted in writing on or before 3 November 2023 to the contact person below.

Please submit your comments by **3 November 2023** to:
Nicolene Venter of **Savannah Environmental** PO Box 148, Sunninghill, 2157 Tel: 011-656-3237 Mobile: 060 978 8396 Fax: 086-684-0547 Email: publicprocess@savannahsa.com

Comments can be made as written submission via fax, post, or email

EXECUTIVE SUMMARY

FE Kudu (Pty) Ltd, a Special Purpose Vehicle (SPV), proposes the development of a wind energy facility and associated infrastructure, on a site located approximately 40km west of the town of Aberdeen in the Eastern Cape Province. The site is located within the Dr Beyers Naude Local Municipality in the greater Sarah Baartman District Municipality. The entire extent of the site falls within the Beaufort West Renewable Energy Development Zone (REDZ). The facility is to be known as FE Kudu Wind Energy Facility. The project site and development area are located on Portion 2 of Farm Oorlogspoort 85.

The project site/development area has an extent of ~9 170ha, which is considered sufficient in extent (allowing sufficient space to avoid any major environmental sensitivities) and suitable from a technical perspective for the development of up to 80 wind turbines with a contracted capacity of up to 600MW. The smaller facility development footprint will be sited within the development area, with an estimated disturbance area of up to 185ha of the development area. The infrastructure associated with the 600MW FE Kudu Wind Energy Facility will include:

» Up to 80 wind turbines, turbine foundations and turbine hardstands
» An on-site substation hub incorporating:
  - A132kV on-site facility substation
  - Switchyard with collector infrastructure
  - Battery Energy Storage System (BESS)
  - Operation and Maintenance buildings
» A balance of plant area incorporating:
  - Temporary laydown areas
  - A construction camp laydown and temporary concrete batching plant
» Power lines internal to the wind farm, trenched and located adjacent to internal access roads, where feasible[1].
» Access roads to the site and between project components with a width up to 8m for primary access routes.

A technically viable development footprint was proposed by the developer and assessed as part of the BA process. The assessment of the development footprint within the project site was undertaken by independent specialists and their findings have informed the results of this BA report.

[1] The intention is for internal project cabling to follow the internal roads.

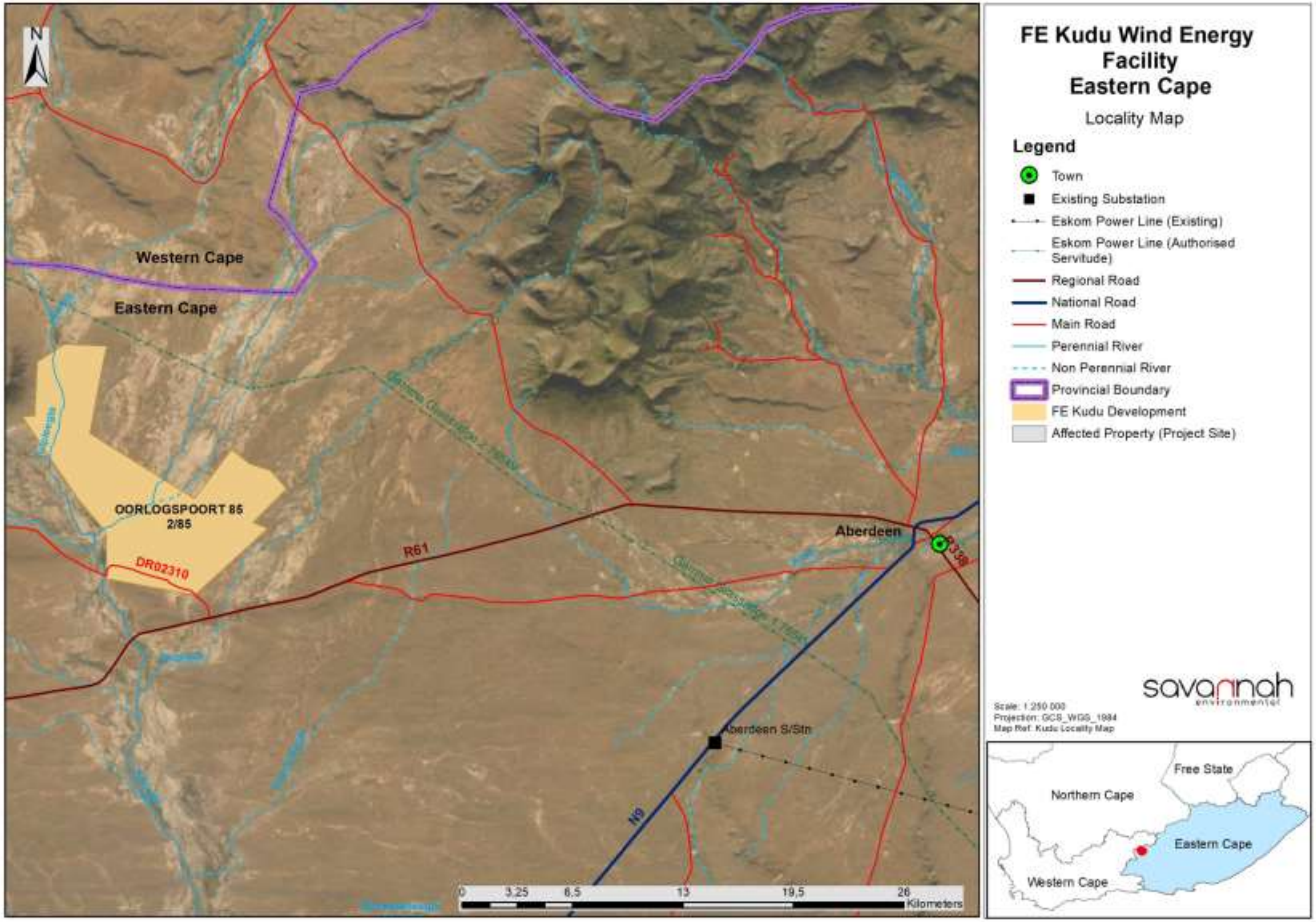

Figure 1: Locality map showing the location of the project site proposed for the development of the FE Kudu Wind Energy Facility

The specialist findings have indicated that there are no identified fatal flaws associated with the implementation of the development footprint within the project site. The potential environmental impacts associated with the FE Kudu Wind Energy Facility identified and assessed through the BA process include:

Impacts on Terrestrial Ecology

The Ecological Impact Assessment has identified all impacts to be of low significance after mitigation. There are no impacts associated with the development of the FE Kudu Wind Energy Facility on terrestrial biodiversity that cannot be mitigated to an acceptable level. As such, should all the proposed mitigation measures be implemented, the development is deemed acceptable from a terrestrial ecological impact perspective. No impacts of a high significance or fatal flaws are expected to occur after implementation of the recommended mitigation measures.

Impacts on Aquatic Resources

The Aquatic Resources Impact Assessment has identified all impacts to be of low significance after mitigation. As a result of the ephemeral and braided nature of the watercourses and susceptibility to erosion and the flat topography likely to be seasonally flooded, the construction and operation phase activities would influence the hydrology, water quality and soil movement within the affected watercourses and vernal pools, notably where the proposed infrastructure traverse these aquatic features and/or their associated 32m buffer. This 32 m buffer also applies to vernal pools. The optimised facility layout has largely avoided the ESAs and associated aquatic features, with limited watercourse crossings proposed which are considered to be acceptable and appropriately placed. There is however the exception of portions of the roads that come in close proximity to the vernal pools and fall within their buffers.

There are no impacts associated with the development of the FE Kudu Wind Energy Facility on freshwater ecology that cannot be mitigated to an acceptable level. As such, should all the proposed mitigation measures be implemented, the development is deemed acceptable from an aquatic resources impact perspective. No impacts of a high significance or fatal flaws are expected to occur after implementation of the recommended mitigation measures. With the responsible implementation of mitigation measures, the project will present low residual impacts to the watercourses.

Impacts on Avifauna

The Avifauna Impact Assessment identified that all impacts associated with the development of the FE Kudu Wind Energy Facility development footprint will be of a medium significance before mitigation and can be mitigated to an acceptable level of impact with medium (lower impact score) and low sensitivity. No impacts of a high significance or fatal flaws are expected to occur with the implementation of the recommended mitigation measures. The current 80 turbine layout assessed in this report avoids all the recommended avifaunal turbine exclusion zones (including rotor-swept areas) and is therefore deemed acceptable. Turbine N20 has been micro-sited to avoid the recommended avifaunal sensitivity buffer. The development is supported, provided the mitigation measures listed in this report are strictly applied.

Impacts on Bats

Based on the bat activity recorded at the FE Kudu Wind Energy Facility project site the significance ratings for the majority of the impacts to bats posed by the development are predicted to be medium or high before mitigation, depending on the impact being considered. After mitigation, all impacts are predicted to be of a medium to low significance. Based on the opportunity for reduction of the impacts through appropriate mitigation measures from a high or medium significance to a medium acceptable significance, no fatal flaws are expected to occur.

The specialist indicates that provided the mitigation measures are implemented, the development of the FE Kudu Wind Energy Facility will not result in unacceptable impacts to bats and can be authorised.

Impacts on Agriculture

Majority of the impacts of the FE Kudu Wind Energy Facility from an agricultural perspective will be medium or low prior to the implementation of mitigation. With the implementation of the recommended mitigation measures, all impacts can be reduced to a low acceptable level. No impacts of a high significance are expected to occur, and no fatal flaws are associated with the development from an agricultural perspective. Given the avoidance of sensitive features at the site by the facility layout no high impacts are likely to occur as a result of the development.

It is the specialist's opinion that the application be considered favourably, permitting that the mitigation measures are successfully implemented. The project infrastructure should also remain within the development area boundaries and in the positions indicated in the layout map.

Impacts on Heritage Resources (archaeology, palaeontology and cultural landscape)

The site forms part of an intact cultural landscape representative of the Central Plateau of the Great Karoo possessing heritage value for historical, aesthetic, architectural, social and scientific reasons. Based on the site suvey and assessment of potential heritage resources and receptors, a wind farm at the proposed location is acceptable from a cultural landscape perspective. There are no red flags, which identify the project to be a fatal flaw from a cultural landscape perspective. No structures or cultural landscape elements of significance are located within the area proposed for development and the optimised layout observes the recommended buffer areas and mitigation measures.

All impacts identified on the heritage resources (including archaeology, palaeontology and cultural landscape) are of a medium to high significance prior to the implementation of mitigation measures. With the implementation of the mitigation measures the impact significance will be reduced to impacts of a medium to low significance. With the opportunities presented for the reduction of impact through the implementation of the recommended mitigation measures, no unacceptable impacts of a high significance are expected to occur. No fatal flaws are therefore associated with the FE Kudu Wind Energy Facility a heritage perspective.

Noise Impacts

From the noise impacts assessed there will be a low significance for daytime construction activities, a medium significance for night-time construction activities (with mitigation proposed to reduce the significance to low), and a low significance for night-time facility operation activities and an impact to ambient sound levels at noise-sensitive receptors due to air-borne noise from the wind turbines. No impacts of a high significance after the implementation of mitigated measures, or fatal flaws were identified.

It was determined that the potential noise impacts, without mitigation, would be:

» of a high significance for the construction of access roads, although mitigation measures are available and recommended that would reduce the significance of the noise impact to low;
» of a low significance relating to noises from construction traffic;
» of a low significance for the daytime construction activities (hard standing areas, excavation and concreting of foundations and the assembly of the WTG and other infrastructure);
» of a potential low significance for the night-time construction activities (the pouring of concrete, erection of WTG);
» of a low significance for daytime operational activities (noises from wind turbines) when considering the worst-case SPL; and
» of a low significance for night-time operational activities (noises from wind turbines) when considering the worst-case SPL.

Mitigation measures are available and were included in this report, that should reduce the significance of the noise impact to low:

» of a low significance for daytime operational activities (noises from wind turbines) when considering the worst-case SPL; and
» of a low significance for night-time operational activities (noises from wind turbines) when considering the worst-case SPL.

No impacts of a high significance after the implementation of mitigation measures, or fatal flaws were identified.

Visual Impacts

The primary visual impact, namely the appearance of the wind energy facility (the wind turbines) is not possible to mitigate. The functional design of the turbines cannot be changed in order to reduce visual impacts. Alternative colour schemes (i.e., painting the turbines sky-blue, grey or darker shades of white) are currently not permissible as the SACAA's Marking of Obstacles expressly states, "Wind turbines shall be painted bright white to provide the maximum daytime conspicuousness". Failure to adhere to the prescribed colour specifications will result in the fitting of supplementary daytime lighting to the wind turbines, once again aggravating the visual impact. Night-time lighting impacts can be mitigated through the implementation of needs-based night lighting, if this is considered acceptable by the SACAA and ICASA.

Overall, the significance of the visual impacts associated with the proposed FE Kudu Wind Energy Facility is expected to be high as a result of the generally undeveloped character of the landscape. The facility would be visible within an area that contains certain sensitive visual receptors who could consider visual exposure to this type of infrastructure to be intrusive. Such visual receptors include people travelling along the national, arterial and secondary roads, as well as, residents of rural homesteads or travellers/ tourists passing through the region.

Conventional mitigation (e.g., such as screening of the structures) of the potential visual impacts is highly unlikely to succeed due to the nature of the development and the receiving environment. The overall potential for mitigation is therefore generally low.

Even though it is possible that the potential visual impacts may exceed acceptable levels within the context of the receiving environment, the proposed development is not considered to be fatally flawed.

Social Impacts

The positive effects and impacts of FE Kudu Wind Energy Facility would outweigh the negative effects. This is largely due to the fact that the project is expected to have a positive net impact on economic development, employment, household earnings, government revenue and skills development in the country and most importantly in the local community that experiences a high unemployment rate as well as a small economic base. The negative impacts that are expected to occur as a result of the project will be far more localised and would affect a significantly smaller number of people and households than in the case of the net benefits that would be derived by the project.

No negative impacts with an unacceptable level of significance following the implementation of mitigation are expected to occur from a social perspective.

Impacts on Traffic

The traffic generated during the construction phase, although significant, will be temporary and impacts are considered to be negative and of medium significance before and of low significance after mitigation. The operation phase impacts would be minimal. The decommissioning phase will result in the same impact as the construction phase as similar trips are expected. The potential traffic impact will be of medium significance before mitigation measures during the construction and decommissioning phases. However, considering that this is temporary and short term in nature, the impact can be mitigated to an acceptable level of low significance.

No impacts of high significance were identified, and no fatal flaws are associated with the FE Kudu Wind Energy Facility from a traffic perspective.

Cumulative Impacts

Based on the specialist cumulative assessment and findings, the development of the FE Kudu Wind Energy Facility and its contribution to the overall impact of all wind energy facilities to be developed within a 30km radius, it can be concluded that the FE Kudu Wind Energy Facility cumulative impacts will be of a medium to low significance with impacts of a high significance associated with impacts on bats, visual cumulative impacts and impacts on heritage. Therefore, the development of the FE Kudu Wind Energy Facility will not result in unacceptable, cumulative impacts and will not result in a whole-scale change of the environment. well as the specialist consultant.

Figure 2 provides an environmental sensitivity map of the development footprint assessed as part of the BA process, as well as the environmental sensitivities identified.

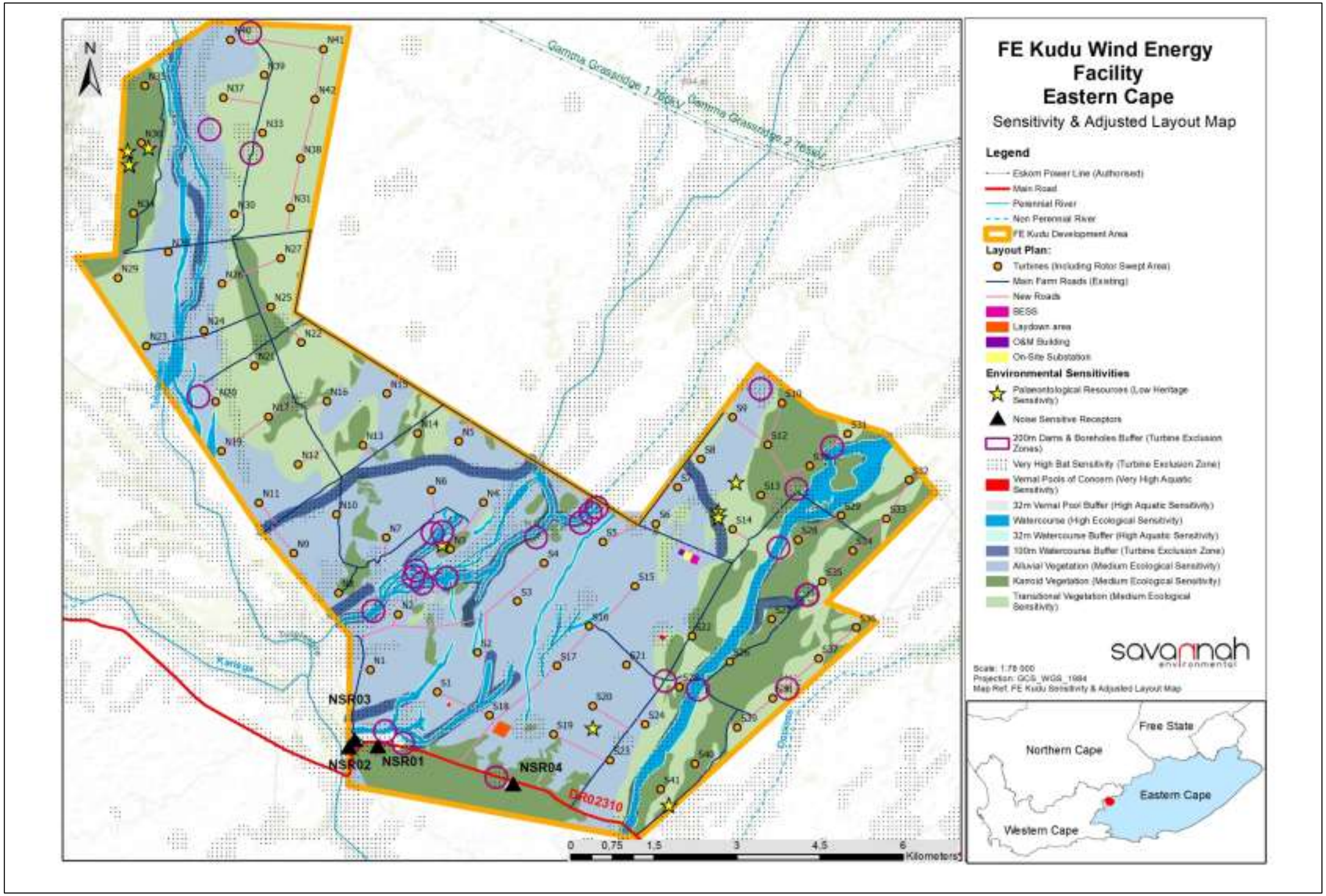

Figure 2: The development footprint (~185ha) of the FE Kudu Wind Energy Facility overlain on the identified environmental sensitive features (refer to **Appendix O**)

Overall Conclusion (Impact Statement)

The preferred activity was determined by the developer to be the development of a renewable energy facility on site using wind as the preferred technology, due to the availability of a suitable wind resource. Independent specialists appointed to undertake the assessment of potential impacts associated with the project assessed a larger area in order to inform the best location for the FE Kudu Wind Energy Facility infrastructure. The specialists considered desktop data, field work, existing literature and the National Web-based Environmental Screening Tool to inform the identification of sensitivities. A proposed layout was designed after provision of sensitivity data by the specialists with the aim of avoiding sensitive areas identified.

Based on the specialist investigations of the larger area, a technically viable development footprint was proposed by the developer and assessed as part of the BA process. The findings of the assessment of the development footprint undertaken by independent specialists have informed the results of this BA report. The specialist findings have indicated that there are no identified fatal flaws associated with the implementation of the project within the project site.

Based on the conclusions of the specialist studies and the facility layout which prioritised the avoidance of environmental sensitivities, it can be concluded that the development of the FE Kudu Wind Energy Facility will not result in unacceptable environmental impacts (subject to the implementation of the recommended mitigation measures). Impacts can be mitigated to acceptable levels or enhanced through the implementation of the recommended mitigation or enhancement measures. This is however not relevant for the visual impact of the wind farm as the turbines will be visible regardless of the mitigation applied. This high significance rating is, however, not considered as a fatal flaw by the specialist. The facility layout and EMPr presented within this BAR should therefore be authorised for implementation.

A validity period of 10 years of the Environmental Authorisation is requested, should the project obtain approval from DFFE.

DEFINITIONS AND TERMINOLOGY

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

Archaeological material: Remains resulting from human activities 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.

Commence: The start of any physical activity, including site preparation and any other activity on site furtherance of a listed activity or specified activity, but does not include any activity required for the purposes of an investigation or feasibility study as long as such investigation or feasibility study does not constitute a listed activity or specified activity.

Construction: Construction means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity. Construction begins with any activity which requires Environmental Authorisation.

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

Decommissioning: To take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily re-commissioned. This usually occurs at the end of the life of a facility.

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

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

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

Emergency: An undesired/ unplanned event that results in a significant environmental impact and requires the notification of the relevant statutory body, such as a local authority.

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

Environment: the surroundings within which humans exist and that are made up of:
i. The land, water and atmosphere of the earth;
ii. Micro-organisms, plant and animal life;
iii. Any part or combination of (i) and (ii) and the interrelationships among and between them; and
iv. The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

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

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

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

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

Heritage: That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act of 2000).

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

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

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

Method statement: A written submission to the ECO and the site manager (or engineer) by the EPC Contractor in collaboration with his/her EO.

Mitigation hierarchy: The mitigation hierarchy is a framework for managing risks and potential impacts related to biodiversity and ecosystem services. The mitigation hierarchy is used when planning and implementing development projects, to provide a logical and effective approach to protecting and conserving biodiversity and maintaining important ecosystem services. It is a tool to aid in the sustainable management of living, natural resources, which provides a mechanism for making explicit decisions that balance conservation needs with development priorities.

No-go areas: Areas of environmental sensitivity that should not be impacted on or utilised during the development of a project as identified in any environmental reports.

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.

Pollution: A change in the environment caused by substances (radio-active or other waves, noise, odours, dust or heat emitted from any activity, including the storage or treatment or waste or substances.

Pre-construction: The period prior to the commencement of construction, this may include activities which do not require Environmental Authorisation (e.g. geotechnical surveys).

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

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

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

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

Waste: means—

a) any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 to this Act; or
b) any other substance, material or object that is not included in Schedule 3 that may be defined as a waste by the Minister

Watercourse: 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

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

ACRONYMS

BA	Basic Assessment
BGIS	Biodiversity Geographic Information System
CBA	Critical Biodiversity Area
DFFE	Department of Forestry, Fisheries, and the Environment (National)
DWS	Department of Water and Sanitation
CBA	Critical Biodiversity Area
CR	Critically Endangered
CSIR	Council for Scientific and Industrial Research
DM	District Municipality
DMRE	Department of Mineral Resources Energy
EAP	Environmental Assessment Practitioner
EGIS	Environmental Geographic Information System
EMF	Environmental Management Framework
EMP	Environmental Management Plan
EMPr	Environmental Management Programme
EN	Endangered
EP	Equator Principles
ESA	Ecological Support Area
GA	General Authorisation
GHG	Greenhouse Gas
IBA	Important Bird Area
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IEP	Integrated Energy Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
IRP	Integrated Resource Plan
IUCN	International Union for Conservation of Nature
I&AP	Interested and Affected Party
km	Kilometre
kWh	Kilowatt hour
LC	Least Concern
LM	Local Municipality
LNG	Liquid Natural Gas
m	Metre
m^2	Square meters
m^3	Cubic meters
m amsl	Metres Above Mean Sea Level
MW	Megawatts
NDP	National Development Plan
NEMA	National Environmental Management Act (No. 107 of 1998)
NEM:AQA	National Environmental Management: Air Quality Act (No. 39 of 2004)
NEM:BA	National Environmental Management: Biodiversity Act (No. 10 of 2004)

NEM:WA	National Environmental Management: Waste Act (No. 59 of 2008)
NFA	National Forests Act (No. 84 of 1998)
NFEPA	National Freshwater Ecosystem Priority Area
NHRA	National Heritage Resources Act (No. 25 of 1999)
NT	Near Threatened
NWA	National Water Act (No. 36 of 1998)
ONA	Other Natural Area
PA	Protected Area
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SAIAB	South African Institute for Aquatic Biodiversity
SANBI	South African National Biodiversity Institute
SDF	Spatial Development Framework
TOPS	Threatened or Protected Species
VU	Vulnerable

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APPENDICES LIST

CHAPTER 1 INTRODUCTION

FE Kudu (Pty) Ltd, a Special Purpose Vehicle (SPV), proposes the development of a wind energy facility and associated infrastructure, on a site located approximately 40km west of the town of Aberdeen in the Eastern Cape Province. The site is located within the Dr Beyers Naude Local Municipality in the greater Sarah Baartman District Municipality. The entire extent of the site falls within the Beaufort West Renewable Energy Development Zone (REDZ)[2]. The facility is to be known as FE Kudu Wind Energy Facility.

The project is planned as part of a cluster of renewable energy projects, which includes a second facility, FE Tango Wind Energy Facility, located approximately 20km to the east of the site. The FE Kudu Wind Energy Facility has a planned capacity up to 600MW. The wind energy facility will connect to the national grid at a planned Aberdeen Collector Substation via a 132kV grid connection solution[3].

The facility is proposed in response to identified objectives of the national and provincial government, and local and district municipalities to develop renewable energy facilities for power generation purposes. It is the Developer's intention to bid the wind energy facility under the Department of Mineral Resource and Energy's (DMRE) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or other public or private off-taker programmes. The power generated is intended to be sold either to Eskom to be fed into the national electricity grid, or as required by the off-taker programme. The development of the wind energy facilities will assist in achieving the energy mix (through a process of diversification) as set out in the Integrated Resources Plan (IRP), as well as aiding in the stabilisation of the country's electricity supply.

As the project has the potential to impact on the environment, an Environmental Impact Assessment process is required to be completed in support of an application for Environmental Authorisation prior to the commencement of construction of the project. The entire extent of the site falls within the Beaufort West REDZ, and therefore the undertaking of a Basic Assessment (BA) process is applicable as per GNR114 of February 2018. This BA Report describes and assesses this proposed project and consists of the following chapters:

- **Chapter 1** provides background to the proposed FE Kudu Wind Energy Facility and the basic assessment process.
- **Chapter 2** provides a description of the wind energy facility and the infrastructure associated with the facility.
- **Chapter 3** provides the site selection information and identified project alternatives.
- **Chapter 4** describes wind energy as a power generation option and provides insight to technologies for wind energy.
- **Chapter 5** outlines the strategic regulatory and legal context for energy planning in South Africa and specifically for the proposed facility.
- **Chapter 6** describes the need and desirability of the FE Kudu Wind Energy Facility within the project site.
- **Chapter 7** outlines the approach to undertaking the basic assessment process.

[2] The REDZ are zones identified by the Department of Environment, Forestry and Fisheries (DEFF) as geographical areas of strategic importance for the development of large-scale solar PV and wind energy development activities and which have been earmarked for the development of renewable energy facilities within South Africa as per GNR114 of February 2018.

[3] The wind energy grid connection solution will be subject to a separate Application for Environmental Authorisation.

- **Chapter 8** describes the existing biophysical and socio-economic environment within and surrounding the project site.
- **Chapter 9** provides a sensitivity analysis of the project site and development footprint.
- **Chapter 10** provides an assessment of the potential issues and impacts associated with the wind energy facility and associated infrastructure and presents recommendations for the mitigation of significant impacts.
- **Chapter 11** provides an assessment of the potential for cumulative impacts.
- **Chapter 12** presents the conclusions and recommendations based on the findings of the BA Report.
- **Chapter 13** provides references used in the compilation of the BA Report.

The Environmental Management Programme (EMPr) is included in **Appendix N**.

1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

The National Environmental Management Act (NEMA, Act No. 107 of 1998) is the national legislation that provides for the authorisation of certain controlled activities known as 'listed activities.' In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be considered, investigated, assessed, and reported on to the Competent Authority (the decision-maker) charged by the NEMA with the granting of the relevant environmental authorisation being applied for through this BA process.

The development (i.e., construction and operation) of FE Kudu Wind Energy Facility is subject to the requirements of the EIA Regulations of 2014 (as amended), published in terms of Section 24(5) of NEMA. Therefore, in terms of the EIA Regulations of 2014, promulgated under Section 24 and 24D of NEMA, various aspects of the project are listed as activities that may have a detrimental impact on the environment. The primary listed activity triggered is Activity 1 of Listing Notice 2 (GN R325) which relates to the development of facilities or infrastructure for the generation of electricity from a renewable resource where the generating capacity is 20MW or more. FE Kudu Wind Energy Facility will have a contracted capacity of up to 600MW.

This BA report has been prepared in accordance with the requirements of the EIA Regulations published on 08 December 2014 (as amended in April 2017) promulgated in terms of Chapter 5 of the National Environmental Management Act (Act No 107 of 1998). This chapter of the BA report includes the following information required in terms of Appendix 1: Content of basic assessment reports:

Requirement	Relevant Section
3(a) the details of the (i) EAP who prepared the report and (ii) the expertise of the EAP, including a curriculum vitae.	The details of the EAP who prepared the report and the expertise of the EAP is included in section 1.3. The curriculum vitae of the EAP and project team are included in **Appendix A**.
3(b) the location of the activity including (i) the 21 digit Surveyor General code of each cadastral land parcel, (ii) where available the physical address and farm name and (iii) where the required information in items (i) and (ii) is not available, the co-ordinates of the boundary of the property or properties.	The location of the FE Kudu Wind Energy Facility is included in section 1.2, **Table 1.1** and **Figure 1.1**. The information provided includes the 21-digit Surveyor General code of the affected properties and the farm names. Additional information is also provided regarding the location of the development which includes the relevant province, local and district municipalities, ward and current land zoning.

2. Project Overview

A project site[4] consisting of a single affected property (**Figure 1.1** and **Table 1.1**), has been identified as the preferred area for the development of the turbines and the associated infrastructure of the FE Kudu Wind Energy Facility. The project site and development area[5] is located on Portion 2 of Farm Oorlogspoort 85.

The identification of the project site and development area was undertaken through a site selection process which included a regional screening process assessing aspects including wind speed, predominant wind direction, grid connection costs, site accessibility, site topography and ecological features. This confirmed the suitability of the development area for a wind energy facility, and provided an upfront understanding of the potential social and environmental challenges which may be present within the project site and surrounding areas.

The project site/development area has an extent of ~9 170ha, which is considered sufficient in extent (allowing sufficient space to avoid any major environmental sensitivities) and suitable from a technical perspective for the development of up to 80 wind turbines with a contracted capacity of up to 600MW. The smaller facility development footprint[6] will be sited within the development area, with an estimated disturbance area of up to 185ha of the development area. The infrastructure associated with the 600MW FE Kudu Wind Energy Facility will include:

- Up to 80 wind turbines, turbine foundations and turbine hardstands
- An on-site substation hub incorporating:
  - A132kV on-site facility substation
  - Switchyard with collector infrastructure
  - Battery Energy Storage System (BESS)
  - Operation and Maintenance buildings
- A balance of plant area incorporating:
  - Temporary laydown areas
  - A construction camp laydown and temporary concrete batching plant
- Power lines internal to the wind farm, trenched and located adjacent to internal access roads, where feasible[7].
- Access roads to the site and between project components with a width up to 8m for primary access routes.

Access to the facility will be via an existing (unnamed) gravel road originating off the DR02310 which turns off from the R61 between Beaufort West and Aberdeen. A main access road up to 8m in width will provide access to the facility. It is likely sections of this road will require upgrading and widening to 8m to

[4] The project site is that identified area within which the development area and development footprint are located. It is the broader geographic area assessed as part of the BA process, within which indirect and direct effects of the project may occur. The project site is ~9 170ha in extent. The project site is the entire extent of the property for the wind farm, namely Portion 2 of Farm Oorlogspoort 85.
[5] The development area is that identified area where the 600MW wind energy facility is planned to be located. This area has been selected as a practicable option for the facility, considering technical preference and constraints. The development area is ~9 170ha in extent.
[6] The development footprint is the defined area (located within the development area) where the wind farm and other associated infrastructure for the facility is planned to be constructed. This is the actual footprint of the facility, and the area which would be disturbed.
[7] The intention is for internal project cabling to follow the internal roads.

accommodate the movement of heavy vehicles. This existing road traverses the Remaining Extent of Farm Pretorius Kuil 89 and Portion 2 of Farm Oorlogspoort 85.

The key infrastructure components proposed as part of the project is described in greater detail in Chapter 2 of this BA Report. Details of the FE Kudu Wind Energy Facility and associated infrastructure to be developed is included in **Table 1.1**. **Figure 1.1** provides a locality map of the FE Kudu Wind Energy Facility.

Table 1.1: A detailed description of the FE Kudu Wind Energy Facility and associated infrastructure.

<table>
<tr><td>Province</td><td colspan="3">Eastern Cape</td></tr>
<tr><td>District Municipality</td><td colspan="3">Sarah Baartman District Municipality</td></tr>
<tr><td>Local Municipality</td><td colspan="3">Dr Beyers Naude Local Municipality</td></tr>
<tr><td>Ward number(s)</td><td colspan="3">Ward 1</td></tr>
<tr><td>Nearest town(s)</td><td colspan="3">Aberdeen (40km west of the FE Kudu Wind Energy Facility)</td></tr>
<tr><td>Affected Properties: Farm name(s), number(s) and portion numbers</td><td colspan="3"><u>Wind Farm:</u>
» Portion 2 of Farm Oorlogspoort 85

<u>Access Road</u>
» Portion 2 of Farm Oorlogspoort 85
» Remaining Extent of Farm Pretorius Kuil 89</td></tr>
<tr><td>SG 21 Digit Code (s)</td><td colspan="3">» C00100000000008500002 - Portion 2 of Farm Oorlogspoort 85
» C00100000000008900000 - Remaining Extent of Farm Pretorius Kuil 89</td></tr>
<tr><td>Current zoning and land use</td><td colspan="3">Zoning: Agricultural
Land Use: Farming</td></tr>
<tr><td>Site central coordinates</td><td colspan="3">32°27'44.58"S, 23°34'31.98"E</td></tr>
<tr><td rowspan="4">Start, middle and end points of the access road to be upgraded</td><td></td><td>Latitude</td><td>Longitude</td></tr>
<tr><td>Start</td><td>32°30'58.28"S</td><td>23°36'34.75"E</td></tr>
<tr><td>Middle</td><td>32°29'50.08"S</td><td>23°35'0.61"E</td></tr>
<tr><td>End</td><td>32°29'30.91"S</td><td>23°32'39.80"E</td></tr>
<tr><td rowspan="13">Site Corner Coordinates</td><td></td><td>Latitude</td><td>Longitude</td></tr>
<tr><td>Corner 1</td><td>32°24'29.46"S</td><td>23°29'36.93"E</td></tr>
<tr><td>Corner 2</td><td>32°22'46.75"S</td><td>23°30'10.13"E</td></tr>
<tr><td>Corner 3</td><td>32°22'10.09"S</td><td>23°31'17.62"E</td></tr>
<tr><td>Corner 4</td><td>32°22'14.43"S</td><td>23°32'48.88"E</td></tr>
<tr><td>Corner 5</td><td>32°25'3.81"S</td><td>23°32'6.27"E</td></tr>
<tr><td>Corner 6</td><td>32°27'8.90"S</td><td>23°36'4.32"E</td></tr>
<tr><td>Corner 7</td><td>32°25'34.88"S</td><td>23°37'26.27"E</td></tr>
<tr><td>Corner 8</td><td>32°26'51.50"S</td><td>23°39'29.31"E</td></tr>
<tr><td>Corner 9</td><td>32°28'5.73"S</td><td>23°38'48.27"E</td></tr>
<tr><td>Corner 10</td><td>32°30'11.84"S</td><td>23°36'4.85"E</td></tr>
<tr><td>Corner 11</td><td>32°29'40.19"S</td><td>23°32'38.24"E</td></tr>
<tr><td>Corner 12</td><td>32°28'14.81"S</td><td>23°32'44.20"E</td></tr>
</table>

FE Kudu (Pty) Ltd has confirmed that the project site is particularly suitable for wind energy development from a technical perspective due to the strength of the wind speed, predominant wind direction, grid connection costs, site accessibility, site topography and ecological features. The unique features of this site eliminate the possibility of alternatives with similar site conditions. Alternatives are restricted to on-site aspects such as turbine footprints and layouts, roads and related infrastructure option (refer to Chapter 3 for further details). Depending on the final turbine selection, the estimated total contracted capacity for the wind farm is up to 600MW.

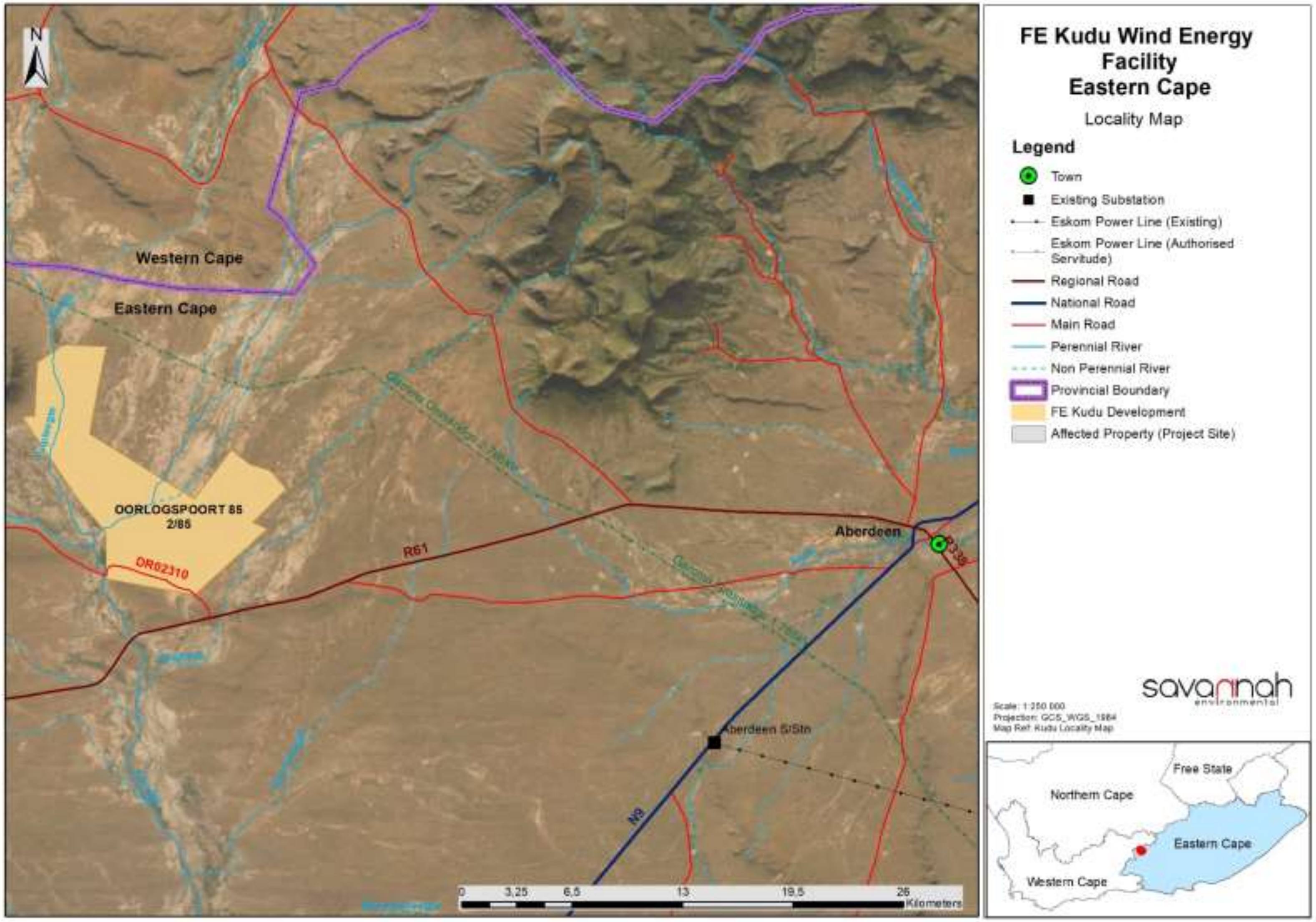

Figure 1.1: Locality map illustrating the location of the development area for the FE Kudu Wind Energy Facility and associated infrastructure

3. Details of the Environmental Assessment Practitioner and Expertise to conduct the BA process

In accordance with Regulation 12 of the 2014 EIA Regulations (GNR 326), FE Kudu (Pty) Ltd has appointed Savannah Environmental (Pty) Ltd as the independent Environmental Assessment consultant to undertake the Basic Assessment and prepare the BA Report for the proposed FE Kudu Wind Energy Facility. Neither Savannah Environmental nor any of its specialists are subsidiaries of, or are affiliated to FE Kudu (Pty) Ltd. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed project.

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

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

» **Karen Jodas** holds a Master of Science Degree and is registered as a Professional Natural Scientist (400106/99) with the South African Council for Natural Scientific Professions (SACNASP) and is registered with the Environmental Assessment Practitioners Association of South Africa (EAPASA 2022/5499). She has gained extensive knowledge and experience on potential environmental impacts associated with electricity generation and transmission projects through her involvement in related EIA processes over the past 25 years. She has successfully managed and undertaken EIA processes for infrastructure development projects throughout South Africa.
» **Chantelle Geyer** holds a BSc degree in Environmental Science, and a BSc Honours degree in Environmental Geology and is a Candidate Environmental Assessment Practitioner with the Environmental Assessment Practitioners Association of South Africa (EAPASA 2022/5021). Regulation 14(6) states that when acting under supervision of a registered environmental assessment practitioner, a registered candidate environmental assessment practitioner may assist with the performance of tasks associated with the EIA. She is an Environmental Consultant and Lead GIS Consultant and specialises in basic assessments, environmental impact assessments, GIS-mapping, public participation administration, environmental management programmes, and environmental compliance.
» **Nicolene Venter** is the public participation consultant for the project. She is a Board Member of IAPSA (International Association for Public Participation South Africa). She holds a Higher Secretarial Diploma and has over 27 years of experience in public participation, stakeholder engagement, awareness creation processes and facilitation of various meetings (focus group, public meetings, workshops, etc.). She is responsible for project management of public participation processes for a wide range of environmental projects across South Africa and neighbouring countries.

In order to adequately identify and assess potential environmental impacts associated with the proposed FE Kudu Wind Energy Facility, the following specialist consultants have provided input into this BA Report:

Company	Specialist Area and Expertise	Specialist Name
Jamie Pote (Independent Specialist)	Terrestrial Ecology	Jamie Pote
The Biodiversity Company	Freshwater and surface water ecology	Dale Kindler

AfriAvian Environmental	Avifauna	Albert Froneman Megan Loftie-Eaton
ERM Southern Africa	Bats	Craig Campbell Dieter Rodewald
Terra Africa	Soils and Agricultural potential	Mariné Pienaar
CTS Heritage	Heritage (including cultural landscape, archaeology and palaeontology)	Jenna Lavin
Enviro Acoustic Research	Noise	Morné de Jager
LOGIS	Visual	Lourens du Plessis
Tony Barbour (Independent Specialist)	Social	Tony Barbour Schalk van der Merwe
iWink Consulting	Traffic	Iris Wink

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

CHAPTER 2 PROJECT DESCRIPTION

This chapter provides an overview of the FE Kudu Wind Energy Facility and details the project scope, which includes the planning/design, construction, operation and decommissioning activities required for the development.

2.1. Legal Requirements as per the EIA Regulations, 2014 (as amended)

This chapter of the Basic Assessment report includes the following information required in terms of the EIA Regulations, 2014 - Appendix 1: Content of Basic Assessment reports:

Requirement	Relevant Section
3(b) the location of the activity including (i) the 21-digit Surveyor General code of each cadastral land parcel, (ii) where available the physical address and farm name and (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties.	The location of the proposed project is detailed in Chapter 1, **Table 1.1**, as well as **section 2.2.1** below.
3(c)(i)(ii) a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or on land where the property has not been defined, the coordinates within which the activity is to be undertaken	A layout map illustrating the development footprint of the FE Kudu Wind Energy Facility, including associated infrastructure is included as **Figure 2.1**. This development footprint has been assessed within this Basic Assessment Report and the independent specialist studies.
3(d)(ii) a description of the scope of the proposed activity, including a description of the activities to be undertaken including associated structures and infrastructure	A description of the activities to be undertaken with the development of project is included in **Table 2.1** and **Table 2.2**.

2.2 Nature and extent of FE Kudu Wind Energy Facility

The FE Kudu Wind Energy Facility and associated infrastructure will add capacity to the national electricity grid, which will comprise up to 80 wind turbines with a contracted capacity of up to 600MW. The optimum turbine for use at the site is yet to be determined, and it is considered that each turbine could have a generating capacity of up to 7.5MW (with a hub height of up to 164m and a tip height of up to 250m). The final turbine capacity and model will be dependent on what is deemed suitable for the site in relation to, among other things, further studies of the wind regime, terrain, and outcome of the final engineering, procurement and construction (EPC) tendering process. The wind energy facility is proposed to connect to the national grid at a planned Aberdeen Collector Substation via a 132kV grid connection solution[1].

2.2.1. Project Site, Development Area and Development Footprint

[1] The wind energy grid connection solution will be subject to a separate Application for Environmental Authorisation.

The site is located ~40km west of the town of Aberdeen within the Dr Beyers Naude Local Municipality and the greater Sarah Baartman District Municipality, in the Eastern Cape Province. A project site[2] has been identified as the preferred area for the development of the turbines and the associated infrastructure of the FE Kudu Wind Energy Facility. The project site and development area[3] consists of a single property, namely Portion 2 of Farm Oorlogspoort 85.

The project site/development area has an extent of ~9 170ha, which is considered sufficient in extent (allowing sufficient space to avoid any major environmental sensitivities) and suitable from a technical perspective for the development of up to 80 wind turbines with a contracted capacity of up to 600MW.

The identification of the project site was undertaken through a site selection process which included a regional screening process, as well a specific specialist input, to inform and confirm the suitability of the project site for the development of a wind energy facility and provide an upfront understanding of the potential social and environmental challenges which may be present within the project site and surrounding areas.

Access to the facility will be via an existing (unnamed) gravel road originating off the DR02310 which turns off from the R61 between Beaufort West and Aberdeen (refer to **Figure 2.1**). A main access road up to 8m in width will provide access to the facility. It is likely sections of this road will require upgrading and widening to 8m to accommodate the movement of heavy vehicles. This existing road traverses the Remaining Extent of Farm Pretorius Kuil 89 and Portion 2 of Farm Oorlogspoort 85.

The entire extent of the site falls within the Beaufort West Renewable Energy Development Zones (i.e., REDZ Focus Area 11) as well as the Eastern Corridor of the Strategic Transmission Corridor. A development area of approximately 9 170ha has been identified within the project site and assessed as part of the Basic Assessment process. Within this development area a development footprint, or area to be transformed is estimated to be up to 185ha.

[2] The project site is that identified area within which the development area and development footprint are located. It is the broader geographic area assessed as part of the Basic Assessment process, within which indirect and direct effects of the project may occur. The project site is ~9 170ha in extent, and includes Portion 2 of Farm Oorlogspoort 85.

[3] The development area is that identified area where the 600MW wind energy facility is planned to be located. This area has been selected as a practicable option for the facility, considering technical preference and constraints. The development area is ~9 170ha in extent and includes Portion 2 of Farm Oorlogspoort 85.

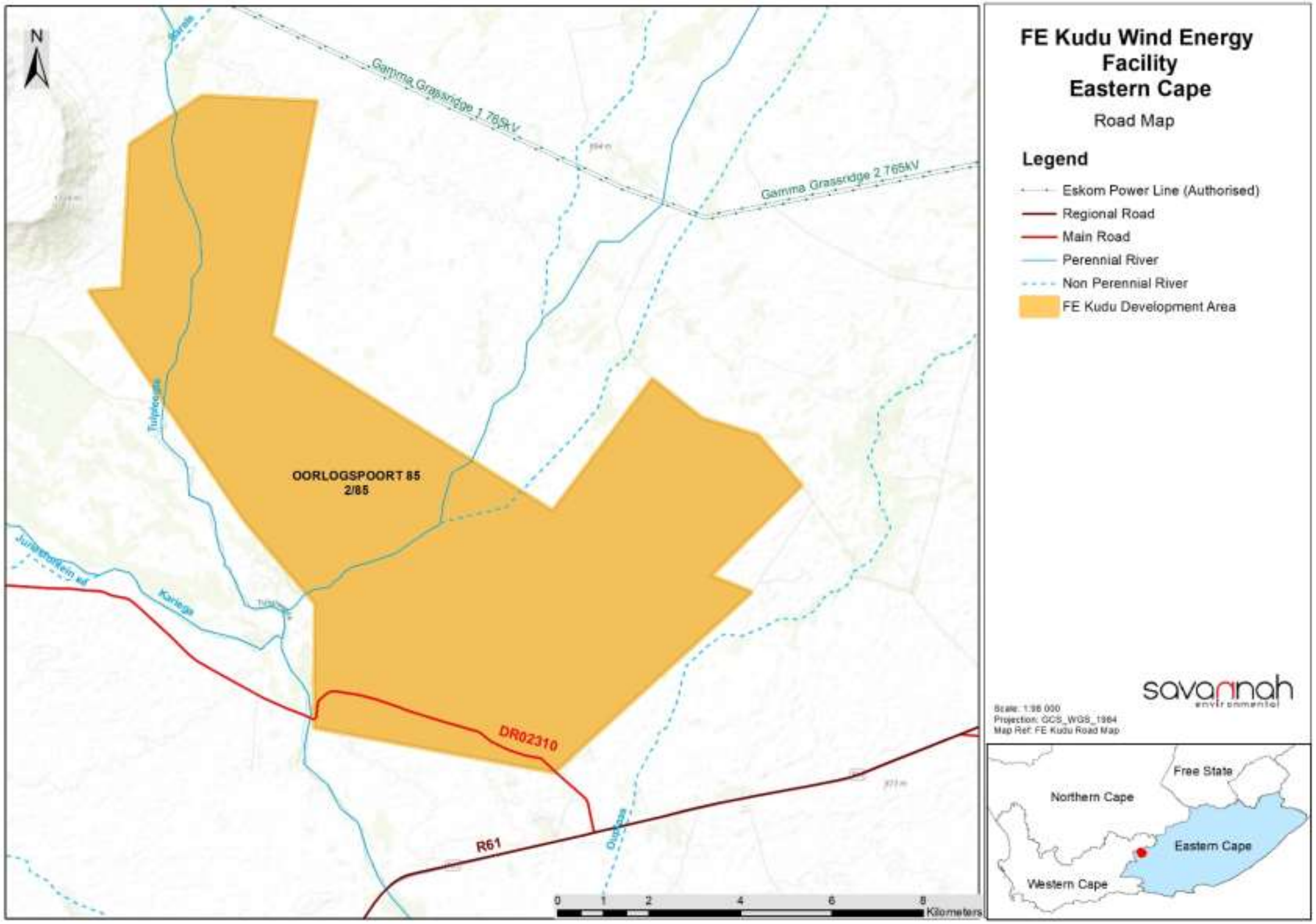

Figure 2.1: Illustration of the roads providing access to the FE Kudu Wind Energy Facility

2.2.2. *Components of the FE Kudu Wind Energy Facility*

The project site is proposed to accommodate both the wind turbines as well as the associated infrastructure which is required for such a facility. The infrastructure associated with the 600MW FE Kudu Wind Energy Facility, and will include:

» Up to 80 wind turbines, turbine foundations and turbine hardstands
» An on-site substation hub incorporating:
  - A132kV on-site facility substation
  - Switchyard with collector infrastructure
  - Battery Energy Storage System (BESS)
  - Operation and Maintenance buildings
» A balance of plant area incorporating:
  - Temporary laydown areas
  - A construction camp laydown and temporary concrete batching plant
» Power lines internal to the wind farm, trenched and located adjacent to internal access roads, where feasible[11].
» Access roads to the site and between project components with a width up to 8m for primary access routes.

A summary of the details and dimensions of the planned infrastructure associated with the project is provided in **Table 2.1.** The confirmed details and dimensions of the facility development footprint have been assessed as part of the independent specialist studies. **Figure 2.1** illustrates the proposed development footprint (i.e., area proposed to be transformed) within the development area of the FE Kudu Wind Energy Facility, as assessed in this Basic Assessment report.

Table 2.2 provides the details regarding the requirements and the activities to be undertaken during the project development phases, and **Table 2.3** provides photographs of the construction phase of a wind farm similar in nature to the FE Kudu Wind Energy Facility.

[11] The intention is for internal project cabling to follow the internal roads.

Table 2.1: Summary of the details and dimensions of the planned infrastructure associated with the FE Kudu Wind Energy Facility and associated infrastructure.

Infrastructure	Footprint and dimensions
Location of the site	40km West of Aberdeen, Eastern Cape Province
The total area of the site	~9 170ha
Development footprint (area transformed by permanent infrastructure)	Up to 185ha (including associated infrastructure) will include permanent infrastructure.
Number of turbines	Maximum of 80 turbines
Turbine hub height	Up to 164m
Turbine top tip height	Up to 250m
Blade length	Minimum ~100m
Rotor swept area	up to 21 000m^2
Contracted capacity of the facility	Up to 600MW (turbines up to 7.5MW in capacity)
Tower type	Steel towers, and/or concrete towers, and/or towers of a hybrid nature, comprising concrete towers with top steel sections.
Area occupied by the on-site facility substation	The on-site facility substation will cover an approximate footprint of up to 2ha.
Capacity of on-site facility substation	132kV
On-site substation coordinates	<table><tr><th></th><th>Latitude</th><th>Longitude</th></tr><tr><td>**Corner 1**</td><td>32°27'25.65"S</td><td>23°36'35.47"E</td></tr><tr><td>**Corner 2**</td><td>32°27'27.35"S</td><td>23°36'40.22"E</td></tr><tr><td>**Corner 3**</td><td>32°27'31.71"S</td><td>23°36'37.96"E</td></tr><tr><td>**Corner 4**</td><td>32°27'29.62"S</td><td>23°36'33.20"E</td></tr></table>
Underground cabling	Underground cabling, with a capacity of 33kV, will be installed to connect the turbines to the on-site facility substation.
Battery Energy Storage System (BESS)	» Solid state battery technology (e.g. Lithium-ion technology) as a preferred technology. » BESS will be housed in containers approximately 20m long, 3m wide, and 5m high with an approximate footprint of up to 5ha.
BESS Coordinates	<table><tr><th></th><th>Latitude</th><th>Longitude</th></tr><tr><td>**Corner 1**</td><td>32°27'27.39"S</td><td>23°36'40.83"E</td></tr><tr><td>**Corner 2**</td><td>32°27'29.33"S</td><td>23°36'45.53"E</td></tr></table>

	Corner 3 — 32°27'33.81"S — 23°36'43.17"E **Corner 4** — 32°27'31.83"S — 23°36'38.31"E
Operation and maintenance (O&M) buildings	~ 1ha in extent
Balance of plant area	A balance of plant hub placed within the development footprint will include: • Temporary laydown areas up to 6ha in extent. • Temporary warehouse of 1ha • Temporary site camp establishment and concrete batching plants of 1ha
Access and internal roads – Main road	Main access road to the site and between project components with a width up to 8m and a servitude of 13.5m.
Access and internal roads – Internal network	Road network between project components with a width up to 8m
Turbine hardstand footprint	For each turbine: ~up to 7500m^2 for the turbine hardstand area
Turbine foundation footprint	~ 1000m^2 per turbine
Temporary infrastructure total area	Temporary infrastructure (including crane hardstanding areas, laydown and compound areas and a concrete batching plant) will be required during the construction phase. All temporary infrastructure will be rehabilitated following the completion of the construction phase, where it is not required for the operation phase.
Grid line connection to Eskom grid	The grid line connection required to connect the facility to the national grid will primarily be located outside of the project site and will be assessed as part of a separate Basic Assessment process.

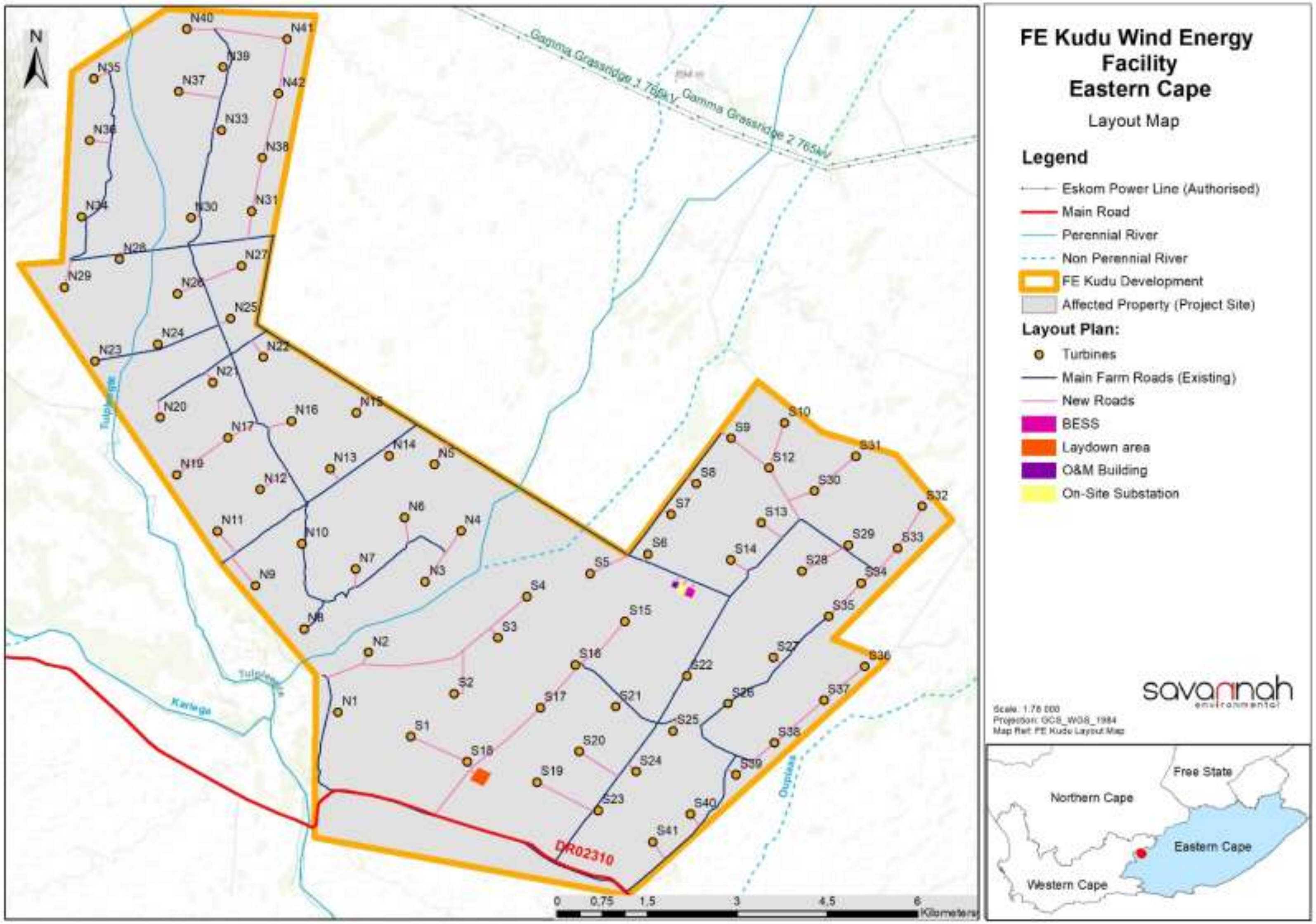

Figure 2.2: Illustration of the planned facility infrastructure assessed for the FE Kudu Wind Energy Facility

2.2.3 Project Development Phases associated with the FE Kudu Wind Energy Facility

Table 2.2: Details of the project development phases (i.e. construction, operation and decommissioning)

Construction Phase	
Requirements	» Project requires Environmental Authorisation from DFFE, a generation license issued by NERSA (if required), and a secured Power Purchase Agreement. » Duration dependent on the number of turbines; expected to be 24-30 months. » Create direct construction employment opportunities. Up to 250-300 jobs created and maintained for approximately two years. The employment will include low skilled (55%), semi-skilled (30%) and skilled (15%) opportunities. » No on-site labour camps. Employees to be accommodated in the nearby towns such as Aberdeen and other suitable accommodation and will be transported to and from site by bus on a daily basis. » Overnight on-site worker presence would be limited to security staff. » Waste removal and sanitation will be undertaken by a sub-contractor or the municipality, where possible. Waste containers, including containers for hazardous waste, will be located at each crane pad, site camp and laydown (and compound) area when construction activities are active. » Electricity required for construction activities will be generated by a generator or will be sourced from available Eskom distribution networks in the area. » Water will be required for the construction phase and will largely be used for road construction, hardstand compaction, concrete batching, cleaning equipment after concrete pours and dust suppression on roads. Sources being considered for water supply include the Dr Beyers Naude Local Municipality, or supply from a Private Contractor which may include extraction from any bulk water supply lines.
Activities to be undertaken	
Conduct surveys prior to construction	» Including, but not limited to: a geotechnical survey, site survey and confirmation of the turbine micro-siting footprint, survey of the on-site facility substation and laydown area, BESS and O&M buildings to determine and confirm the locations of all associated infrastructure.
Establishment of access roads to the site	» Access/haul roads and internal access roads within the site will be established at the commencement of construction. » Existing access roads will be utilised where possible to minimise impact and upgraded where required. » Main access road/s to the site will have a width of up to 8m. » Access roads to be established between the turbines for construction and/or maintenance activities within the development footprint. » Internal service road alignment will be within a servitude of approximately 8m wide during construction.
Undertake site preparation	» Including the clearance of vegetation at the footprint of each turbine, establishment of the laydown and compound areas, the establishment of internal access roads and excavations for foundations. » Stripping of topsoil to be stockpiled, backfilled and/or removed from site. » To be undertaken in a systematic manner to reduce the risk of exposed ground being subjected to erosion. » Include search and rescue of floral species of concern (where required) and the identification and excavation of any sites of cultural/heritage value (where required).
Establishment of laydown and compound areas	» A laydown and compound area for the storage of wind turbine components, including the cranes required for tower/turbine assembly and civil engineering construction equipment. » The laydown and compound area will also accommodate building materials and equipment associated with the construction of buildings.

and batching plant on site	» A crane hardstand at each turbine position where the main lifting crane will be erected and/or disassembled. The total turbine hardstand footprint will be ~up to 7500m^2. » Infilling or depositing materials will be sourced from licensed operators/ borrow pits, as close as possible to the site. If a new borrow pit is required to be established, then it will comply with all statutory requirements. » A temporary site camp and concrete batching plant of ~1ha in extent to facilitate the concrete requirements for turbine foundations.
Construct foundation	» Concrete foundations of approximately ~ 1000m^2 with a depth to be determined (depending on soil type), in extent to be constructed at each turbine location. » Excavations to be undertaken mechanically and filled with steel-reinforced concrete. » Concrete foundation will be constructed to support a mounting ring. » Depending on geological conditions, the use of alternative foundations may be considered (e.g. reinforced piles).
Transport of components and equipment to and within the site	» Turbine units to be transported includes the tower segments, hub, nacelle, and three rotor blades. » Components to be transported to the site in sections on flatbed trucks by the turbine supplier. Imported components to be transported from the Port of Ngqura in Coega, Port Elizabeth (preferred route) or the Port of Saldanha, Western Cape. » Transportation will take place via appropriate National and Provincial roads, and the dedicated access/haul road to the site. » Components considered as abnormal loads in terms of Road Traffic Act (Act No 29 of 1989) due to dimensional limitations (abnormal length of the blades) and load limitations (i.e. the nacelle) will require a permit for the transportation of the abnormal loads on public roads. » Specialised construction and lifting equipment to be transported to site to erect the wind turbines. » Civil engineering construction equipment to be brought to the site for the civil works (e.g. excavators, trucks, graders, compaction equipment, cement trucks, site offices etc.). » Components for the establishment of the substation (including transformers) and associated infrastructure to be transported to site.
Construction of the turbine	» A lifting crane will be utilised to lift the tower sections, nacelle and rotor into place. » Approximately 1 week is required to erect a single turbine depending on climatic conditions. » Lifting cranes are required to move between the turbine sites.
Construction of the on-site facility substation)	» Infrastructure, including the onsite facility substation hub will be constructed. » The infrastructure will be constructed adjacent one another.
Connection of wind turbines to the substation	» Each wind turbine is to be connected to the onsite facility substation via underground electrical cables. » Excavation of trenches are required for the installation of the cables. Trench depth will vary, but will be compliant with appropriate regulations depending on the specific application, design and loading requirements. » Underground cables are planned to follow the internal access roads, as far as possible.
Establishment of ancillary infrastructure	» A Control Centre, Offices, Warehouse, Workshop, Canteen, Visitors Centre, Staff Lockers, temporary storage areas and a construction laydown area will be required. » Establishment will require the clearing of vegetation, levelling and the excavation of foundations prior to construction.
Undertake site rehabilitation	» Commence with rehabilitation efforts once construction is completed in an area, and all construction equipment is removed. » On commissioning, access points to the site that will not be required for the operation phase will be closed and prepared for rehabilitation.
Operation Phase	

Requirements	» Duration will be 20-25 years » Requirements for security, monitoring and maintenance of the facility. » Employment opportunities relating mainly to operation activities and maintenance. Between 20-30 employment opportunities will be available and will include low skilled (50%), semi-skilled (40%) and skilled (10%) employment opportunities. » Current land-use activities, i.e. farming activities, being undertaken within the project site can continue during the operation of the wind energy facility.
Activities to be undertaken	
Operation and Maintenance	» Full time security, maintenance and control room staff. » All turbines will be operational except under circumstances of mechanical breakdown, inclement weather conditions, or maintenance activities. » Wind turbines to be subject to periodic maintenance and inspection. » Disposal of waste products (e.g., absorbents, filter materials (including oil filters), wiping cloths, protective clothing contaminated by maintenance chemicals, organic waste containing chemicals (e.g. nacelle cooling water), lead batteries, spent waxes and fats, synthetic machine and gear oil and mineral-based non-chlorinated hydraulic oils in accordance with relevant waste management legislation. » The construction period laydown area will be rehabilitated. The temporary hardstand area (boom erection, storage and assembly area) will also be rehabilitated. » Crane hardstands would be left for unplanned maintenance/ replacement of the blades or nacelle.
Decommissioning Phase	
Requirements	» Decommissioning of the FE Kudu Wind Energy Facility infrastructure at the end of its economic life. » Potential for repowering of the facility if the PPA can be renegotiated, and redesign possible and feasible, then the upgrade of the facility will be a consideration. » Expected lifespan of approximately 20 - 25 years (with maintenance) before decommissioning is required. » The decommissioning phase of the project is also expected to create skilled and unskilled employment opportunities. » Decommissioning activities to comply with the legislation relevant at the time.
Activities to be undertaken	
Site preparation	» Confirming the integrity of site access to accommodate the required equipment and lifting cranes. » Preparation of the site (e.g. laydown areas and construction platform). » Mobilisation of construction equipment.
Disassemble and remove turbines	» Large crane required for the disassembling of the turbine and tower sections. » Components to be reused, recycled, or disposed of in accordance with regulatory requirements. » All parts of the turbine would be considered reusable or recyclable » Concrete will be removed to a depth as defined by an agricultural specialist and the area rehabilitated. » Cables will be excavated and removed, as may be required. » The turbines may also be traded or sold as there is an active second hand market for wind turbines and/or it may be used as scrap metal.
Components to be disposed of or recycled.	» Foundation » Tower » Electrical facilities in tower base » Rotor » Generator » Machine house

	» Regarding the foundation body and sub-base of the tower, the concrete will undergo crushing and be used as combined base/wearing course » Reinforcing steel will go through cleansing and milling to re-melt the components

It is expected that the areas of the project site affected by the wind farm infrastructure (development footprint) will revert back to their original land-use (i.e., primarily grazing) once the FE Kudu Wind Energy Facility has reached the end of its economic life and all infrastructure has been decommissioned.

CHAPTER 3: ALTERNATIVES

This chapter details the preferred site location, activity, layout and technology alternatives as well as the 'do nothing' option for the FE Kudu Wind Energy Facility.

3.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the BA Report includes the following information required in terms of the EIA Regulations, 2014 - Appendix 1: Content of basic assessment reports:

Requirement	Relevant Section
3(g) a motivation for the preferred site, activity and technology alternative	The identification and motivation for the preferred project site, the development footprint, the proposed activity and the proposed technology is included in **sections 3.3.1, 3.3.2 and 3.3.3.**
3(h)(i) details of the alternative considered	The details of all alternatives considered as part of the FE Kudu Wind Energy Facility is included in **sections 3.3.1 – 3.3.** A summary of the alternatives is also included in **section 3.3.**
3(h)(ix) the outcome of the site selection matrix	The site selection process followed by the developer in order to identify the preferred project site and development footprint is described in **section 3.3.1.**
3(h)(x) if no alternatives, including alternative locations for the activity were investigation, the motivation for not considering such	Where no alternatives have been considered, motivation has been included. This is included in **section 3.3.**

3.2 Alternatives Considered during the BA Process

In accordance with the requirements of Appendix 1 of the 2014 Environmental Impact Assessment (EIA) Regulations (GNR 326), reasonable and feasible alternatives including but not limited to site and technology alternatives, as well as the "do-nothing" alternative should be considered.

The DFFE Guideline for determining alternatives states that the key criteria for consideration when identifying alternatives are that they should be "practicable", "feasible", "relevant", "reasonable" and "viable". Essentially there are two types of alternatives:

» Incrementally different (modifications) alternatives to the project.
» Fundamentally (totally) different alternatives to the project.

In this instance, 'the project' refers to the FE Kudu Wind Energy Facility, a wind energy facility with capacity of up to 600MW and associated infrastructure proposed to be developed by an Independent Power Producer (IPP). The project is intended to provide electricity to the national grid through the Department of Mineral Resource and Energy's (DMRE) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or other public or private off-taker programmes.

3.2.1 Consideration of Fundamentally Different Alternatives

Fundamentally different alternatives are usually assessed at a strategic level and, as a result, project-specific environmental impact assessments (including Basic Assessment processes) are therefore limited in scope and ability to address fundamentally different alternatives. At a strategic level, electricity generating alternatives have been addressed as part of the DMRE's current Integrated Resource Plan for Electricity 2010 – 2030 (IRP)[1], and will continue to be addressed as part of future revisions (refer to Chapter 5 for more details). In this regard, the need for renewable energy power generation from wind energy facilities has been identified as part of the technology mix for power generation in the country for the next 20 years.

The fundamental energy generation alternatives were assessed and considered within the development of the IRP and the need for the development of renewable energy projects has been defined. Therefore, fundamentally different alternatives to the proposed project are not considered within this Basic Assessment process.

3.2.2 Consideration of Incrementally Different Alternatives

Incrementally different alternatives relate specifically to the project under investigation. "Alternatives", in relation to a proposed activity, means different ways of meeting the general purposes and requirements of the activity, which may include alternatives for:

» The property on which, or location where the activity is proposed to be undertaken.
» The type of activity to be undertaken.
» The design or layout of the activity.
» The technology to be used in the activity.
» The operational aspects of the activity.

In addition, the option of not implementing the activity (i.e., the "do-nothing" alternative) must also be considered.

The sections below describe the incrementally different alternatives being considered as part of the FE Kudu Wind Energy Facility. Where no alternative is being considered, a motivation has been provided as required by the EIA Regulations, 2014.

3.3 Project Alternatives under Consideration for the FE Kudu Wind Energy Facility

Table 3.1 provides an overview of the alternatives being considered as part of the project.

[1] The Integrated Resource Plan (IRP) is legislated policy which regulates power generation planning.

Table 3.1: Summary of the alternatives considered as part of the FE Kudu Wind Energy Facility project.

Nature of Alternatives Considered	Description of the Alternative relating to the FE Kudu Wind Energy Facility
Site-specific and Layout Alternatives	A preferred project site (affected property) has been identified for the development of the FE Kudu Wind Energy Facility due to site specific characteristics such as the wind resource, land availability, topographical considerations and environmental features. The project site is ~9 170ha in extent which is considered to be sufficient for the development of a wind farm with a contracted capacity of up to 600MW. The location of the project site within a REDZ (as determined by the Minister of Forestry, Fisheries and the Environment) has also been a significant determination for site site-specific identification. A technically feasible layout was provided by the developer for assessment, which included the placement of the turbine positions and roads. This layout was tested against the findings of the site-specific sensitivity mapping (from field work) as well as the Site Sensitivity Verification reporting concluded by the specialists.
Activity Alternatives	Only the development of a renewable energy facility is considered by FE Kudu Wind Energy Facility. Due to the location of the project site and the suitability of the wind resource, only the development of a wind farm is considered feasible considering the natural resources available to the area and the current land-use activities undertaken within the project site (i.e., agriculture activities).
Technology Alternatives	An on-site wind measurement campaign and other technical characteristics that were assessed found the project site to be well suited to the establishment of a wind energy facility. The use of wind turbines for the generation of electricity is considered to be the most efficient technology for the project site for the generation of up to 600MW. It should be noted that various wind turbine options are being considered (these are not considered alternatives), as well as a range of alternative turbine technologies available for commercial-scale wind energy facilities, and that the technology is constantly evolving.
'Do-nothing' Alternative	This is the option to not construct the FE Kudu Wind Energy Facility. No impacts (positive or negative) are expected to occur on the social and environmental sensitive features or aspects located within or within the surrounding areas of the project site. The opportunities associated with the development of the facility for the Aberdeen area and other surrounding towns will not be realised.

These alternatives are described in more detail in the sections which follow.

3.3.1 Site-specific and Layout Alternatives

The FE Kudu Wind Energy Facility project site is planned for the area east of Aberdeen. This area falls within the Beaufort West REDZ and the Eastern Corridor of the Strategic Transmission Corridors. This region was originally designated as a REDZ and Strategic Transmission Corridor by virtue of the favourable wind resource and existing and planned grid connection infrastructure. As a result, FE Kudu (Pty) Ltd identified this area as a suitable area for the development of a commercial wind energy facility with the aim to supply the electricity generated to the national grid and/or private off-takers.

The project site identified as preferred for the development of the FE Kudu Wind Energy Facility was identified through a regional screening process which investigated prospective sites and properties in the Aberdeen area. The Investigation involved the consideration of specific characteristics within the Eastern Cape Province and specifically within the areas near Aberdeen. The characteristics considered were identified by the developer as the main aspects that play a role in the opportunities and limitations for the development of a wind farm. The characteristics considered, and the results thereof, are discussed in the sections below. The developer considered that should these characteristics not be favourable for the development of a wind farm, then some limitations and challenges may be expected and potentially hinder such development.

» *Wind resource* – The developer firstly considered the available wind resource for the Eastern Cape and the Aberdeen area through the consideration of various datasets and variables. Following the consideration and the confirmation of the wind presence and wind speed on a desktop level (through the consideration of existing data), as well as meteorological information and geographical factors it was confirmed that the area, and in particular the FE Kudu Wind Energy Facility project site, is suitable for the development of a wind energy facility (refer to **Figure 3.1**).

» *Land availability and rights* – In order to develop the FE Kudu Wind Energy Facility with a contracted capacity of up to 600MW sufficient land space is required. The project site was identified within the Eastern Cape Province and in the Aberdeen area following the confirmation of the wind resource. The property/project site is a privately-owned parcel of land available for development, which is confirmed through the consent provided by the landowner. The affected property has an extent of ~9 170ha, which was considered by the developer as sufficient for the placement of a development footprint of up to 185ha. This was informed by the consideration of environmental constraints and sensitivities.

» *Access to the National Electricity Grid* – Following the confirmation of sufficient available land for the development of the wind energy facility, the developer considered the possible grid connection points in order to evacuate the generated electricity into the national grid. This was considered as a vital aspect by the developer for the project in order to reduce transmission costs and environmental and social impact as much as possible. The developer consulted with the Eskom network planners to understand the current capacity of existing and planned grid connection infrastructure and to identify feasible connection points for the wind farm. The wind energy facility will connect to the national grid at a planned Aberdeen Collector Substation via a 132kV grid connection solution[2]. Pending confirmation from Eskom on the preferred grid connection, the grid solution will be assessed as part of a separate BA process and will cater for the connection of the FE Kudu Wind Energy Facility.

[2] The wind energy grid connection solution will be subject to a separate Application for Environmental Authorisation.

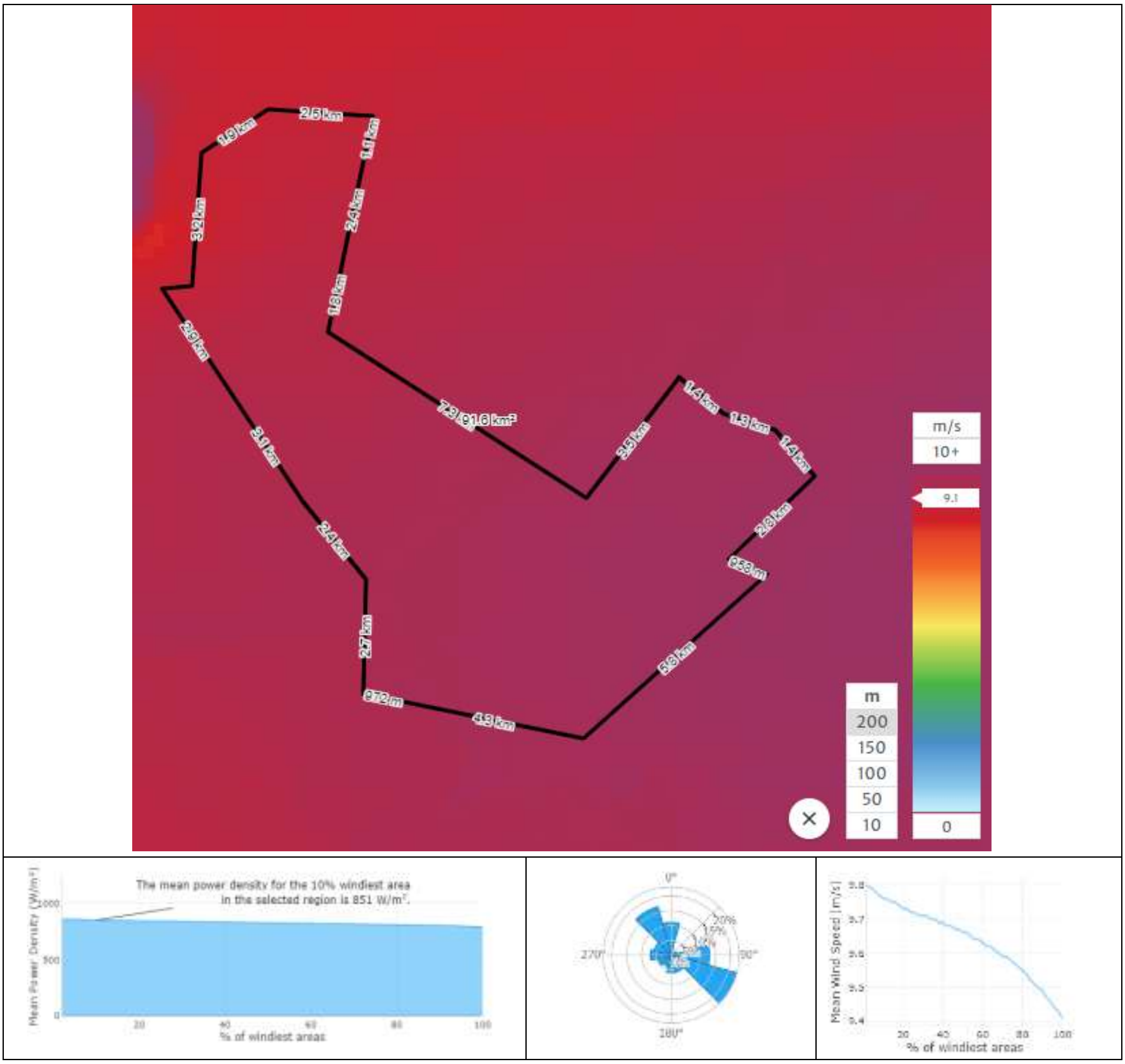

Figure 3.1: Average wind speed expected at the FE Kudu Wind Energy Facility (https://globalwindatlas.info/).

» *Geographical and topographical considerations, and existing infrastructure* – The greater area surrounding the project site has agricultural activities (mainly grazing) as the dominant land uses. The developer considered the potential opportunity for the FE Kudu Wind Energy Facility to bring some relief to the area and the affected landowner and surrounding communities in terms of socio-economic development, skills development and upliftment. The entire project site is also located within the Beaufort West REDZ and and the Eastern Corridor of the Strategic Transmission Corridors, and the development of the facility within the REDZ and corridor is considered to be a strategic placement as supporting transmission and distribution infrastructure (required for the development of renewable energy developments) is readily available in the surrounding area of the project site to enable renewable energy development and the evacuation of the generated power.

» *The availability of existing infrastructure* – This was also considered by the developer as this will enable the wind energy development to make use of infrastructure already available and reduce the disturbance associated with the construction of the associated infrastructure. The existing road network within the surrounding areas and within the project site makes access to the development footprint readily available. The developer also considered the fact that the project site has little infrastructure related to residential uses, which could be affected by the development of a wind energy facility.

» *Transportation of Material and Components* - As material and components would need to be transported to the site during the construction phase of the FE Kudu Wind Energy Facility, accessibility was a key factor in determining the technical viability of the project, particularly taking transportation costs into consideration (direct and indirect) and the impact of this on project economics. The presence of national and regional roads available for use from the Port of Coega is considered beneficial as access to the site is available from the port for equipment transportation during the construction and operation of the wind energy facility.

» *Environmental Screening and consideration of sensitive environmental features* – Following the confirmation of the FE Kudu Wind Energy Facility preferred project site as being technically feasible for the development of a wind energy facility, the developer commenced with the environmental screening of the site, and assessed the main constraints and opportunities to determine whether or not there were any potential fatal flaws or significant no-go areas that might compromise or limit the development of the FE Kudu Wind Energy Facility. The screening exercise took place prior to the commencement of the BA process and included specialist investigations of the project site. This included field investigations by the specialist team appointed to undertake the BA studies, as well as desk-top consideration of environmental constraints. The purpose of this phase of the process was to identify sensitive and no-go areas, as well as determination of appropriate buffers to be considered within the development of the project layout. The sensitivity spatial data compiled by a specialist team for this larger site (which included ecology, birds and bats) was provided to the developer prior to the lodging of the application for environmental authorisation. This is a common approach in the development of renewable energy projects in order to inform the placement of infrastructure for further investigation in the BA process. Through the integration of the specialist sensitivity data (based on field-survey and pre-construction monitoring), the developer optimised the development footprint to consider/avoid areas and features of high environmental sensitivity through appropriate placement of infrastructure associated with the wind farm development. Where avoidance was not possible, the developer provided details of technical mitigation planned to reduce the significance of the potential environmental impacts associated with the project. This has resulted in the consideration of a development footprint as part of the BA process which is designed to be environmentally appropriate as far as possible.

Based on the above considerations, the project site was identified by the developer as being the most technically feasible and viable project site within the broader area for further investigation in support of an application for authorisation. No feasible alternative sites were identified for assessment as part of this BA process. The site selection and layout optimisation process applied by the developer (which includes the steps followed above) demonstrates due consideration of the suitability of the project site for the FE Kudu Wind Energy Facility in line with a typical mitigation hierarchy:

1. First Mitigation: avoidance of adverse impacts as far as possible by use of preventative measures (in this instance an environmental screening and integration process assisted in the avoidance of identified sensitive areas).

2. Second Mitigation: minimisation or reduction of adverse impacts to 'as low as practicable' through implementation of mitigation and management measures (in this instance the development of technical mitigation solutions as well as recommendations from the various environmental specialists).
3. Third Mitigation: remedy or compensation for adverse residual impacts, which are unavoidable and cannot be reduced further.

As part of the site selection process and environmental screening, as described above, the first tier of avoidance has already been applied prior to the BA process. A feasible layout (development footprint) has been identified for investigation. Therefore, as part of the BA process the development footprint has been fully assessed and the impact of the wind farm ground-truthed by independent specialists. The significance of the impacts associated with the proposed development footprint and the appropriateness of the layout has been assessed and is included in Chapter 9 and **Appendices D – M.**

Where any further conflicts in terms of the development footprint and environmental and social sensitivities or features occur, the mitigation strategy will be further implemented to refine the layout in order to meet the objectives of the mitigation hierarchy (i.e., avoid, minimise, mitigate). This refinement of the layout will lead to the optimisation of the development footprint resulting in the presentation of the most environmentally appropriate layout for the authorisation and development of the facility.

The sub-sections which follow provide the details of specific layout alternatives being considered for the development of FE Kudu Wind Energy Facility.

3.3.2 Activity Alternatives

FE Kudu (Pty) Ltd, the Applicant, is a renewable energy project company and as such will only consider renewable energy activities in accordance with the need for such development as set out in the IRP. Considering the available natural energy resources within the area and the current significant restrictions placed on other natural resources such as water, it is considered that wind energy is the preferred option for the development within the preferred project site. Based on the wind data collected from the wind measurement met masts installed on the site, the site has shown good wind potential, making development of a wind energy facility on the proposed site technically and economically feasible. The site is also located within a REDZ, as identified by DFFE as an important node for wind and solar PV development. The project site is, therefore, considered best suited for the development of a wind energy facility. In addition, the site is located with the Eastern Corridor of the Strategic Transmission Corridors which are areas of strategic importance for the development grid connection infrastructure to connect the facility to the national grid.

No activity alternatives are considered further within this Basic Assessment as the activity (i.e., the development of a wind energy facility) is considered to be appropriate owing to due consideration of the following:

1. The suitability of the project site for the development of a wind energy facility.
2. The current land-use activities being undertaken within the project site which relate to grazing and the compatibility of this land use with the proposed facility; and
3. The size of the development footprint for the facility (i.e., ~185ha) and the minimal loss to livestock carrying capacity as a result of the development.

3.3.3 *Technology Alternatives*

As FE Kudu (Pty) Ltd is an IPP, only renewable energy technologies are being considered are being considered for the generation of up to 600MW (contracted capacity) of electricity. Considering the local resources available (i.e., wind and solar irradiation) for such technologies, the footprint requirements for such developments, the topography of the project site and the current land use in the project site (i.e., agriculture), the project site is considered most suitable for the establishment of a wind energy facility. This has been confirmed through the onsite wind measurement campaign and other technical characteristics available within the surrounding areas of the project site.

Once environmental constraining factors have been determined through the BA process, and more detailed site-specific wind data and turbine specifications are available from the wind monitoring on site, FE Kudu (Pty) Ltd will be considering various wind turbine options. The preferred option will be informed by efficiency as well as environmental impact and constraints (such as noise associated with the turbine and sensitive biophysical features). The wind turbines being proposed for the project will be up to 7.5MW[3] in capacity. The turbines are proposed to have a hub height of up to 164m, with an overall tip height of up to 250m.

There is a limited range of alternative technologies (turbines) available for commercial-scale wind energy facilities. In addition, the technology is constantly evolving. **Table 3.2** summarises the types of variables associated with existing wind turbine technologies.

Table 3.2: Variables associated with existing wind turbine technologies

Variables	Description
Type	The vertical axis wind turbine completely dominates the commercial scale wind turbine market.
Size	Typical land-based utility scale wind turbines are currently in the 600kW to 8MW range internationally as well as locally.
Foundation	The foundation is usually poured reinforced concrete. Its size and shape are dictated by the size of the wind turbine and local geotechnical considerations. The foundation for the FE Kudu Wind Energy Facility will be 7500m^2 (turbine hardstands) and 1000m^2 (turbine foundations) in area with the combined permanent footprint for the turbine foundations to be up to 20ha in extent.
Tower	Towers are typically constructed from steel and/or concrete and can be hybrid using both materials. The towers used for the FE Kudu Wind Energy Facility will be up to 200m in height.
Rotor	3- Bladed rotor is standard.
Rotor speed control	Fixed or variable speed rotors.
Gears	Geared and gearless.
Generator	Standard high-speed generator (geared) or custom low-speed ring generator (gearless).
Other variables	Yaw gears, brakes, control systems, lubrication systems and all other turbine components are similar on modern wind turbines.

FE Kudu (Pty) Ltd therefore confirms wind energy technology as the preferred technology alternative for the development of the FE Kudu Wind Energy Facility. No further technology alternatives will be considered.

[3] The capacity of the individual turbines is a predicted maximum capacity per turbine. The turbine capacity will be subject to the turbine technology at the time of the project commencement. The developer has however indicated that the turbine capacity will not result in an exceedance of the total contracted capacity of the facility of 600MW.

3.3.4 The 'do-nothing' Alternative

The 'do-nothing' alternative is the option of FE Kudu (Pty) Ltd not constructing the FE Kudu Wind Energy Facility on the proposed site. This would result in no environment or social impacts (positive or negative) as a result of the development of a wind energy facility within the preferred project site. This alternative is assessed in detail within Chapter 9 of this BA Report.

CHAPTER 4: WIND AS A POWER GENERATION TECHNOLOGY

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

Compared with other renewable energy sources such as solar and bio-energy, wind energy generates a higher energy yield while affecting the smallest physical land space. Wind technologies convert the energy of moving air masses at the earth's surface to mechanical power that can be used directly for mechanical needs (e.g., milling or water pumping) or converted to electric power in a generator (i.e. a wind turbine). The use of wind for electricity generation is essentially a non-consumptive use of a natural resource, and produces an insignificant quantity of greenhouse gases in its life cycle. A wind energy facility also qualifies as a Clean Development Mechanism (CDM) project (i.e., a financial mechanism developed to encourage the development of low carbon generating technologies) as it meets all international requirements in this regard.

This chapter explores the use of wind energy as a means of power generation.

4.1. Wind Resource as a Power Generation Technology

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

- **Wind power** is the conversion of wind energy into a useful form, such as electricity, using wind turbines.
- **Wind speed** is the rate at which air flows past a point above the earth's surface. Average annual wind speed is a critical siting criterion, since this determines the cost of generating electricity. The doubling of the wind speed increases the wind power by a factor of 8, so even small changes in wind speed can produce large changes in the economic performance of a wind energy facility. Wind turbines can start generating electricity at wind speeds of between ~3 m/s to 4 m/s (this is also known as the cut-in wind speed), with average annual wind speeds greater than 6 m/s currently typically required for a wind energy facility to be economically viable. Wind speed can be highly variable and is also affected by a number of factors, including surface roughness of the terrain. The effect of height variation/relief in the terrain is seen as a speeding-up/slowing-down effect of the wind due to the topography of the landscape. Elevation in the topography influences the flow of air, and results in turbulence within the air stream, which has to be considered in the placement of turbines.

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

A wind resource measurement campaign and analysis programme should be conducted for the site proposed for development, as only measured data will provide a robust prediction of the wind energy facility's expected energy production over its lifetime. This is being undertaken for the project site through the on-site monitoring of the wind resource via four wind measurement met masts installed on the larger project site.

The placement of the individual turbines within a wind energy facility should consider the following technical factors:

» Predominant wind direction, wind strength and frequency;
» Topographical features or relief affecting the flow of the wind (e.g., causing shading effects and turbulence of air flow); and
» Effects of adjacent turbines on wind flow and speed – specific spacing is required between turbines in order to reduce the effects of wake turbulence.

Wind turbines typically need to be spaced approximately 3 to 5 times the rotor diameter apart in order to minimise the induced wake effect that the turbines might have on each other (refer to **Figure 4.1**). Once a viable footprint for the establishment of the wind energy facility has been determined (through the consideration of both technical and environmental criteria) the spacing requirements will be considered through the process of micro-siting the turbines on the site.

4.1.1. How do wind turbines function and what are the associated infrastructure?

Wind turbines are mounted on a tower at height to capture the most energy. The kinetic energy of wind is used to turn a wind turbine to generate electricity. At an increased height above ground, they can take advantage of the faster and less turbulent wind. Turbines catch the wind's energy with their propeller-like blades. Generally, a wind turbine consists of three rotor blades and a nacelle mounted at the top of a tapered steel or concrete tower. The mechanical power generated by the rotation of the blades is transmitted to the generator within the nacelle.

Turbines are able to operate at varying speeds. The amount of energy a turbine can harness depends on both the wind velocity and the length of the rotor blades. It is anticipated that the turbines utilised for the FE Kudu Wind Energy Facility will have a hub height of up to 164m, and a tip height of up to 250m. The capacity of the wind energy facility will depend on the wind turbine selected by FE Kudu (Pty) Ltd (turbine capacity and model that will be deemed most suitable for the site). A total of 80 turbines are proposed for the project site.

Other infrastructure associated with the facility includes internal access roads, an onsite facility substation, a warehouse, BESS, and operation and maintenance buildings. The construction phase of the wind energy facility is dependent on the number of turbines erected and is estimated at a maximum of approximately 24 months (including all infrastructure). The lifespan of the facility (i.e., operation phase) is approximated at 20 to 25 years.

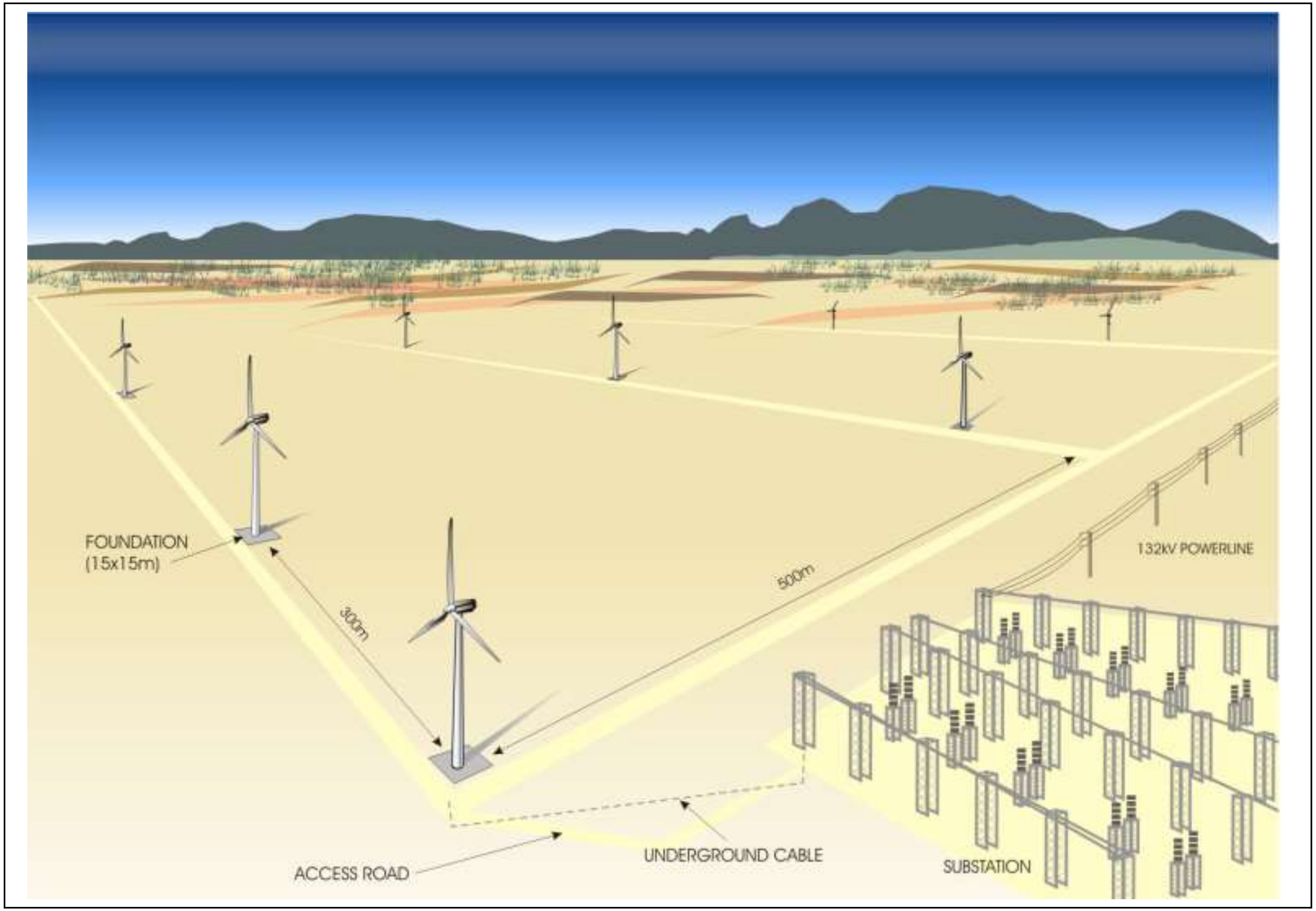

Figure 4.1: Artist's impression of a portion of a typical wind energy facility, illustrating the various components and associated infrastructure. Note that distances and measurements shown are indicative and for illustrative purposes only.

4.1.2. Main Components of a Wind Turbine

The turbine consists of the following major components (as shown in **Figure 4.2**):

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

The foundation

The foundation is used to secure each wind turbine to the ground. These structures are commonly made of reinforced concrete and are designed to withstand the vertical loads (weight) and lateral loads (wind). The foundation footprint for the turbines proposed for the FE Kudu Wind Energy Facility project are ~ 1000m^2 per turbine in extent.

The tower

The tower is a hollow structure (steel, or concrete, or a combination of the two materials, known as hybrid) allowing access to the nacelle (up to 200m in height). The height of the tower is a key factor in determining the amount of electricity a turbine can generate as the wind speed varies with height. Towers are typically delivered to site in sections and then erected and joined together on site. Towers can be made of steel or reinforced post-stressed concrete, or a combination of the two materials.

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

Figure 4.2: Example of a tower on which the blade is being mounted

The Rotor

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

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

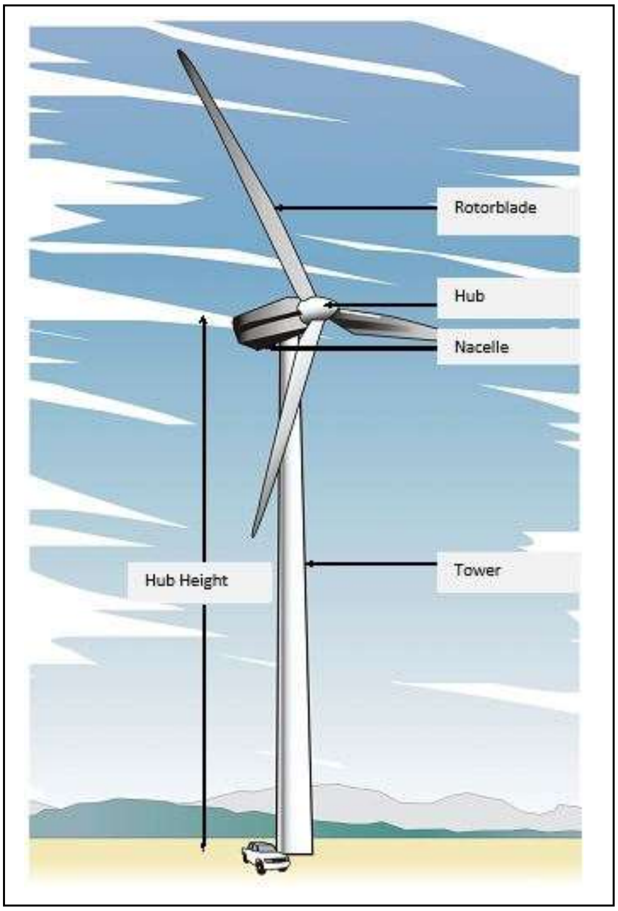

Figure 4.3: Illustration of the main components of a wind turbine

The nacelle

The nacelle at the top of the tower accommodates the gears, the generator, anemometer for monitoring the wind speed and direction, cooling and electronic control devices, and yaw mechanism. Geared nacelles generally have a longer form/ structure than gearless turbines.

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

4.1.3. Operating Characteristics of a Wind Turbine

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

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

It is the flow of air over the blades and through the rotor area that makes a wind turbine function. The wind turbine extracts energy by slowing the wind down. The theoretical maximum amount of energy in the wind that can be collected by a wind turbine's rotor is approximately 59%. This value is known as the Betz Limit. Therefore, if a blade were 100% efficient then it would extract 59% of the energy, as this is the maximum (due to Betz law). In practice, the typical collection efficiency of a rotor is 35% to 45%. A complete wind energy system incurs losses through friction and modern systems end up converting between 20-25% of the energy in the air into electricity (which equates to 34% to 42% of the maximum (due to Betz Law)).

However, because the energy in the air is free, describing how efficiently the energy is converted is only useful for system improvement and monitoring purposes. A more useful measurement is the Capacity Factor, which is also represented as a percentage. The Capacity Factor percentage is calculated from the actual MWh output of electricity from the entire wind energy facility over 1 year divided by the nameplate maximum theoretical output for the same period. It therefore also takes wind resource, wind variability and system availability (downtime, maintenance and breakdowns) into account. FE Kudu (Pty) Ltd has initial Net P50 predictions for Capacity Factors between 35% and 40%. This is turbine specific and subject to change, which compares favourably with other best resource sites in South Africa. This figure will be predicted more accurately when more on-site wind data has been recorded and the most suitable turbine has been chosen.

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

4.2. Battery Energy Storage System (BESS) as an Energy Storage Technology

The need for a Battery Energy Storage System (BESS) stem from the fact that electricity is only produced by the wind energy facility while the wind is blowing. Therefore, the storage of electricity and supply thereof during peak-demand will mean that the facility is more efficient, reliable and electricity supply more constant.

The BESS will:

» Store and integrate a greater amount of renewable energy from the wind energy facilities into the electricity grid;
» Assist with the objective to generate electricity by means of renewable energy to feed into the National Grid which will be procured under either the Renewable Energy Independent Power Producer Procurement Program (REIPPPP), other government run procurement programmes, or for sale to private entities if required.
» Proposed footprint of battery storage area: Up to ~5 ha
» Battery types to be considered: Solid State batteries as the preferred technology (Lithium Ion)

4.2.1 Battery Energy Storge System (BESS) technology

The general purpose and utilisation of a BESS is to save and store excess electrical output as it is generated, allowing for a timed release when the capacity is required. BESS systems therefore provide flexibility in the efficient operation of the electric grid through decoupling of the energy supply and demand. **Figures 4.4, 4.5, 4.6** and **4.7** below illustrate a typical utility scale BESS system (a Lithium-Ion BESS) as applied in the context of a renewable energy facility.

Figure 4.4: Li-Ion BESS implementation for a Renewable Energy facility (Source: Enel Green Power)

Figure 4.5: Li-Ion BESS containerised modules located within the BESS enclosure footprint (Source: Enel Green Power)

Figure 4.6: Li-Ion BESS internal design and implementation of a container used within a BESS. The image shows a series of sealed battery cell packs within a containerised module (Source: Enel Green Power)

Figure 4.7: Illustration of battery storage units installed by Tesla (Source: fastcompany.com)

As technological advances within battery energy storage systems (BESS) are frequent, two BESS technology alternatives are typically used:

» Solid state battery electrolytes typically consist of Lead Acid (Pb), Nickel Cadium (NiCad), Lithium-Ion (Li-ion), Sodium Sulphur (NaS) or Sodium Nickle Chloride (Zebra) (NaNiCl) and use solid electrodes and electrolytes. As a result of the declining costs, Li-ion technology now accounts for more than 90% of battery storage additions globally (IRENA, 2019); and
» Redox-flow technology (e.g., vanadium flow battery, or similar technology and chemistries). Flow batteries use solid electrodes and liquid electrolytes. The most used flow battery is the Vanadium Redox Flow Battery (VRFB), which is a type of rechargeable flow battery that employs vanadium ions in different oxidative states to store chemical potential energy.

Considering the nature of the project, only a solid-state technology type would be envisaged for implementation. The technology includes batteries housed within containers which are fully enclosed and self-contained. Therefore, the assessment proposes all solid-state technologies for authorisation to allow the proponent to determine the precise technology when the project is implemented, on the understanding that further investigation into the specific technologies available at the time of project implementation will allow for one of two to be selected and ultimately developed.

4.2.2 Compliance to local and international standards and Fire Prevention

The BESS will be compliant with all local laws and regulations and health and safety requirements governing battery facilities. Over and above that they will comply with international standards such as UN 38.3 (Transportation Testing for Lithium Batteries), UL 1642 (Standard for Safety – Lithium-ion Batteries) and IEC 62619 (Secondary cells and batteries containing alkaline or other non-acid electrolytes Safety requirements for secondary lithium cells and batteries, for use in industrial applications). Furthermore, the battery facility will also comply with standards such as UL 1973 (Batteries for Use in Stationary Applications) and IEC 62619-

2017 including thermal runaway non-propagation and safety zone region operation limits and a failure mode analysis. The design will be compliant with UL 9540 (Energy Storage Systems and Equipment): this standard defines the safety requirements for battery installation in industrial and grid connected applications.

The design of the BESS in compliance with all the local and international standards ensures that fire risk is minimal. Furthermore, each container has a built-in fire detection and suppression system. This system continually monitors the batteries and in an unlikely event of a fire it supresses the fire using inert gas. Each container is also spaced about 3m apart ensuring the chance of a fire spreading between containers (which are made of metal and therefore not easily flammable) is also minimal.

Figure 4.8 below provides a typical configuration of fire detection and suppression system.

Figure 4.8: Typical configuration of fire detection and suppression system

CHAPTER 5: POLICY AND LEGISLATIVE CONTEXT

This Chapter provides an overview of the policy and legislative context within which the development of a wind energy facility and its associated infrastructure is proposed. It identifies environmental 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 which may be applicable to or have bearing on the proposed project. It also provides information which supports the need and justification for the project, as discussed in Chapter 6.

Further environmental legislation relevant to the project is described and considered in Chapter 7 of this Basic Assessment Report.

5.1 Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the BA Report includes the following information required in terms of Appendix 1: Content of basic assessment reports:

Requirement	Relevant Section
(e) a description of the policy and legislative context within which the development is proposed including- (i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report. (ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments.	A description of the policy and legislative context within which the FE Kudu Wind Energy Facility is proposed is included and considered within this chapter.

5.2 Strategic Electricity Planning in South Africa

The energy sector in South Africa has been, and continues to be, at the centre of the economic and social development. The industry directly affects the economy by using labour and capital to produce energy. As the country's economy continues to grow, the Department of Mineral Resources and Energy (DMRE) is mandated to ensure that energy resources are available, and that there is access to energy services in an affordable, reliable and sustainable manner, while minimising the associated adverse environmental impacts (Department of Energy, 2019).

The expansion of electricity generation capacity in South Africa is based on national policy and informed by on-going strategic planning undertaken by the DMRE. The hierarchy of policy and planning documentation that supports the development of renewable energy projects, such as wind energy facilities, is illustrated in **Figure 5.1**. These policies are discussed in more detail in the following sections, along with the provincial and local policies and plans that have relevance to the development of the FE Kudu Wind Energy Facility.

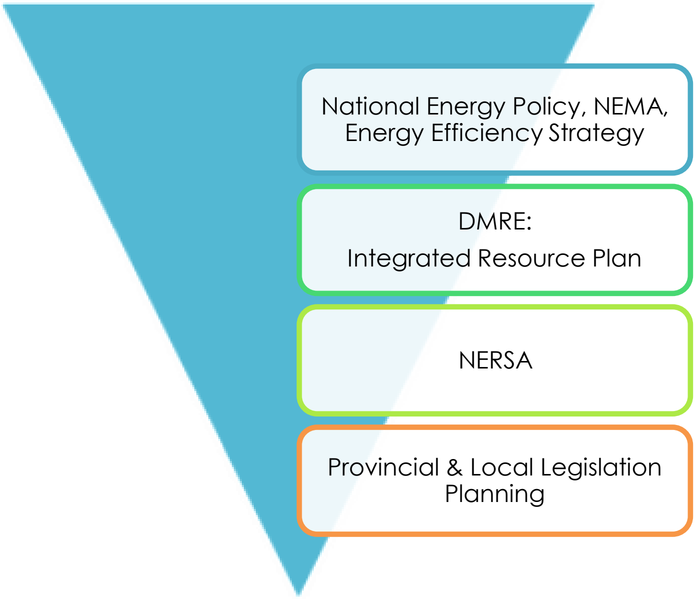

Figure 5.1: Hierarchy of electricity and planning documents

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

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

» **Department of Mineral Resources and Energy (DMRE):** This Department is responsible for policy relating to all energy forms and for compiling and approving the Integrated Resource Plan (IRP), and is also responsible for granting approvals for the use of land which is contrary to the objects of the Mineral and Petroleum Resource Development Act (No. 28 of 2002) (MPRDA) in terms of Section 53 of the MPRDA. Therefore, in terms of the Act, approval from the Minister is required to ensure that the proposed activities do not sterilise mineral resources that may occur within the broader study area.
» **National Energy Regulator of South Africa (NERSA):** NERSA is responsible for regulating all aspects of the electricity sector and will ultimately issue licenses for IPP projects to generate electricity.
» **Department of Forestry, Fisheries and the Environment (DFFE):** This Department is responsible for environmental policy and is the controlling authority in terms of NEMA and the 2014 EIA Regulations (GN R326) as amended. DFFE is the competent authority for this project (as per GNR 779 of 01 July 2016), and is charged with considering whether to grant an EA for the project under consideration. Furthermore, the Department is also responsible for issuing permits for the disturbance or destruction of protected tree species listed under Section 15 (1) of the National Forest Act (No. 84 of 1998) (NFA). The Department is also responsible for permits for Threatened or Protected Species (TOPS) under the National Environmental Management: Biodiversity Act.
» **The South African Heritage Resources Agency (SAHRA):** SAHRA is a statutory organisation established under the National Heritage Resources Act (No. 25 of 1999) (NHRA), as the national administrative body responsible for the protection of South Africa's cultural heritage.

- **South African National Roads Agency Limited (SANRAL):** This Agency is responsible for the regulation and maintenance of all national road routes.
- **Department of Water and Sanitation (DWS):** This Department is responsible for effective and efficient water resource management to ensure sustainable economic and social development. This Department is also responsible for evaluating applications and issuing licenses pertaining to water use (i.e. Water Use Licenses (WUL) and General Authorisation).
- **The Department of Agriculture, Land Reform and Rural Development (DALRRD):** This Department is the custodian of South Africa's agricultural resources and is responsible for the formulation and implementation of policies governing the agricultural sector and the initiation, facilitation, coordination and implementation of integrated rural development programmes.

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

- **Eastern Cape Department of Economic Development, Environmental Affairs and Tourism (DEDEAT):** This Department is the commenting authority for the BA process for the project and is responsible for issuing of other biodiversity and conservation-related permits.
- **Eastern Cape Department of Transport:** This department is responsible for Provincial roads within the Eastern Cape, and for the granting of exemption permits for the conveyance of abnormal loads on public roads.
- **Eastern Cape Provincial Heritage Resources Authority (ECHRA)**: This Department identifies, conserves and manage heritage resources throughout the Eastern Cape Province.
- **Eastern Cape Department: Rural Development and Agrarian Reform:** This Department's involvement relates specifically to sustainable agricultural resource management and land care.

At the **Local Level,** the local and district municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. In the Eastern Cape Province, both the local and district municipalities play a role. The affected local municipality is the **Dr Beyers Naude Local Municipality** which forms parts of the **Sarah Baartman District Municipality**. In terms of the Municipal Systems Act (No. 32 of 2000), it is compulsory for all municipalities to go through an Integrated Development Planning (IDP) process to prepare a five-year strategic development plan for the area under their control.

5.3 International Policy and Planning Context

A brief review of the most relevant international policies relevant to the establishment of FE Kudu Wind Energy Facility are provided below in **Table 5.1**. The facility is considered to be aligned with the aims of these policies, even if contributions to achieving the goals therein are only minor.

Table 5.1: International policies relevant to the FE Kudu Wind Energy Facility

Relevant policy	Relevance to the FE Kudu Wind Energy Facility
United Nations Framework Convention on Climate Change (UNFCCC) and Conference of the Party (COP)	The Conference of the Parties (COP), established by Article 7 of the UNFCCC, is the supreme body and highest decision-making organ of the Convention. It reviews the implementation of the Convention and any related legal instruments and takes decisions to promote the effective implementation of the Convention. The Conference of the Parties (COP) 21 was held in Paris from 30 November to 12 December 2015. From this conference, an agreement to tackle global warming was reached between 195 countries.

Relevant policy	Relevance to the FE Kudu Wind Energy Facility
	South Africa signed the Agreement in April 2016 and ratified the agreement on 01 November 2016. The Agreement was assented to by the National Council of Provinces on 27 October 2016, and the National Assembly on 1 November 2016. South Africa's National Climate Change Response Policy (NCCRP) establishes South Africa's approach to addressing climate change, including adaptation and mitigation responses. The NCCRP formalises Government's vision for a transition to a low carbon economy, through the adoption of the 'Peak, Plateau and Decline' (PPD) GHG emissions trajectory whereby South Africa's emissions should peak between 2020 and 2025, plateau for approximately a decade, and then decline in absolute terms thereafter, and based on this the country has pledged to reduce emissions by 34% and 42% below Business As Usual (BAU) emissions in 2020 and 2025, respectively. The policy provides support for the FE Kudu Wind Energy Facility which will contribute to managing climate change impacts, supporting the emergency response capacity, as well as assist in reducing GHG emissions in a sustainable manner.
The Equator Principles IV (October 2020)	The Equator Principles (EPs) IV constitute a financial industry benchmark used for determining, assessing, and managing a project's environmental and social risks. The EPs are primarily intended to provide a minimum standard for due diligence to support responsible risk decision-making. In addition, these principles are used to ensure that projects financed by the Equator Principles Financial Institutions (EPFI) are developed in a manner that is socially responsible and reflects sound environmental management practices. The EPs are applicable to infrastructure projects (such as the proposed Project) and apply globally to all industry sectors. Such an assessment should propose measures to minimise, mitigate, and offset adverse impacts in a manner relevant and appropriate to the nature and scale of the Project. In terms of the EPs, South Africa is a non-designated country (as at 4 March 2020), and as such the assessment process for projects located in South Africa evaluates compliance with the applicable IFC Performance Standards on Environmental and Social Sustainability, and Environmental Health and Safety (EHS) Guidelines. The Project is currently being assessed in accordance with the requirements of the 2014 EIA Regulations, as amended, published in terms of Section 24(5) of the National Environmental Management Act (No. 107 of 1998) (NEMA), which is South Africa's national legislation providing for the authorisation of certain controlled activities. Through this assessment, all potential social and environmental risks are identified and assessed, and appropriate mitigation measures proposed.
Kyoto Protocol, 1997	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.
International Finance Corporation (IFC) Performance Standards and Environmental and	The International Finance Corporation's (IFC) Performance Standards (PSs) on Environmental and Social Sustainability were developed by the IFC and were last updated on 1 January 2012.

Relevant policy	Relevance to the FE Kudu Wind Energy Facility
Social Sustainability (January 2012)	Performance Standard 1 requires that a process of environmental and social assessment be conducted, and an Environmental and Social Management System (ESMS) appropriate to the nature and scale of the project, and commensurate with the level of its environmental and social risks and impacts, be established and maintained. The above-mentioned standard is the overarching standard to which all the other standards relate. Performance Standards 2 through to 8 establish specific requirements to avoid, reduce, mitigate or compensate for impacts on people and the environment, and to improve conditions where appropriate. While all relevant social and environmental risks and potential impacts should be considered as part of the assessment, the standards 2 and 8 describe potential social and environmental impacts that require particular attention specifically within emerging markets. Where social or environmental impacts are anticipated, the developer is required to manage them through its ESMS consistent with Performance Standard 1. Given the nature of the FE Kudu Wind Energy Facility, it is anticipated that Performance Standards 1, 2, 3, 4, 6, and 8 may be applicable to the project. • Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts • Performance Standard 2: Labour and Working Conditions • Performance Standard 3: Resource Efficiency and Pollution Prevention • Performance Standard 4: Community Health, Safety and Security • ~~Performance Standard 5: Land Acquisition and Involuntary Resettlement –~~ N/A • Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources • ~~Performance Standard 7: Indigenous Peoples –~~ N/A • Performance Standard 8: Cultural Heritage

5.4. National Policy and Planning Context

Further to the South African government's commitment in August 2011 to support the development of renewable energy capacity, the DMRE initiated the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) to procure renewable energy from the private sector in a series of rounds. According to the IPP Procurement Programme overview report (2021), as of March 2021, 6 422MW of renewable energy capacity from 112 independent power producers (IPPs) has been procured in seven bid rounds[1], with 5 078MW from 79 IPP projects operational and made available to the grid[2]. National policies have to be considered for the construction and operation of the wind energy facility to ensure that the development is in line with the planning of the country.

5.4.1 Constitution of the Republic of South Africa, 1996

Section 24 of the Constitution pertains specifically to the environment. It states that everyone has the right to an environment that is not harmful to their health or well-being, and to have the environment protected,

1 Bid windows1, 2 ,3 ,3.5 ,4 and small BW1(1S2) and small BW2(2S2). 2 583 MW of renewable energy capacity was awarded to IPPs in the REIPPPP bid window 5 in October 2021. 860MW of renewable energy capacity (all solar PV) was awarded to IPPs in the REIPPPP bid window 6 in December 2022.

2 https://www.cliffedekkerhofmeyr.com/en/news/publications/2019/Corporate/energy-alert-22-october-The-Integrated-Resource-Plan-2019-A-promising-future-roadmap-for-generation-capacity-in-South-Africa.html

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 development.

The Constitution outlines the need to promote social and economic development. Section 24 of the Constitution therefore requires that development be conducted in such a manner that it does not infringe on an individual's environmental rights, health, or well-being. This is especially significant for previously disadvantaged individuals who are most at risk to environmental impacts. The undertaking of an EIA process for the proposed project in terms of the requirements of the EIA Regulations, 2014 (as amended), aims to minimise any impacts on the natural and social environment.

5.4.2 National Environmental Management Act (No. 107 of 1998) (NEMA)

This piece of legislation is South Africa's key piece of environmental legislation and sets the framework for environmental management in South Africa. NEMA is founded on the principle that everyone has the right to an environment that is not harmful to their health or well-being as contained within the Bill of Rights.

The national environmental management principles state that the social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed and evaluated, and decisions must be appropriate in the light of such consideration and assessment. The Project is currently being assessed in accordance with the requirements of the 2014 EIA Regulations, as amended, published in terms of Section 24(5) of NEMA. Through this assessment, all potential social and environmental risks are identified and assessed, and appropriate mitigation measures proposed.

The need for responsible and informed decision-making by government on the acceptability of environmental impacts is therefore enshrined within NEMA.

5.4.3 The National Energy Act (No. 34 of 2008)

The purpose of the National Energy Act (No. 34 of 2008) is 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, while taking into account environmental management requirements and interactions amongst economic sectors, as well as matters relating to renewable energy. The National Energy Act also provides for energy planning, increased generation and consumption of renewable energies, contingency energy supply, holding of strategic energy feedstocks and carriers, adequate investment in, appropriate upkeep and access to energy infrastructure. The Act provides measures for the furnishing of certain data and information regarding energy demand, supply and generation, and for establishing an institution to be responsible for promotion of efficient generation and consumption of energy and energy research.

The Act provides the legal framework which supports the development of power generation facilities. The Act also provides for licences and registration as the manner in which generation, transmission, distribution, trading and the import and export of electricity are regulated. The development of FE Kudu Wind Energy Facility will have to ensure compliance with this Act as a license for the generation of electricity from NERSA will be required.

5.4.4 *White Paper on the Energy Policy of South Africa, 1998*

The White Paper on Energy Policy places emphasis on the expansion of energy supply options to enhance South Africa's energy security. This can be achieved through increased use of renewable energy and encouraging new entries into the generation market.

The policy states that the advantages of renewable energy include, minimal environmental impacts during operation in comparison with traditional supply technologies, 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. Nonetheless, renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future.

5.4.5 *White Paper on the Renewable Energy Policy, 2003*

The White Paper on Renewable Energy Policy Supplements Government's predominant policy on energy as set out in the White Paper on the Energy Policy of the Republic of South Africa (DME, 1998). The policy recognises the potential of renewable energy and aims to create the necessary conditions for the development and commercial implementation of renewable energy technologies.

The White Paper on renewable energy sets out Government's vision, policy principles, strategic goals, and objectives for promoting and implementing renewable energy in South Africa. The country relies heavily on coal to meet its energy needs due to its abundant, and accessible and affordable coal resources. However, massive renewable energy resources that can be sustainable alternatives to fossil fuels, have so far remained largely untapped.

The development of additional renewable energy projects will promote the use of the abundant South African renewable energy resources and contribute to long-term energy security and diversification of the energy mix.

5.4.6 *The Electricity Regulation Act (No. 04 of 2006) (ERA)*

The Electricity Regulation Act of 2006, replaced the Electricity Act (No. 41 of 1987), as amended, except for Section 5B, which provides funds for the energy regulator for the purpose of regulating the electricity industry. The Act establishes a national regulatory framework for the electricity supply industry and introduces the National Energy Regulator (NERSA) as the custodian and enforcer of the National Electricity Regulatory Framework. The Act also provides for licences and registration as the manner in which the generation, transmission, distribution, trading, and import and export of electricity are regulated.

5.4.7 *The National Development Plan (NDP) 2030*

The National Development Plan (NDP) 2030 is a plan prepared by the National Planning Commission in consultation with the South African public which is aimed at eliminating poverty and reducing inequality by 2030.

In terms of the Energy Sector's role in empowering South Africa, the NDP envisages that, by 2030, South Africa will have an energy sector that promotes:

» Economic growth and development through adequate investment in energy infrastructure. The sector should provide reliable and efficient energy service at competitive rates, while supporting economic growth through job creation.
» Social equity through expanded access to energy at affordable tariffs and through targeted, sustainable subsidies for needy households.
» Environmental sustainability through efforts to reduce pollution and mitigate the effects of climate change.

In formulating its vision for the energy sector, the NDP took the IRP 2010 as its point of departure. Therefore, although electricity generation from coal is still seen as part of the energy mix within the NDP, the plan sets out steps that aim to ensure that, by 2030, South Africa's energy system will look very different to the current situation: coal will contribute proportionately less to primary-energy needs, while gas and renewable energy resources – especially wind, solar, and imported hydroelectricity – will play a much larger role.

The NDP aims to provide a supportive environment for growth and development, while promoting a more labour-absorbing economy. The development of FE Kudu Wind Energy Facility supports the NDP through the development of energy-generating infrastructure which will not lead to the generation of GHGs and will result in economic development and growth of the area surrounding the development area.

5.4.8 Integrated Energy Plan (IEP), November 2016

The purpose and objectives of the Integrated Energy Plan (IEP) are derived from the National Energy Act (No. 34 of 2008). The IEP takes into consideration the crucial role that energy plays in the entire economy of the country and is informed by the output of analyses founded on a solid fact base. It is a multi-faceted, long-term energy framework which has multiple aims, some of which include:

» To guide the development of energy policies and, where relevant, set the framework for regulations in the energy sector.
» To guide the selection of appropriate technologies to meet energy demand (i.e. the types and sizes of new power plants and refineries to be built and the prices that should be charged for fuels).
» To guide investment in and the development of energy infrastructure in South Africa.
» To propose alternative energy strategies which are informed by testing the potential impacts of various factors such as proposed policies, introduction of new technologies, and effects of exogenous macro-economic factors.

A draft version of the IEP was released for comment on 25 November 2016. The purpose of the IEP is to provide a roadmap of the future energy landscape for South Africa which guides future energy infrastructure investments and policy development. The development of the IEP is an ongoing continuous process. It is reviewed periodically to take into account changes in the macroeconomic environment, developments in new technologies and changes in national priorities and imperatives, amongst others.

The 8 key objectives of the integrated energy planning process are as follows:

» Objective 1: Ensure security of supply.
» Objective 2: Minimise the cost of energy.
» Objective 3: Promote the creation of jobs and localisation.

» Objective 4: Minimise negative environmental impacts from the energy sector.
» Objective 5: Promote the conservation of water.
» Objective 6: Diversify supply sources and primary sources of energy.
» Objective 7: Promote energy efficiency in the economy.
» Objective 8: Increase access to modern energy.

5.4.9 Integrated Resource Plan (IRP) for Electricity 2010 - 2030

The Integrated Resource Plan (IRP) for Electricity 2010 – 2030 is a subset of the IEP and constitutes South Africa's National electricity plan. The primary objective of the IRP is to determine the long-term electricity demand and detail how this demand should be met in terms of generating capacity, type, timing and cost. The IRP also serves as input to other planning functions, including amongst others, economic development and funding, and environmental and social policy formulation.

The promulgated IRP 2010–2030 identified the preferred generation technology required to meet expected demand growth up to 2030. It incorporated government objectives such as affordable electricity, reduced greenhouse gas (GHG) emissions, reduced water consumption, diversified electricity generation sources, localisation and regional development.

Since the promulgated IRP 2010–2030, the following capacity developments have been procured:

» A total 6 422 MW under the Renewable Energy Independent Power Producers Programme (REIPPP) has been procured. As of 31 March 2021[3], 5 078MW from 79 IPP projects operational has been made available to the grid[4].
» 2 000MW of generating capacity (comprising various technologies) has been awarded to 8 Independent Power Producers under the RMIPPPP in March 2021.
» 2 583MW of electricity in bid window 5 of the REIPPPP, announced on 28 October 2021 (DMRE, 2021).
» 860MW of electricity in bid window 6 of the REIPPPP, with 315MW of electricity still eligable, announced on 8 December 2022.
» IPPs have commissioned 1 005 MW from two Open Cycle Gas Turbine (OCGT) peaking plants.
» Under the Eskom build programme, the following capacity has been commissioned:
    * 1 332 MW of Ingula pumped storage,
    * 1 588 MW of Medupi,
    * 800 MW of Kusile and
    * 100 MW of Sere Wind Farm.
» 18 000MW of new generation capacity has been committed to.

Besides capacity additions, a number of assumptions have changed since the promulgation of IRP 2010–2030. Key assumptions that changed include the electricity demand projection, Eskom's existing plant performance, as well as new technology costs. In addition, environmental considerations such as South Africa's contribution to Greenhouse gases which contribute to climate change, local air quality and water availability have come to the fore.

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3 Bid windows1, 2 ,3, 3.5, 4 and small BW1(1S2) and small BW2(2S2). 2 583 MW of renewable energy capacity was awarded to IPPs in the REIPPPP bid window 5 in October 2021.

4 https://www.cliffedekkerhofmeyr.com/en/news/publications/2019/Corporate/energy-alert-22-october-The-Integrated-Resource-Plan-2019-A-promising-future-roadmap-for-generation-capacity-in-South-Africa.html

These considerations necessitated the review and update of the IRP and ultimately the promulgation of a revised plan in October 2019. In terms of the IRP 2019, South Africa continues to pursue a diversified energy mix that reduces reliance on a single or a few primary energy sources. In the period prior to 2030, the system requirements are largely for incremental capacity addition (modular) and flexible technology, to complement the existing installed inflexible capacity. South Africa is a signatory to the Paris Agreement on Climate Change and has ratified the agreement. In line with INDCs (submitted to the UNFCCC in November 2016), South Africa's emissions are expected to peak, plateau and from year 2025 decline.

Following consideration of all these factors, the following provision has been made for the following new capacity by 2030:

» 1 500MW of coal;
» 2 500MW of hydro;
» 6 000MW of solar PV;
» 14 400MW of wind;
» 1 860MW of nuclear;
» 2 088MW of storage;
» 3 000MW of gas/diesel; and
» 4 000MW from other distributed generation, co-generation, biomass and landfill technologies.

In terms of renewable energy five bidding rounds have been completed for renewable energy projects under the RE IPP Procurement Programme. The most dominant technology in the IRP2019 is renewable energy from wind and solar PV technologies, with wind being identified as the stronger of the two technologies. There is a consistent annual allocation of 1 600MW for wind technology commencing in the year 2022 up to 2030. The solar PV allocation of 1 000MWs per year is incremental over the period 2022 to 2030, with no allocation in the years 2024 (being the year the Koeberg nuclear extension is expected to be commissioned) and the years 2026 and 2027 (presumably since 2 000MW of gas is expected in the year 2027). The IRP 2019 states that although there are annual build limits, in the long run such limits will be reviewed to take into account demand and supply requirements.

Development of FE Kudu Wind Energy Facility would contribute towards the allocation for wind energy development.

5.4.10 New Growth Path (NGP) Framework, 2010

The purpose of the New Growth Path (NGP) Framework is to provide effective strategies towards accelerated job-creation through the development of an equitable economy and sustained growth. The target of the NGP is to create 5 million jobs by 2020. With economic growth and employment creation as the key indicators identified in the NGP. The framework seeks to identify key structural changes in the economy that can improve performance in term of labour absorption and the composition and rate of growth.

To achieve this, government will seek to, amongst other things, identify key areas for large-scale employment creation, as a result of changes in conditions in South Africa and globally, and to develop a policy package to facilitate employment creation in these areas.

5.4.11 National Climate Change Bill, 2018

On 08 June 2018, the Minister of Environmental Affairs published the National Climate Change Bill ("the Bill") for public comment. The Bill provides a framework for climate change regulation in South Africa aimed at governing South Africa's sustainable transition to a climate resilient, low carbon economy and society. The Bill provides a procedural outline that will be developed through the creation of frameworks and plans.

FE Kudu Wind Energy Facility is a renewable energy generation facility and would not result in the generation or release of emissions during its operation.

5.4.12 National Climate Change Response Policy, 2011

South Africa's National Climate Change Response Policy (NCCRP) establishes South Africa's approach to addressing climate change, including adaptation and mitigation responses. The NCCRP formalises Government's vision for a transition to a low carbon economy, through the adoption of the 'Peak, Plateau and Decline' (PPD) GHG emissions trajectory whereby South Africa's emissions should peak between 2020 and 2025, plateau for approximately a decade, and then decline in absolute terms thereafter, and based on this the country has pledged to reduce emissions by 34% and 42% below Business As Usual (BAU) emissions in 2020 and 2025, respectively.

As an integral part of the policy, a set of near-term priority flagship programmes will be implemented to address the challenges of climate change, one of which includes the Renewable Energy Flagship Programme. This flagship programme includes a scaled-up renewable energy programme, based on the current programme specified in the IRP 2010, and using the evolving South African Renewables Initiative led by the Department of Public Enterprise and Department of Trade and Industry (DTI), as a driver for the deployment of renewable energy technologies. The programme will be informed by enhanced domestic manufacturing potential and the implementation of energy efficiency and renewable energy plans by local government.

The policy provides support for FE Kudu Wind Energy Facility which will contribute to managing climate change impacts, supporting the emergency response capacity, as well as assist in reducing GHG emissions in a sustainable manner.

5.4.13 National Climate Change Response Strategy for South Africa, 2004

The need for a national climate change policy for South Africa was identified as an urgent requirement during the preparations for the ratification of the UNFCCC in 1997. A process to develop such a policy was thus instituted under the auspices of the National Committee for Climate Change (NCCC), a non-statutory stakeholder body set up in 1994 to advise the Minister on climate change issues and chaired by the then Department of Environmental Affairs and Tourism (DEAT). It was determined that a national climate change response strategy will promote integration between the programmes of the various government departments involved to maximise the benefits to the country as a whole, while minimising negative impacts. Further, as climate change response actions can potentially act as a significant factor in boosting sustainable economic and social development, a national strategy specifically designed to bring this about is clearly in the national interest, supporting the major objectives of the government including poverty alleviation and the creation of jobs.

A number of principles and factors guided the conception of the strategy and is required to be implemented. These are:

» Ensuring that the strategy is consistent with national priorities, including poverty alleviation, access to basic amenities including infrastructure development, job creation, rural development, foreign investment, human resource development and improved health, leading to sustainable economic growth;
» Ensuring alignment with the need to consistently use locally available resources;
» Ensuring compliance with international obligations;
» Recognizing that climate change is a cross cutting issue that demands integration across the work programmes of other departments and stakeholders, and across many sectors of industry, business and the community;
» Focussing on those areas that promote sustainable development;
» Promoting programmes that will build capacity, raise awareness and improve education in climate change issues;
» Encouraging programmes that will harness existing national technological competencies;
» Reviewing the strategy constantly in the light of national priorities and international trends;
» Recognizing that South Africa's emissions will continue to increase as development is realised.

The strategy was devised through an integrated approach and considers policies and programmes of other government departments and the fact that South Africa is a developing country. This will ensure that the principles of sustainable development are adequately served and do not conflict with existing development policies.

5.4.14 Just Transition Framework for South Africa (June 2022) - A Presidential Climate Commission Report

The Presidential Climate Commission (PCC) is a multi-stakeholder body established by the President of the Republic of South Africa to (1) advise on the country's climate change response and (2) support a just transition to a low-carbon climate-resilient economy and society. The PCC facilitates dialogue between social partners on these issues — defining the type of economy and society the country wants to achieve, and detailed pathways for how to get there.

One of the first tasks of the PCC was to design a just transition framework for South Africa. In December 2020, President Cyril Ramaphosa created the PCC to oversee and facilitate a just transition to a low-emissions and climate-resilient economy. The just transition framework is the first building block towards this objective, bringing coordination and coherence to just transition planning in the country. The just transition framework sets out a shared vision for the just transition, principles to guide the transition, and policies and governance arrangements to give effect to the transition.

The Just Transition Framework builds on research, policies, and consultations on the just transition in South Africa, as well as international best practice guidelines.

The Just Transition Framework sets out a shared vision for the just transition, principles to guide the transition, and policies and governance arrangements to give effect to the transition from an economy that is predominantly reliant on fossil-fuel based energy, towards a low-emissions and climate-resilient economy. The framework is a planning tool for achieving a just transition in South Africa, setting out the actions that the government and its social partners will take to achieve a just transition, and the outcomes to be realised in the short, medium, and long term.

5.4.15 Strategic Integrated Projects (SIPs)

The Presidential Infrastructure Coordinating Committee (PICC) was established to integrate and coordinate the long-term infrastructure build programmes. Core functions include: to unlock opportunity, transform the economic landscape, create new jobs, strengthen the delivery of basic services and support the integration of African economies. A balanced approach is being fostered through greening of the economy, boosting energy security, promoting integrated municipal infrastructure investment, facilitating integrated urban development, accelerating skills development, investing in rural development and enabling regional integration.

Strategic Integrated Project's (SIP) have been developed and approved to support economic development and address service delivery in the poorest provinces. These projects are to be expedited in terms of Schedule 2 (Section 17(2)) of the Infrastructure Development Act (Act No. 23 of 2014).

SIP 8, 9 and 20 supports the development of the wind energy facility:

» 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 – 2030) and supports bio-fuel production facilities.
» SIP 9: Electricity generation to support socio-economic development: The proposed FE Kudu Wind Energy Facility is a potential SIP 9 Project as electricity will be generated and social and economic upliftment, development and growth will take place within the surrounding communities. It would become a SIP 9 project if selected as a Preferred Bidder project by the Department Mineral Resources and Energy. SIP 9 supports the acceleration of the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy and address historical imbalances.
» SIP 20: Energy: Relating to energy generation and associated infrastructure.

The Embedded Generation National Programme (EGNP) forms part of the Energy Strategic Integrated Project No. 20c, which was gazetted in Government Gazette 43547 on 24 July 2020. These projects are classified as Strategic Integrated Projects are to be managed within the requirements as set out in the Infrastructure Development Act (Act No. 23 of 2014) and its amendments. The overall objective of the EGIP is to support the development and upscaling of solar photovoltaic and wind renewable energy embedded generation projects, developed by independent power producers operating in South Africa.

The outcome of the SIP process will be a letter which requests that the Project Sponsor is assisted with the necessary approvals, authorisations, licences, permissions and exemptions, as determined within the boundaries of the Infrastructure Development Act (Act No 23 of 2014).

The FE Kudu Wind Energy Facility could be registered as a SIP project.

5.4.16 Renewable Energy Development Zones (REDZ) (GNR 114 of February 2018)

The Strategic Environmental Assessment for Wind and Solar Photovoltaic Energy in South Africa identified 8 (increased to 11 in 2021) Renewable Energy Development Zones (REDZs) that are of strategic importance for large-scale wind and solar photovoltaic energy development, including the roll-out of its supporting transmission and distribution infrastructure, in terms of Strategic Integrated Project (SIP) 8: Green Energy in support of the South African Economy. The FE Kudu Wind Energy Facility is located within the Beaufort West REDZ.

5.4.17 National Infrastructure Plan (NIP) of 2012

Government adopted a National Infrastructure Plan (NIP) in 2012. The aim of the plan is to transform the economic landscape while simultaneously creating significant numbers of new jobs and strengthening the delivery of basic services. The aim of the NIP is support 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 included three energy SIPs, namely SIP 8, 9 and 10.

- SIP 8: Green energy in support of the South African economy.
- SIP 9: Electricity generation to support socio-economic development.
- SIP 10: Electricity transmission and distribution for all.

The NIP 2050 was gazetted for public comment on 10 August 2021. The first phase of the NIP 2050 focuses on four critical network sectors that provide a platform, namely, energy, freight transport, water, and digital infrastructure. In line with the NDP, the vision for the energy sector is to promote:

» Economic growth and development through adequate investment in energy infrastructure" (generation, transmission, and distribution) and reliable and efficient energy service at competitive rates, while supporting economic growth through job creation by stimulating supply chains.
» Social equity through expanded access to energy at affordable tariffs and through targeted, sustainable subsidies for needy households.
» Environmental sustainability through efforts to reduce pollution, reduce water usage and mitigate the effects of climate change.

The NIP 2050 notes that by 2030, the NDP set a target that more than 90% of the population should enjoy access to grid connected or off-grid electricity by 2030. To realise this vision, South Africa's energy system will be supported by effective policies, institutions, governance systems, regulation and, where appropriate, competitive markets. In terms of energy mix, NIP 2050 notes that coal will contribute significantly less to primary-energy needs in the future, while gas will have an important enabling role, energy supply will be increasingly dominated by renewable energy resources– especially wind and solar which are least cost and where South Africa has a comparative advantage.

NIP 2050 also notes that South Africa is signatory of the Paris Agreement which aims to achieve Net Zero greenhouse gas emissions by 2050. To achieve this will require a shift to a least cost energy path that is increasingly reliant on renewables. For South Africa this is imperative for the following reasons:

» SA cannot afford to overspend while dramatically expanding capacity
» Renewables can be built quickly and in modular form thereby avoiding many of the challenges associated with mega projects.

» Trade partners are expected to increasingly impose border carbon taxes harming SA exports.
» SA will need to commit to emission reductions as a global citizen.

5.5 Provincial Planning and Context

5.5.1. Eastern Cape Provincial 2030 Draft Development Plan (PDP), 2014

The vision set out for 2030 is stated as a point along a journey towards ubuntu, where by 2030 the Eastern Cape will seek to achieve the commitment for the province where:

» There has been proliferation of innovation and industry, and citizens who can feed themselves.
» All children and youth manifesting our shared belief that they are the cornerstone of the future.
» Participatory local development action is driven by committed, capable citizens and conscientious institutional agents.

The 2030 vision notes that the sustainable future for the Eastern Cape rests on a people-centred development to achieve five related goals as agreed by all stakeholders involved in the process to develop this plan. The provincial development plan (PDP) identifies five goals, with the following relevant to the project

Goal 1: A growing, inclusive and equitable economy
The PDP promotes a growing, inclusive, and equitable economy. This includes a larger and more efficient provincial economy that optimally exploits the competitive advantages of the Eastern Cape, increased employment and reduced inequalities of income and wealth. The economic goal will be achieved through five strategic objectives, of which improved economic infrastructure that promotes new economic activity and development of high potential economic sectors are of relevance to the project.

In terms of improved economic infrastructure, the PDP notes that this includes positioning the Eastern Cape as a key investment hub in the energy sector and ensuring reliable energy supplies to high potential sectors. Strategic Action 1.1.6 notes that the province is positioning itself as an investment hub in the energy sector (wind farms, imported liquefied natural gas, shale-gas, and nuclear energy). This will provide opportunities to develop the capital goods sector and heavy industries.

The rapid development of high-potential economic sectors includes the energy sector with the aim of developing the province as an energy hub. Tourism is also identified as a key sector, including eco-tourism.

Goal 4: Vibrant and equitably enabled communities
Strategic objective 4.3 seeks to ensure universal access to adequate, reliable, and basic infrastructure for all by 2030.Linked to this Strategic Action, 4.3.2 outlines the requirements to ensure adequate energy infrastructure for household and public facility access and universal access to energy by 2030. The development of renewable energy hubs for remote rural areas are a potential solution, using solar, wind and biomass/biogas is identified as means to achieving this.

The PDP also identifies four catalytic flagships that are aimed at meeting the development goals and addressing the socio-economic challenges facing the province. The following are relevant to the project:

Infrastructure
The third catalytic flagship focuses on the provision and maintenance of infrastructure, including energy infrastructure. The initiative also aims to encourage private sector investment in infrastructure and develop appropriate technology. The REIPPP creates the opportunity for private sector investment in renewable energy infrastructure.

Ilima labantu
Ilima labantu is an agricultural development initiative that aims to revive the rural economy and encourage other areas of development in the province. The Eastern Cape is endowed with significant natural resources that can be used to help address its food security needs, expand its capacity to provide jobs, raise income levels and trigger development in allied industries and other sectors. The establishment of Community Trusts associated with the REIPPPP creates opportunities to support agricultural development in rural areas.

Ematholeni!
Ematholeni! (children first!). The focus is on creating and improving education opportunities and facilities in the Eastern Cape, starting with better-coordinated early childhood development (ECD). The establishment of Community Trusts associated with the REIPPPP creates opportunities to support education programmes in rural areas.

Considering the above, the FE Kudu Wind Energy Facility falls within the overall energy objective for the Province.

5.5.2. Eastern Cape Provincial Growth and Development Program

The Eastern Cape Provincial Growth and Development Programme (PGDP) (2004-2014) sets out the vision and plan for development for the Eastern Cape up until 2014. It highlights, in particular, strategies to fight poverty, promote economic and social development, and create jobs. In as far as could be established, no updated version of the Program is available.

The strategy document does not highlight any specific measures to promote the development of renewable energy sources. However, an analysis of energy sources within the province reveals that 23% of the population of the province still rely on paraffin for their energy needs while 25% rely on candles for lighting.

Section 5 of the PGDP (2004-2014) identifies six strategic objective areas or programs aimed at addressing the challenges facing the province. The PGDP indicates that the programmes have been selected for their potential in leveraging significant resources, creating a large multiplier effect, and providing a foundation for accelerated economic growth. Of specific relevance to the proposed development is the Strategic Infrastructure Programme. This programme indicates that enabling economic and logistics infrastructure – energy, roads, rail, ports, and air transport among others – is a necessary condition for economic growth and development. Specific reference is therefore made to energy infrastructure.

The report notes that development of infrastructure, especially in the former homelands, is a necessary condition to eradicate poverty through:

» The elimination of social backlogs in access roads, schools and clinics and water and sanitation.
» To leverage economic growth through access roads and improving the road, rail and air networks of the province.

Energy demands and electricity infrastructure rollout forms part of the Strategic Infrastructure Programme of the PGDP. The PGDP states that the, "…economic and logistics infrastructure – energy, roads, rail, ports, and air transport among others – is a necessary condition for economic growth and development."

The Strategic Infrastructure Programme also seeks to consolidate and build on this coastal advantage through the provision of world-class infrastructure and logistics capability at the Coega and East London IDZs and improving connectivity and linkages with major industrial centres such as Johannesburg.

The high-level objectives of the Strategic Infrastructure Programme include consolidating and building upon the strengths of the Province's globally-competitive industrial sector through the development of world-class infrastructure and logistics capability in the East London and Coega IDZs. A reliable energy supply will be critical to achieving these objectives. The proposed wind energy facility will assist to contribute to the future energy requirements of the Eastern Cape, and its proximity to the Coega IDZs will also benefit these key initiatives.

5.5.3. Eastern Cape Sustainable Energy Strategy 2012

The Eastern Cape Sustainable Energy Strategy developed in 2012 responds to a number of imperatives, including the need for improved provincial energy security and self-sufficiency, improved access to energy among the poorest in the province, and the need to stimulate a green and low-carbon economy underpinning decent and sustainable jobs.

The vision set out in 2012 was "The Eastern Cape provides the most enabling environment for sustainable energy investment and implementation in the country". The mission statement linked to the vision is "To encourage sustainable, affordable and environmentally friendly energy production and efficient use within the Eastern Cape Province by creating an enabling environment for energy production and sustainable technology, skills and industry development".

The strategy also identifies a set of goals to achieve the vision, namely:

- Goal 1: Job creation and skills development.
- Goal 2: Alleviate energy poverty.
- Goal 3: Reduce CO_2 emissions and environmental pollution.
- Goal 4: Improve industrial competitiveness.
- Goal 5: Promote renewable energy production in the Province.
- Goal 6: Promote the development of a renewable energy manufacturing industry and technology development.

Goal 3: Reduce CO_2 emissions and environmental pollution.
A key objective of Goal 3 is to reduce Greenhouse gas emissions and combat climate change.

Goal 4: Improve industrial competitiveness
Providing clean energy to manufacturers will assist them in improving the environmental performance, and therefore market competitiveness, of their products.

Goal 5: Promote renewable energy production in the Province

The production of renewable energy in the province will promote provincial energy security and self-sufficiency, improve local economies (particularly in rural areas), and assist with job creation both in urban and rural areas.

Goal 6: Promote the development of a renewable energy manufacturing industry and technology development
Meeting goal 6 will create jobs and develop skills and industrial expertise.

The strategy lists a number of recommendations, of which the following are relevant to the development.

Recommendation 1:
The development of a sustainable energy sector should form an integral and important part of the Province's development initiatives such as the Provincial Growth and Development Plan and the Green Economy theme of the Provincial Industrial Development Strategy and Implementation Plan.

Recommendation 4:
Develop an Eastern Cape Provincial locational perspective on renewable energy, this includes guidance on the appropriate location of renewable energy developments. This includes environmental sensitivity analysis using existing data from various environmental planning processes which indicate ecosystem sensitivities and general parameters that renewable energy developments should work within to avoid controversy and prevent environmental damage and unsustainable development patterns emerging.

5.5.4. Eastern Cape Climate Change Response Strategy (2011)

The Eastern Cape Climate Response Strategy (ECCCRS) was initiated by the Eastern Cape Provincial Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) in January 2010. The province recognised itself as a contributor of climate change whilst simultaneously being vulnerable to the effects of climate change. The key aspects of the Eastern Cape Climate Change Response Strategy (ECCCRS) Report were discussed in the MEC's (DEDEA: Department of Economic Development, Environmental Affairs) 2011 budget speech: "*The recent completion of the Eastern Cape Climate Change Response Strategy paves the way for the Province to explore alternative industrial models supporting a Green Economy and Decent Work. Avenues that hold potential include alternate building materials, reducing emissions, and the establishment of alternate energy generation. We concur with the Ministers of Economic Development and Environmental Affairs, who believe that the renewable energy industry could boost Government's plans to halve unemployment by 2014. Minister Patel estimates that up to 300 000 jobs can be created in the green economy over ten years. He projects that the benefits, which include health and pollution management, waste collection, disposal and storage activities, could generate between R22 billion and R36 billion within the environment sector*".

Key points from the ECCCRS in line with the MEC's address include the DEDEAT's commitment to develop and implement policy in accordance with the National Green Paper for the National Climate Change Response Strategy (2010), and an acknowledgement of the Eastern Cape Province's vulnerability to climate-change. The development and promotion of a provincial green economy, including green jobs, and environmental learnership is regarded as an important provincial intervention in addressing climate change. The renewable energy sector, including solar and wind energy (including also biofuels and energy from waste), is explicitly indicated as an important element of the Provincial Climate Change Response Strategy.

According to strategy, wind energy was the fastest growing energy technology sector, which accounted for more than 50% of worldwide clean energy investment, in 2009 as well as almost half of the installed clean energy capacity worldwide. The South African Wind Energy Association called for 25% of the overall electricity generation mix by 2025 to be derived from renewable energy, with 80% of this target potentially coming from wind power. The ECCCRS further indicated that by mid-2010 more than 30 separate wind farms ranging from 8MW to over 100MW had been planned for the Eastern Cape.

As part of the strategy, Greenhouse Gas (GHG) mitigation programmes have been developed and include the following:

- » Mainstreaming GHG mitigation in provincial and local government and in industry
- » Promotion of renewable energy in the Eastern Cape
- » Mitigation and opportunities for rural livelihoods
- » Mitigation in solid waste and wastewater treatment
- » Greenhouse gas mitigation in transport

The development of the FE Kudu Wind Energy Facility contributes towards the strategy as it is in line with some of the mitigation measures that have been developed in an effort to reduce GHG emissions, albeit only to a limited extent.

5.5.5. Eastern Cape Sustainable Energy Strategy (2012)

The Eastern Cape Sustainable Energy Strategy identifies six (6) goals to assist in achieving the Province's vision of creating an enabling environment for sustainable energy investment and implementation, and these goals include:

- » Job creation and skills development
- » Alleviate energy poverty
- » Alleviate CO2 emissions and environmental pollution
- » Improve industrial competitiveness
- » Promote renewable energy production in the Province
- » Promote the development of a renewable energy manufacturing industry and technology development

Considering the goal to promote renewable energy production and the associated manufacturing industry in the Province, the development of the Wind Garden Wind Farm is considered to contribute to the goals.

5.5.6. Eastern Cape Environmental Management Bill (Department of Economic Development, Environmental Affairs and Tourism, 2019)

This Bill ensures that the government of the Province of the Eastern Cape shall manage the environment in such a way that the basic right of every citizen can be realised. The Bill seeks to ensure that an adverse impact on the environment is limited and that the rights of all that live in the province with regard to the environment are protected.

Applicable clauses within the bill in the context of this study include:

» Provides for the transfer of hunting and other rights of a holder of a certificate of adequate enclosure.
» Provides for the MEC's general powers in respect of wild animals.
» Details restricted activities involving provincially protected and endangered species.
» Stipulates obligations of holders of certificates of adequate enclosure.
» Details permit requirements of persons and businesses operating game parks etc.

5.5.7. Eastern Cape Biodiversity Conservation Plan (2019)

A Biodiversity Conservation Plan (BCP), also known as a Biodiversity Sector Plan, is a tool that guides and informs land use and resource-use planning and decision-making by a full range of sectors whose policies, programmes and decisions impact on biodiversity, in order to preserve long-term functioning and health of priority areas known as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). The purpose of the plan is to provide a map of these important biodiversity areas and develop associated land use management guidelines to inform:

1. Cross-sectoral spatial planning at all levels of government, relevant to sectors whose policies, actions and decisions impact on biodiversity;
2. Environmental assessment and authorisations; and
3. Natural resource management and protected area expansion programmes.

A complete revision of the first version of the Eastern Cape Biodiversity Conservation Plan (ECBCP2007) was undertaken. The Eastern Cape Biodiversity Conservation Plan (ECBCP2019) was developed in line with the principles and methods gazetted in the National Environmental Management: Biodiversity Act No 291 of 2009, "*Guideline regarding the determination of Bioregions and the Preparation of and publication of Bioregional Plans*".

The Eastern Cape Biodiversity Conservation Plan (ECBCP) is responsible for mapping areas that are priorities for conservation in the province, and defines Terrestrial and Aquatic CBAs. The Terrestrial CBA map and the Aquatic CBA maps developed in the current assessment replace, in their entirety, the ECBCP2007 maps and are presented in Part C of the ECBCP2019.

Land use guidelines have been developed to influence planning and development. These are detailed in Part D of the ECBCP2019 and summarised below.

Table 5.2: Terrestrial Critical Biodiversity Areas and Biodiversity Land Management Classes as described by the Eastern Cape Biodiversity Conservation Plan

CBA Map Category	Desired State	Land management objective
Protected Areas	Natural	Protected Areas are managed through Protected Area Management Plans and are therefore not managed through the ECBCP2019.
Critical Biodiversity Area 1	Natural	Maintain in a natural state (or near-natural state if this is the current condition of the site) that secures the retention of biodiversity pattern and ecological processes. For areas classified as CBA1, the following objectives must apply: » Ecosystem and species must remain intact and undisturbed; » Since these areas demonstrate high irreplaceability, if disturbed or lost, biodiversity targets will not be met; » Important: these biodiversity features are at, or beyond, their limits of acceptable change. If land use activities are unavoidable in these areas, and depending on expert opinion of the condition of the site, a Biodiversity Offset must be designed and implemented
Critical Biodiversity Area 2	Natural	Maintain in natural (or near-natural state if this is the current condition of the site) that secures the retention of biodiversity pattern and ecological processes. For areas classified as CBA2, the following objectives must apply: » Ecosystem and species must remain intact and undisturbed; » There is some flexibility in the landscape to achieve biodiversity targets in these areas. It must be noted that the loss of a CBA2 area may elevate other CBA 2 areas to a CBA 1 category. » These biodiversity features are at risk of reaching their limits of acceptable change. If land use activities are unavoidable in these areas, and depending on the condition of the site, set-aside areas must be designed in the layout and implemented. If site specific data confirms that biodiversity is significant, unique and/or highly threatened or that a Critically Endangered or Endangered species is present, Biodiversity Offsets must be implemented.
Ecological Support Area 1	Functional	Maintain ecological function within the localised and broader landscape. A functional state in this context means that the area must be maintained in a semi-natural state such that ecological function and ecosystem services are maintained. For areas classified as ESA1, the following objectives apply: » These areas are not required to meet biodiversity targets, but they still perform essential roles in terms of connectivity, ecosystem service delivery and climate change resilience. » These systems may varying in condition and maintaining function is the main objective, therefore: ∗ Ecosystems still in natural, near natural state should be maintained.

CBA Map Category	Desired State	Land management objective
		* Ecosystems that are moderately disturbed/degraded should be restored
Ecological Support Area 2	Functional	Maintain current land use with no intensification For areas classified as ESA2, the following objectives apply: » These areas have already been subjected to severe and/or irreversible modification » These areas are not required to meet biodiversity targets, but they may still perform some function with respect tov connectivity, ecosystem service delivery and climate change resilience » Objective is to maintain remaining function, therefore: * Areas should not undergo any further deterioration in ecological function. * Opportunities to change land use practices to improve ecological function (i.e. cultivation agriculture to livestock grazing agriculture) are desirable in ESA2 areas.
Other Natural Areas and No Natural Habitat Remaining	Production	No desired state or management objective is provided for ONA or NNR.

5.6 Local Policy and Planning Context

The local tiers of government within which the FE Kudu Wind Energy Facility is located is the Dr Beyers Naude Local Municipality which falls within the jurisdiction of the Sarah Baartman District Municipality. The development instruments or policies at both the district and local level contain objectives which are in line with the development of the FE Kudu Wind Energy Facility. These include economic growth, job creation, community upliftment and poverty alleviation.

Table 5.2: Relevant district and local legislation and policies for the FE Kudu Wind Energy Facility

Relevant policy	Relevance to the FE Kudu Wind Energy Facility
Dr Beyers Naude Municipality Spatial Development Framework (SDF) Final Report (2021)	Dr Beyers Naudé Local Municipality (BNLM) is third largest Local Municipality in the country and covers an area of 28,653 km². The main settlements include Graaff-Reinet, Willowmore, Aberdeen, Jansenville, Steytlerville, Nieu-Bethesda, Klipplaat and Rietbron; plus a number of smaller settlements and surrounding farms. The town of Graaff-Reinet, 4th oldest in South Africa and referred to as the "Gem of the Karoo", is a hub of agri-tourism activity and the political and administrative seat of the Municipality. In terms of the settlements and their functions Aberdeen is identified as a sub-district centre. The Spatial Development Framework (SDF) notes that the town is located at the junction of the N9 and R61 national and regional distributors and serves an important agricultural service centre to the surrounding community who practice primary stock and game farming activities. Furthermore, the town is surrounded by primarily privately owned agricultural land units. The urban area comprises of Aberdeen Town, Lotusville and Thembalesizwe settlements. In terms of potential project linked socio-economic development opportunities, the SDF notes that adequate vacant and partly serviced land is available in Aberdeen for community facilities. This land can be rezoned for community needs and facilities. New spatial planning must provide for all land use and facilities identified by the municipality and residents of

Relevant policy	Relevance to the FE Kudu Wind Energy Facility
	Aberdeen. The SDF indicates that the population of Aberdeen was 5 133, made up of 1 407 households. The vision of the BNLM SDF is "A resilient and prosperous community living in a pleasant, healthy environment with sustainable well-planned development and integrated settlements". The SDF notes that the spatial vision can be expanded into four primary spatial goals: » Spatial Goal 1: Integrated and Efficient Settlements. » Spatial Goal 2: Tourism and Agricultural Development. » Spatial Goal 3: Sustainable Resource Use. » Spatial Goal 4: Mainstream Spatial Planning. Spatial Goal 3 lists a number of objectives that are relevant to the proposed development. The following are of specific relevance. **Alternative energy production** Green energy production developments (Solar and wind) are supported in principle provided that any negative impacts on the tourism and agricultural economy are avoided. These developments, particularly wind energy production facilities, have a high visual impact on the surrounding area and should be located away from existing and future tourism focus area - Preferably outside of the 10km 'buffer' surrounding the World Heritage Site. The SDF makes specific reference to renewable energy and refers to projects located near Aberdeen. The SDF also refers to the potential impacts associated with the establishment of renewable energy projects, including potential damage to roads and other infrastructure and their strain on the region's scarce water resources, is a concern. Reference is also made to the traffic impacts associated with the transportation of wind turbine components. **Use of appropriate technology** Alternative and appropriate technologies are utilised to reduce the demand on non-renewable fuel energy and scarce resource. **Adopting the current protected area network** The protected area network together with the proposed ecological linkages is acknowledged in the spatial plan and the appropriate land use management guidelines implemented. The areas that have been identified for protected area expansion have been mapped and are subjected to similar land use management guidelines as for the protected area. In terms of economic activities tourism and ecotourism are the two key economic drivers in the DBNLM. The key tourist and eco-tourism assets include the Camdeboo National Park with the Valley of Desolation. The SDF highlights the risks posed by climate change
Sarah Baartman District Municipality Draft Integrated Development Plan for 2022/2027 (2021/2022)	The vision of the Sarah Baartman District Municipality (DM) is "An innovative and dynamic municipality striving to improve the quality of life for all communities in the District". The mission of the Sarah Baartman DM is to "Co-ordinate, support and provide sustainable services and promote socio-economic development". The following strategic and local economic development objectives have been identified for the Sarah Baartman DM:

Relevant policy	Relevance to the FE Kudu Wind Energy Facility
	» Infrastructure development » Capacity building and support » Economic development » Community services provision » Institutional development The Sarah Baartman IDP identifies the green economy (including, but not limited to renewable energy and ecosystem services) as a focal point of economic development in the district, noting that such investments are likely to have significant economic spinoffs for local income streams. To achieve this, the IDP proposes investing in natural capital so as to create a new generation of green economy jobs rooted in renewable energy. The development of the FE Kudu Wind Energy Facility is in line with the objectives of the IDP and will contribute to the achieving of the objectives, albeit to a limited extent. The contribution of the tourism as a key private sector driven industry, is noted within the IDP, however concern is drawn to the fact visits from other regions in South Africa has decreased at an average annual rate of-5.21% whilst visits from tourists from other countries decreased at an average annual growth rate of 2.99% from 2009. . Due to the COVID Pandemic and the closing of national and provincial borders and limited travel permitted as well as the closure of most of the tourist and hospitality industry the situation for 2020-2021 is extremely bleak for Tourism in SBDM.
Dr Beyers Naude Municipality Integrated Development Plan 2020/ 2021	The vision of the BNLM is "A responsive, developmental and unifying Local Government providing quality services to its citizens in a safe, healthy and well managed environment, with equal opportunities for all." The IDP lists five Key Performance Areas (KPAs), namely: » KPA 1 Organizational Transformation & Institutional Development » KPA 2 Service Delivery & Infrastructure Planning » KPA 3 Local Economic Development » KPA 4 Financial Viability » KPA 5 Good Governance & Public Participation KPA 3, local economic development, is the most relevant KPA to the development. The IDP identifies a number of challenges facing economic development in the BNLM, including high levels of unemployment and poverty. The IDP also notes that a key constraint to economic growth in the BNLM is the shortage of water. The IDP lists a number of requirements that are required to supporting LED. The following are relevant to the proposed development. » Creation of an environment conducive to economic development through the provision of economic and other infrastructure and investment incentives. » Creation of employment opportunities and poverty eradication programmes that support and involve SMMEs. » Created opportunities for skills development and training (internships, learnerships, apprenticeships etc). » Support Basic Education & Training (ABET, skills development courses). » Provide community facilities (sports, recreation, and cultural facilities). The IDP also identifies climate change and the associated droughts as a key threat / risk to economic development. With reference to renewable energy the IDP notes that the

Relevant policy	Relevance to the FE Kudu Wind Energy Facility
	Municipality supports renewable energy and green technology and is actively seeking ways and means to play a meaningful role in alleviating the country's energy crisis, by partnering with or supporting initiatives for alternative and renewable energy. However, the IDP also notes that the development of renewable energy projects should not impact on the natural environment and or the health and the livelihoods of its communities. Of specific reference the IDP does refer to the potential threats posed by proposed wind farms. The proposed development area is located in Ward 1. Key challenges facing Ward 1 include: » Unemployment and low skills levels. » Lack of sports and recreation facilities » Land for commercial and agricultural development.

5.7 Conclusion

From a review of the relevant policy and planning framework, it can be concluded that the project is well aligned with the policy framework, and a clear need for the project is seen from a policy perspective at a local, provincial, and national level.

CHAPTER 6: NEED AND DESIRABILITY

One of the objectives of the EIA process is to motivate for "*the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred development footprint*". The need and desirability of a development needs to consider whether it is the right time and right place for locating the type of land-use/activity being proposed. Need and desirability must consider the wise use of land, and should be able to answer the question of what the most practicable and/sustainable use of land is.

This chapter provides a description of the need and desirability of the FE Kudu Wind Energy Facility at the project site considered to be reasonable and feasible by the project Applicant.

6.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the BA report includes the following information required in terms of the EIA Regulations, 2014 - Appendix 1: Content of Basic Assessment reports:

Requirement	Relevant Section
3(f) a motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred location.	The need and desirability of the FE Kudu Wind Energy Facility is included and discussed within this chapter. The need and desirability for the development of the FE Kudu Wind Energy Facility has been considered from an international, national, regional and site-specific perspective.

6.2 Need and Desirability from an Energy Perspective

Electricity is essential for most human activities and for South Africa's social and economic development. The development of large-scale electricity generation projects contributes towards security of supply and assists in minimising the costs of energy. In order for the benefits associated with electricity to be realised, it needs to be readily available, easily accessible, and affordable. It should also be generated in a sustainable manner, while minimising adverse social and environmental impacts. In addition to energy provision, large-scale electricity generation projects, such as wind energy facilities, have the ability to contribute positively to the creation of skilled, unskilled, and semi-skilled employment opportunities and mitigate climate change.

An increased supply of electricity within or to an area is also considered beneficial from a development perspective as the availability of electricity and other services can act as a pull factor attracting new development and industry.

6.3 Need and Desirability from an International Perspective

The need and desirability of the FE Kudu Wind Energy Facility from an international perspective, can be described through the project's alignment with internationally recognised and adopted agreements, protocols, and conventions. South Africa is signatory to a number of international treaties and initiatives, including the United Nation's Development Programme's (UNDP's) Sustainable Development Goals (SDGs).

The SDGs address social and economic development issues such as poverty, hunger, health, education, climate change, gender equality, water, sanitation, energy, urbanisation, environment and social justice. The SDGs comprise 17 global goals set by the United Nations. The 17 SDGs are characterised by 169 targets, and 304 indicators.

Goal 7 of the SGDs relates to "Affordable and Clean Energy", with the aim of the goal being to ensure access to affordable, reliable, sustainable and modern energy for all. The following targets and indicators have been set for Goal 7:

Targets		Indicators	
7.1	By 2030, ensure universal access to affordable, reliable and modern energy services.	7.1.1 7.1.2	Proportion of population with access to electricity. Proportion of population with primary reliance on clean fuels and technology.
7.2	By 2030, increase substantially the share of renewable energy in the global energy mix.	7.2.1	Renewable energy share in the total final energy consumption.
7.3	By 2030, double the global rate of improvement in energy efficiency.	7.3.1	Energy intensity measured in terms of primary energy and GDP.
7.A	By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology.	7.A.1	Mobilised amount of United States dollars per year starting in 2020 accountable towards the $100 billion commitment.
7.B	By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programmes of support.	7.B.1	Investments in energy efficiency as a percentage of GDP and the amount of foreign direct investment in financial transfer for infrastructure and technology to sustainable development services.

The development of the FE Kudu Wind Energy Facility would contribute positively towards achieving Goal 7 (and specifically 7.2.1) of the SGDs through the following means:

» By generating up to 600MW (contracted capacity) of affordable and clean energy.
  * A study published by the CSIR on 14 October 2016 ("Cost of new power generators in South Africa Comparative analysis based on recent Independent Power Producer (IPP) announcements", Dr Tobias Bischof-Niemz and Ruan Fourie) which took into consideration the results of the cost prices bid successfully under the Department of Mineral Resources and Energy's Renewable Energy (RE) IPP and Coal Baseload IPP Procurement Programmes, found that solar PV and wind were 40% cheaper than new baseload coal (i.e. R0.62/kWh for PV and wind vs R1.03/kWh for coal).
  * Wind power technology is one of the clean electricity generation technologies, as it is not a consumptive technology and does not result in the release of emissions during its operation.
» By contributing towards South Africa's total generation capacity, specifically through the utilisation of renewable energy resources.

The Kyoto Protocol (1997) is also relevant to the need of the development of the FE Kudu Wind Energy Facility from an international perspective. The protocol calls for the reduction of South Africa's greenhouse gas emissions through actively cutting down on using fossil fuels, or by utilising more renewable resources. The development of the FE Kudu Wind Energy Facility will add capacity to the renewable energy sector of the country and strengthen the commitment and action plan to achieve the requirements, as set out in the protocol, through the generation of energy without the emission of greenhouse gasses.

6.4 Need and Desirability from a National Perspective

South Africa has experienced 15 years of intermittent black-outs and in the recent months, the country has yet again faced a considerable shortage in the availability and stability of electricity supply. Following the energy crisis in 2008, the South African Government embarked on a process to introduce renewable energy on a large scale and further enhanced the promotion of energy efficiency in all sectors to meet the demand of energy, while reducing CO_2 emissions and creating jobs. As a consequence, significant investment in renewable energy projects and energy efficiency is required. Increasing the diversity of South Africa's electricity mix is important, not only for enhancing the crucially important security of supply of the country, but also to support job creation and mitigate climate change.

The National Development Plan (NDP) envisages that, by 2030, South Africa will have an energy sector that provides reliable and efficient energy service at competitive rates; that is socially equitable through expanded access to energy at affordable tariffs; and that is environmentally sustainable through reduced emissions and pollution. Historically, coal has provided the primary fuel resource for baseload electricity generation in South Africa. Consequently, Eskom, who is the main electricity generating company in the country, generates approximately 85% of the country's electricity from coal resources (Stats SA, 2016), resulting in a large carbon footprint. Taking into consideration the need to ensure adequate supply of electricity and meet international obligations in terms of addressing climate change, Government has identified the need to diversify the energy mix within the country.

South Africa needs to build about 40 000MW of new generation capacity to meet demand requirements. According to the NDP, 17800MW should be provided by renewable energy projects. To achieve this, the government plans to install a total of 8 400 MW of wind energy, 8 400MW of solar photovoltaic energy, and 1 000 MW of concentrated solar power by 2030.

The FE Kudu Wind Energy Facility is proposed in specific response to the identified energy mix of South Africa as per the requirements set out in the IRP with regards to renewable energy targets. As a result, the need and desirability of the project from a national perspective can largely be assimilated from the project's alignment with national government policies, plans, and programmes which have relevance to energy planning and production (as discussed in detail in Chapter 5). The following key policies have been developed by Government to take into account South Africa's current energy production and projected future demands, and provides the necessary framework within which energy generation projects can be developed:

» Integrated Energy Plan (IEP)
» Integrated Resource Plan (IRP)

The above-mentioned policies have been extensively researched and are updated on an on-going basis to take into consideration changing scenarios, new information, developments in new technologies, and to reflect updated demands and requirements for energy production within the South African context. These plans form the basis of South Africa's energy generation sector and dictate national priorities for energy production.

The IEP is intended to provide a roadmap of South Africa's future energy landscape which guides future energy infrastructure investments and policy development. South Africa has a good wind resource for the development and generation of wind energy.

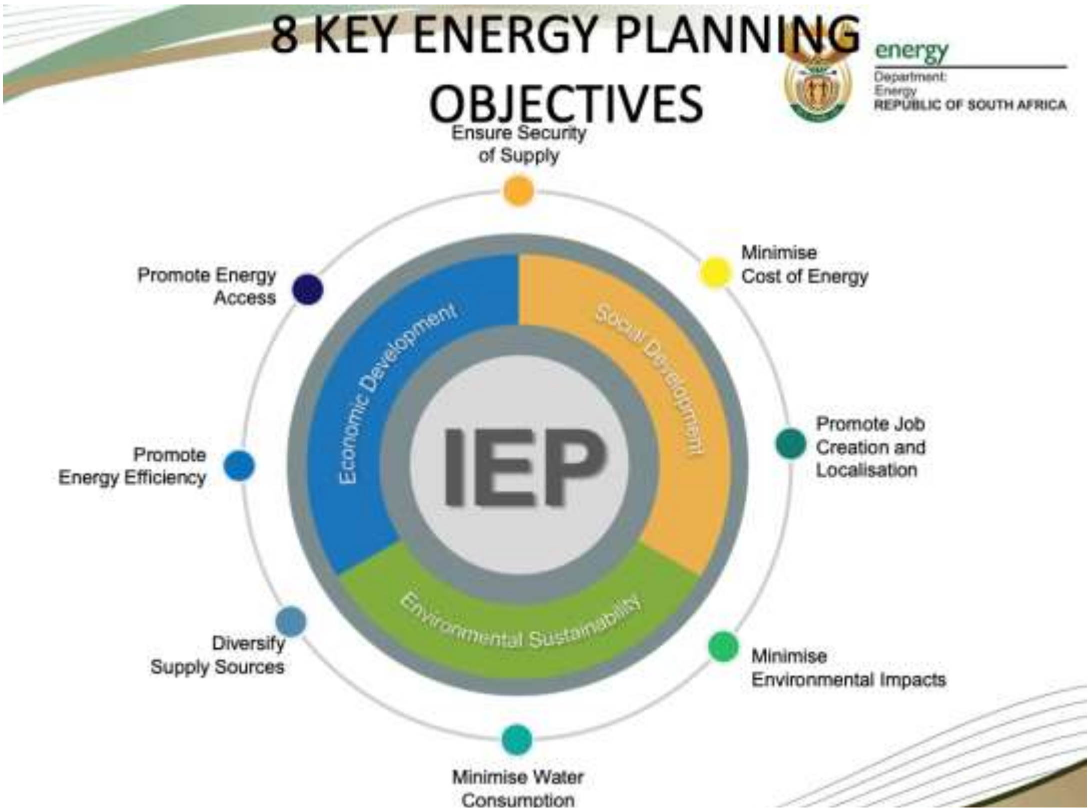

Figure 6.1: Eight key energy objectives as listed in the IEP, 2016 (extract from DOE presentation, December 2016)

In terms of electricity generation, the IEP states that South Africa should continue to pursue a diversified energy mix which reduces reliance on a single or a few primary energy sources, and includes the following statement regarding solar energy's contribution to the diversified energy mix:

» *Wind energy should continue to play a role in the generation of electricity. Allocations to ensure the development of wind energy projects aligned with the IRP should continue to be pursued.*

The IRP for Electricity 2010 – 2030 (gazetted in 2019) is a subset of the IEP and constitutes South Africa's current gazetted energy plan. The purpose of the plan is to ensure sustainable electricity development which takes into consideration technical, economic, and social constraints, and identifies investments in the electricity sector which are required to meet the country's forecasted electricity demands at minimum costs. This plan provides for the development of a total 17 742MW of capacity from wind energy facilities by 2030, with an annual contribution of 1600MW from 2022.

Provision has been made for new additional capacities in the IRP 2019 (refer to **Table 6.1**).

Table 6.1: Overview of the total installed capacity expected by 2030

IPP Procurement Programme	Technology	MW	Total
Renewables	Wind	17 742MW	31 320MW
	Solar CSP	6000MW	
	Solar Photovoltaic	8 288MW	
	Hydro	4 600MW	
Coal	Coal	33 364MW	33 364MW
Nuclear	Nuclear	1 860MW	1 860MW
Gas & Diesel	Gas & Diesel	3 000MW	3 000MW
Other (Distributed Generation, CoGen, Biomass, Landfill)	Other (Distributed Generation, CoGen, Biomass, Landfill)	4 000MW	4 000MW

Renewable resources are valuable in contributing towards electricity generation and diversifying South Africa's electricity mix, while contributing towards South Africa's response to Climate Change. A number of IPP Procurement Programmes have been initiated by government to secure electricity generated from a range of resources from the private sector (i.e., from Independent Power Producers, or IPPs). Between 2011 and 2022, the South African Government, through its IRP 2010-2020, have successfully launched and completed six bidding windows under the REIPPP Programme. Approximately 4.51GW of projects are already in operation, with wind and solar PV projects compromising most of the projects awarded.

In addition to government procurement programmes, various private procurement initiatives have been undertaken by various industries that are electricity intensive which have identified a need to diversify their energy mix and to change their reliance on State-provided electricity. In 2021, the South African government acknowledged that aging state-owned electricity infrastructure and a demand far surpassing supply, is hampering the country and economy's growth. On 10 June 2021, President Ramaphosa announced the government's approval of an increase in the generation license exemption threshold for embedded generation facilities from 1MW to 100MW. This allows industry to not only generate electricity for self-consumption but allows them to develop facilities with a more realistic capacity response to their demand requirements without the need to obtain a Generation License from NERSA. This in turn aims to reduce generation demands on the national grid and to alleviate residential, commercial, and industrial electricity supply constraints.

In addition to the policy considerations detailed above, Government has prioritised post COVID-19 turnaround plans in terms of renewable energies within the Just Energy Transition (JET), coupled with key development objectives of the various spheres of government. These policies share the same ideals, such as:

» The utilisation, application and investment in renewable energy resources in South Africa is considered to be an essential means of reducing the carbon footprint of the country;
» Diversifying the national economy;

» Reducing poverty; and
» Providing critical additional energy to that provided by Eskom.

Government has compiled an Economic Reconstruction and Recovery Plan which was presented to Parliament in October 2020. According to this plan, the economic survey will rely on a massive investment in infrastructure, including energy, telecommunications, ports and rail. The core elements of the Economic Reconstruction and Recovery Plan are as follows:

1. Priority interventions for economic recovery: the plan sets out eight priority interventions that will ignite South Africa's recovery and reconstruction effort. These are the flagship initiatives that all of society will rally around to build a new economy (refer to **Figure 6.2**).
2. Enabling conditions for growth: these are growth-enhancing reforms and other preconditions for an inclusive, competitive and growing economy.
3. Macroeconomic framework: economic reconstruction and recovery requires careful mobilisation of resources to ensure fiscal sustainability.
4. Institutional arrangements: the plan focuses on execution, and is supported by enhanced institutional arrangements to ensure implementation and accountability.

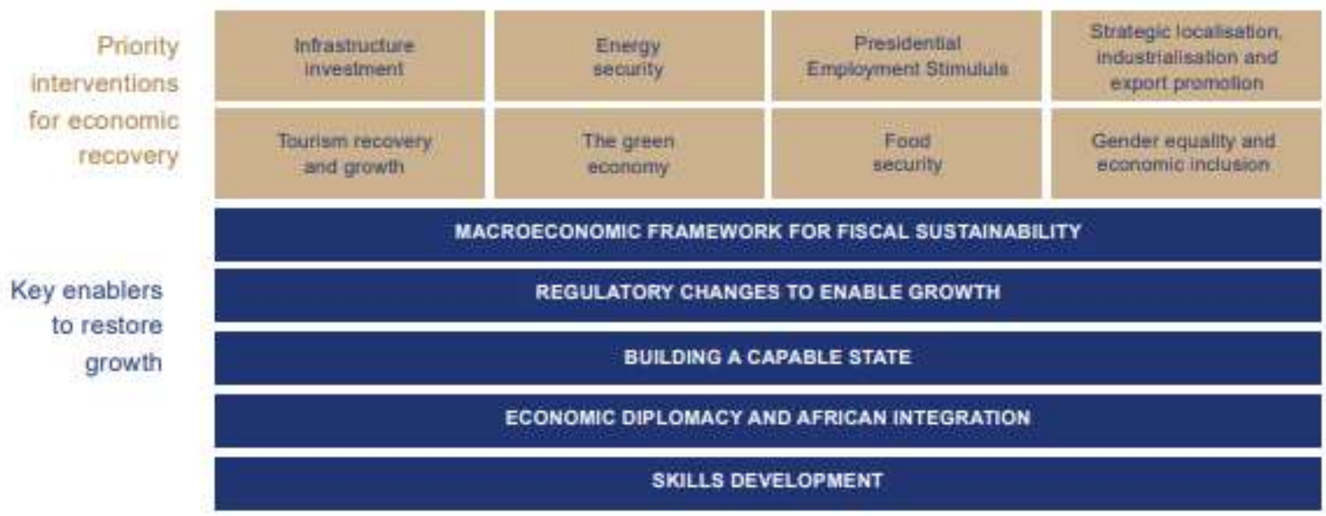

Figure 6.2: Core elements of the Economic Reconstruction and Recovery Plan (source: Building a new economy - Highlights of the Reconstruction and Recovery Plan, Presidency of the Republic of South Africa)

The plan recognises energy security as the most important prerequisite for the recovery agenda and states that renewed investment in a diversified energy mix can be achieved within a short time horizon, while alleviating a crippling energy crisis and facilitating a necessary transition to a less carbon-intensive economy. One of the key commitments of the plan is therefore to implement the IRP 2019 without delay to provide a substantial increase in the contribution of renewable energy sources by 2030, alongside other sources including battery storage, gas and clean coal. The transition to green energy is recognised as contributing towards the realisation of the low-carbon, climate-resilient and inclusive economy envisaged by the National Development Plan. The development of the FE Kudu Wind Energy Facility is identified as a mechanism for securing additional power generation capacity as part of the REIPPP programme or for private off-takers, reducing the reliance for electricity on Eskom.

The development of the FE Kudu Wind Energy Facility will ensure the optimisation of supply, as well as play a significant role in the Just Energy Transition by supplying low-cost energy to the national grid.

The South African government has identified the green economy as one of 12 job drivers that could help contribute to creating 5 million additional jobs by 2020. The New Growth Path, in which the sectoral jobs targets are disaggregated, envisages that as many as 300 000 new direct jobs could be created in the areas of natural resource management and renewable energy construction (Department of Energy, 2019). As the project forms part of the REIPPP programme, the Applicant will implement similar social and economic development strategies, including amongst others, job creation, local content, skills development, enterprise and supplier development, and socio-economic development. In addition to electricity generation and supply the project will therefore also contribute positively towards socio-economic development of a region, over and above job creation.

The need for new power generation from wind energy has, therefore, been identified and assessed by Government at a national scale considering the national energy requirements as well as international commitments to address climate change under the Paris Agreement, and provision has been made for the inclusion of new wind power generation capacity in South Africa's energy mix. The implementation of the FE Kudu Wind Energy Facility, therefore, has the potential to contribute positively towards the identified national need, while simultaneously contributing to job creation and socio-economic development, which is identified as a need for the country within the National Development Plan. The wind farm will make use of renewable energy technology and would contribute positively towards reducing South Africa's GHG emissions and the Just Energy Transition of the country. In addition, by making use of wind power technology, the project would have reduced water requirements, when compared with other generation technologies such as coal and gas, in alignment with one of the vision 2030 themes of DWS's National Water Resource Strategy 2 (2013) (i.e. transitioning to a low carbon economy through stimulating renewable energy and retrofitting buildings).

6.5 Need and Desirability of the project from a Provincial Perspective

South Africa's electricity generation mix has historically been dominated by coal. This can be attributed to the fact that South Africa has abundant coal deposits, which are relatively shallow with thick seams, and are therefore easy and comparatively cost effective to mine. In 2016, South Africa had a total generation capacity of 237 006GWh; approximately 85.7% (equivalent to 203 054GWh) of this figure was generated by coal, and only 0.9% (equivalent to 2 151GWh) was generated by wind (refer to **Figure 6.3**).

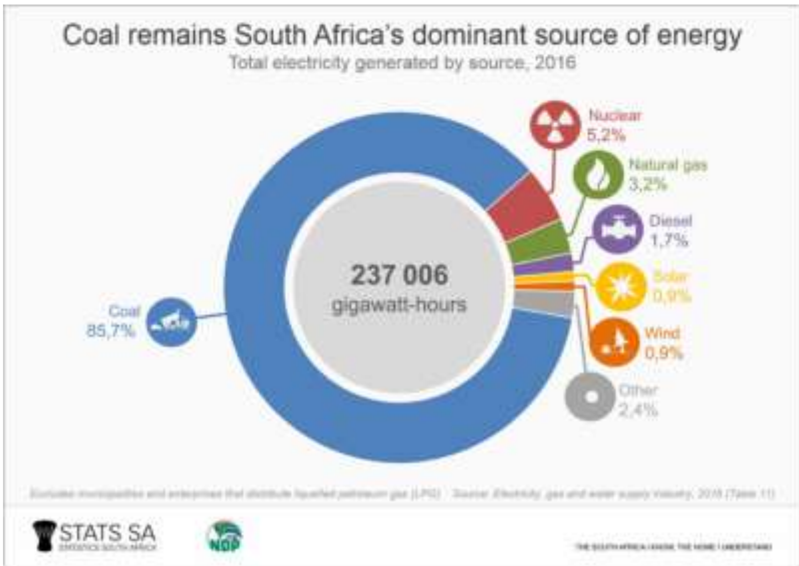

Figure 6.3: Overview of South Africa's electricity generation by source (source: StatsSA 2016 Electricity, gas and water supply industry)

Whereas the majority of South Africa's electricity generation infrastructure is currently located within Mpumalanga due to the location of coal resources within this province, the Eastern Cape Province has been identified as an area where the development of wind energy facilities is a feasible and suitable option for electricity generation.

The Eastern Cape Provincial 2030 Draft Development Plan indicates that sustainable development must be ensured in the Province and that people-centred development and economic development is imperative to address the most significant challenge facing the Eastern Cape, i.e. material poverty and deprivation. The Province also acknowledges climate and environmental challenges, the need to enhance environmental resilience and sustainability, the efficient use of scarce natural resources, the promotion of renewable sources of energy and new jobs and income for the poor in terms of a green agenda.

The overall energy objective for the Province also includes promoting the development of renewable energy supply schemes which are considered to be strategically important for increasing the economic opportunities for affected communities, while also minimising the detrimental environmental impacts. The implementation of sustainable renewable energy is also to be promoted within the Province through appropriate financial and fiscal instruments.

The Province has also been identified as a major source of electricity in South Africa, with the largest number of operational wind energy facilities currently located within the Province. The location of the Province is suited for wind generation based on the wind flows present along the coast and the strong and steady wind current between Aberdeen and the western border of Lesotho. The availability of existing grid infrastructure in the windy areas of the Province makes for ease of access to connect the projects to the national grid and evacuate the generated electricity[1].

The need for the project is therefore supported from a planning and policy level at a Provincial level.

[1] https://www.businessinsider.co.za/trending/eastern-cape-primed-to-become-wind-power-hub-of-sa-this-map-shows-why-2020-11

6.6 Need and Desirability of the project from a District and Local Perspective

From a district level, the need for the development of the FE Kudu Wind Energy Facility is reflected within the Sarah Baartman District Municipality and Dr Beyers Naude Local Municipality. The following planning policies directly and indirectly make reference to the need for the development of renewable energy facilities within the municipal area, based on the contributions of such facilities to various aspects in the municipal area.

» The Sarah Baartman SDF further notes that the introduction of alternative energy generation infrastructure and the associated land use change will provide both economic opportunities but may also have a negative impact on the ecotourism of the district (in the form of potential changes to the visual and cultural landscapes).

» The Sarah Baartman District Municipality Final Reviewed Integrated Development Plan for 2017/2022 has determined that the creation of new generation green jobs and local income streams are rooted in renewable energy. The anticipated growth in the renewable energy sector provides major opportunities for growth in job creation in the province because of the potential of the area to host renewable energy generation infrastructure as well as the potential to be a major manufacturer of such infrastructure leveraging off the automotive sector.

» The Dr Beyers Naude Final Integrated Development Plan (2019-2020) indicates that the municipality is considering innovative energy sourcing methods. With reference to renewable energy the IDP notes that the Municipality supports renewable energy and green technology and is actively seeking ways and means to play a meaningful role in alleviating the country's energy crisis, by partnering with or supporting initiatives for alternative and renewable energy.

Considering the requirements and needs and desirability for the development of a wind energy facility within the municipal area, it is considered that there is a definite need for developments of such a nature considering the development plans of the relevant local and district municipalities and the reliance of the affected areas on such developments.

6.7 Receptiveness and Desirability of the project site to develop the FE Kudu Wind Energy Facility

The overarching objective of the FE Kudu Wind Energy Facility is to maximise electricity production utilising the wind resource. The placement of a wind energy facility is strongly dependent on several factors, including climatic conditions (average wind speeds and duration), topography, the location of the site, and in particular the location in a node for renewable projects, availability of grid connection, the extent of the site and the need and desirability for the project. From a regional site selection perspective, the Eastern Cape region is considered to be favourable for the development of a wind energy facility due to its significant wind resource. From a local level perspective, the project site has specifically been identified by the proponent as being highly desirable for the development of a wind energy facility based on the characteristics detailed in Chapter 3. Section 3.3.1 provides a description of the site-specific considerations that contribute to the desirability of the project within the identified project site.

FE Kudu Wind Energy Facility is proposed to be constructed outside of the urban edge of the surrounding towns on a privately-owned property currently used predominantly for livestock grazing/agricultural practises and clear signs of water provision are seen on the poperty, as well as a guest house (Karoo Secret and Lark Cottage Guest House). The owners envisage making the facilities available for project accommodation during the FE Kudu WEF construction phase, but potential operational phase impacts on historic tourism, specifically birding, are considered difficult to predict or anticipate. The proposed wind energy facility does not conflict with the current or future planned land use of the affected property. The project site falls within the Beaufort West REDZ, an area which has become a node for wind energy projects, as well as within the Central Corridor of the Strategic Transmission Corridors. The project site proposed for the development of FE Kudu Wind Energy Facility displays characteristics which contribute to the overall desirability. In particular, the Aberdeen area has been confirmed as an area with sufficient wind resources and wind speeds for a wind energy development (refer to **Figure 3.1** in Chapter 3).

Considering the above, it can be confirmed that from a district and local perspective there is a need and desirability for the development of wind energy facilities within the regional area of the project site.

6.8 Need for and Benefits of Renewable Energy in the South African Environment

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

Socio-economic upliftment of local communities: FE Kudu Wind Energy Facility has the potential to create much needed employment for unskilled locals during the construction phase. Training opportunities will also be afforded to qualified local people who can be upskilled to undertake certain roles during the construction and operation phases. In terms of the needs of the local community, the Local and District municipality IDPs identified the need to facilitate economic development by creating an environment that is conducive for business development, economic growth, sustainable employment opportunities and growth in personal income levels of communities; unlock opportunities to increase participation amongst all sectors of society in the mainstream economy to create decent job opportunities; promote Local Economic Development; and enhance rural development and agriculture.

Since inception of the REIPPP Programme in 2011 up to bid window 4, approximately 109 400 job years for South African citizens to date have been created[2]. FE Kudu Wind Energy Facility also has the potential to make a positive contribution towards the identified community needs. The potential for creation of employment and business opportunities, and the opportunity for skills development for local communities is significant. Secondary social benefits can be expected in terms of additional spend in nearby towns due to the increased demand for goods and services. These socio-economic benefits would include an increase in the standard of living for local residents within the area as well as overall financial and economic upliftment.

Increased energy security: Given that renewables can often be deployed in a short timeframe and in a decentralised manner close to consumers, they offer the opportunity for improving grid strength and supply quality in the short-term, while reducing expensive distribution losses. According to CSIR's power sector statistics, South Africa experienced loadshedding for 1 900 hours in the first 3 quarters of 2022, making it the most intensive loadshedding year. More loadshedding was recorded in September 2022 than for the entirety of 2020. The contribution of renewable energy technologies (wind, solar PV and CSP) increased in 2022 to a total of 6.2 GW installed capacity and provided 6.5% of the total energy mix.

[2] University of Cape Town. The South African Renewable Energy IPP Procurement Programme: Review, Lessons Learned & Proposals to Reduce Transaction Costs.

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

According to the IPP Procurement Programme overview report dated 31 December 2021, water savings of 85.3 million kilolitres has been realised by the programme from inception to the date of this publication, of which 5.2 million kilolitres were from reporting quarter 3 of 2021.

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

According to the IPP Procurement Programme overview report, as of 31 December 2021, the REIPPPP had made the following significant impacts in terms of energy supply:

» 5 661 MW of electricity generation capacity from 85 IPP projects has been connected to the national grid.
» 71 073 GWh of energy has been generated by renewable energy sources procured under the REIPPPP since the first project became operational in November 2013. Renewable energy IPPs have proved to be very reliable. Of the 85 projects that have started operations, 77 projects have been operational for longer than a year. The electrical energy generated over the past 12-month period for the 77 projects is 14 117 GWh, which is 95% of their annual energy contribution projections of 14 924 GWh over a 12-month delivery period. Thirty one (31) of the 77 projects (40%) have individually exceeded their projections.

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

The following has been achieved by the IPP programme (December 2021) in terms of investment and economics:

» Investment (equity and debt) to the value of R209.7 billion of which R41.8 billion (20%) is foreign investment, was attracted.
» Socio-economic development contributions of R1.8 billion to date, of which R109.6 million was spent in this 2021 reporting quarter.
» Enterprise development contributions of R537.9 million to date, of which R27.2 million was spent in this 2021 reporting quarter.

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

The overview of the Independent Power Producers Procurement Report (December 2021) indicates that a carbon emission reduction of 72.1 Mton CO_2 has been realised by the IPP programme from inception to date, of which 4.4 Mton is in the 2021 reporting quarter 3.

Climate friendly development: The uptake of renewable energy offers the opportunity to address energy needs in an environmentally responsible manner and thereby allows South Africa to contribute towards mitigating climate change through the reduction of greenhouse gas (GHG) emissions. South Africa is estimated to be currently responsible for approximately 1% of global GHG emissions (and circa half of those for which Africa is responsible) and is currently ranked 9th worldwide in terms of per capita carbon dioxide emissions. The renewable energy sector saved South Africa 1.4 million tons of carbon emissions over the first 6 months of 2015[3], with savings that will keep increasing with the development and implementation of renewable energy.

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

Employment creation: The development, procurement, installation, maintenance and management of renewable energy facilities have significant potential for job creation and skills development in South Africa. The construction phase will create temporary employment opportunities and the operation phase will create limited full-time employment opportunities.

The overview of the Independent Power Producers Procurement Report indicates that all IPP projects, as at 31 December 2021, have created 44 172 job years for South African citizens.

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

Support to a new industry sector: The development of renewable energy offers the opportunity to establish a new industry within the South African economy, which will create jobs and skill local communities and result in community upliftment for the affected areas.

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

6.9. Conclusion

The need and desirability for the project is supported from a planning and policy perspective on a national, provincial, district, and local level, as well as from a technical perspective when considering wind resource. It is however important to also consider the potential impacts and benefits that the proposed wind energy facility may have for the affected site and surrounding area from both a biodiversity sustainability

[3] http://www.iol.co.za/capetimes/renewable-energy-saving-sa-billions-csir-1.1903409#.VkNjdJq6FeU

perspective and a socio-economic perspective. Therefore, it is imperative for the assessment being undertaken for the project to consider this project not only from a policy (national, provincial, and local level) perspective, but also from a site-specific biodiversity and socio-economic perspective. The aim of the EIA process is to ensure a balance between these three spheres and to ensure that conclusions made regarding the project draw on both the positive and negative consequences of the proposed development, as well as the potential for impacts to be compounded through the development of the wind energy facility and its associated infrastructure in proximity to other similar developments (i.e. cumulative impact). The potential impacts associated with the project are identified and described within this Basic Assessment Report.

CHAPTER 7: APPROACH TO UNDERTAKING THE BASIC ASSESSMENT PROCESS

In terms of the EIA Regulations of December 2014 (as amended in April 2017) published in terms of the NEMA (Act No. 107 of 1998) as amended, the construction and operation of the FE Kudu Wind Energy Facility is a listed activity requiring environmental authorisation. In terms of GN R114 of February 2018, the application for environmental authorisation is required to be supported by a BA process based on the location of the project site within the Beaufort West REDZ.

The Basic Assessment process aims at identifying and describing potential environmental issues associated with the development of the proposed wind energy facility and the associated infrastructure. In order to ensure that a comprehensive assessment is provided to the competent authority and I&APs regarding the impacts of the facility, detailed independent specialist studies were undertaken as part of the Basic Assessment process.

7.1 Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the Basic Assessment report includes the following information required in terms of the EIA Regulations, 2014 - Appendix 1: Content of basic assessment reports:

Requirement	Relevant Section
3(d)(i) a description of the scope of the proposed activity, including all listed and specified activities triggered and being applied for.	All listed activities triggered as a result of the development of the FE Kudu Wind Energy Facility have been included in section 7.2, **Table 7.1**.
3(h)(ii) details of the public participation process undertaken in terms of Regulation 41 of the Regulations, including copies of the supporting documents and inputs.	The details of the public participation process undertaken have been included and described in section 7.3.2. and copies of the supporting documents and inputs are included in **Appendix C**.
3(h)(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.	The main issues raised through the undertaking of the public participation process, including consultation with I&APs, are included in the Comments and Responses Report in **Appendix C8**.
3(h)(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.	The methodology used to assess the significance of the impacts of the FE Kudu Wind Energy Facility has been included in section 7.4.
(o) a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed.	The assumptions and limitations of the Basic Assessment process being undertaken for the FE Kudu Wind Energy Facility is included in section 7.6.

7.2 Relevant legislative permitting requirements

The legislative permitting requirements applicable to the FE Kudu Wind Energy Facility, as identified at this stage in the process, are described in more detail under the respective sub-headings.

7.2.1 National Environmental Management Act (No. 107 of 1998) (NEMA)

NEMA is South Africa's key piece of national environmental legislation that provides for the authorisation of certain controlled activities known as "listed activities". In terms of Section 24(5) of NEMA, the potential impact on the environment associated with listed activities must be considered, investigated, assessed and reported on to the Competent Authority (the decision-maker) charged by NEMA with granting of the relevant EA. Due to the fact that the FE Kudu Wind Energy Facility is a power generation project and therefore relates to the IRP 2010 – 2030, the National Department of Forestry, Fisheries and the Environment (DFFE) has been determined as the Competent Authority (in terms of GN R779 of 01 July 2016. The Provincial Eastern Cape Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) is the Commenting Authority on the project.

The need to comply with the requirements of the EIA Regulations published under the NEMA ensures that proponents are provided the opportunity to consider the potential environmental impacts of their activities early in the project development process and allows for an assessment to be made as to whether environmental impacts can be avoided, minimised or mitigated to acceptable levels. Comprehensive, independent environmental studies are required to be undertaken in accordance with the EIA Regulations to provide the competent authority with sufficient information in order for an informed decision to be taken regarding the project and Application for Environmental Authorisation.

The BA process conducted for the FE Kudu Wind Energy Facility is undertaken in accordance with Section 24(5) of the NEMA, which defines the procedure to be followed in applying for Environmental Authorisation, and requires that the potential consequences for, or impacts of, listed or specified activities on the environment be considered, investigated, assessed, and reported on to the competent authority. Listed Activities are activities identified in terms of Section 24 of the NEMA which are likely to have a detrimental effect on the environment, and which may not commence without an EA from the competent authority subject to the completion of an environmental assessment process (either a Basic Assessment (BA) or full Scoping and EIA).

As the proposed development is located within Zone 11 of the REDZ (also known as the Beaufort West REDZ), one of the eleven (11) designated REDZ areas, the Basic Assessment process to be followed for the wind energy facility will be as per GN R114, as formally gazetted on 16 February 2018. The FE Kudu Wind Energy Facility is now subject to a Basic Assessment process and not a full EIA process, as well as a shortened timeframe of 57 days for the processing of an application for environmental authorisation.

Table 7.1 details the listed activities in terms of the EIA Regulations, 2014 (as amended) that apply to the FE Kudu Wind Energy Facility, and for which an application for Environmental Authorisation has been submitted to the DFFE. The table also includes a description of the specific project activities that relate to the applicable listed activities.

Table 7.1: Listed activities as per the EIA regulations that are triggered by the FE Kudu Wind Energy Facility

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Describe each listed activity as per project description
GN R327, 08 December 2014 (as amended on 07 April 2017)	11(i)	The development of facilities or infrastructure for the transmission and distribution of electricity— (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts. ***The wind energy facility will require the construction and operation of an on-site facility substation that will have a capacity of 132kV to facilitate the connection to the national grid. The turbines will be connected to the substation via cabling with a capacity of 33kV or more. The development footprint for the facility substation is located outside of an urban area.***
GN R327, 08 December 2014 (as amended on 07 April 2017)	12(ii)(a)(c)	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; or (c) within 32 metres of a watercourse. ***The wind energy facility will require the establishment of infrastructure (including internal access roads) with a physical footprint exceeding 100m² within or within 32m of drainage features, ephemeral washes or streams present within the project site.***
GN R327, 08 December 2014 (as amended on 07 April 2017)	14	The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic meters or more but not exceeding 500 cubic meters. ***The development of the wind energy facility will include the construction and operation of facilities and infrastructure for the storage and handling of dangerous goods (combustible and flammable liquids, such as oils, lubricants, solvents associated with the facility, and facility substation) where such storage will occur inside containers with a combined capacity exceeding 80 cubic meters but not exceeding 500 cubic meters.***
GN R327, 08 December 2014 (as amended on 07 April 2017)	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 ***Drainage features, ephemeral washes or streams are present within the project site. During the construction phase, more than 10 cubic metres of rock will be removed from drainage features for the construction of the wind energy facility and associated infrastructure.***

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Describe each listed activity as per project description
GN R327, 08 December 2014 (as amended on 07 April 2017)	24(ii)	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; ***The width of the internal access roads between the project components will be approximately 8m for access and/or the movement of the crane between turbine positions.***
GN R327, 08 December 2014 (as amended on 07 April 2017)	28(ii)	Residential, mixed, retail, commercial, industrial, or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare. ***The total area to be developed for the wind energy facility (including associated infrastructure) is greater than 1ha and is currently used for agricultural purposes, mainly grazing. The wind energy facility is located outside an urban area.***
GN R327, 08 December 2014 (as amended on 07 April 2017)	56(i)	The widening of a road by more than 6 m, or lengthening of a road by more than 1 km – (i) where the existing reserve is wider than 13.5 meters ***Existing farm roads within the project site will be widened to up to 8m and/or lengthened by more than 1km to accommodate the movement of heavy vehicles and cable trenching activities.***
GN R325, 08 December 2014 (as amended on 07 April 2017)	1	The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, ***The wind energy facility will make use of wind energy as a renewable energy resource. The project will have a contracted capacity of up to 600MW.***
GN R325, 08 December 2014 (as amended on 07 April 2017)	15	The clearance of an area of 20 hectares or more of indigenous vegetation. ***The wind energy facility will require the clearance of an area of more than 20ha (the development footprint area) of vegetation. The project is proposed on a property where the predominant land use is grazing and comprises of indigenous vegetation.***
GN R324, 08 December 2014 (as amended on 07 April 2017)	4(i)(ee)(a)	The development of a road wider than 4 metres with a reserve less than 13,5 metres. a. Eastern Cape i. Outside urban areas (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Describe each listed activity as per project description
		The width of the main access roads to the site will be up to 8m. The width of the internal access roads between the project components will be approximately 8m \ for access and/or the movement of the crane between turbine positions. The project site is located outside of an urban area, and within areas containing indigenous vegetation and within the critical biodiversity areas as identified in the Eastern Cape Biodiversity Conservation Plan (within Ecological Support Areas).
GN R324, 08 December 2014 (as amended on 07 April 2017)	10(a)(i)(ee)(ii)	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 i. Outside urban areas ((ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ii) Areas on the watercourse side of the development setback line or within 100 metres from the edge of a watercourse where no such setback line has been determined; ***The development and operation of the wind farm and associated infrastructure will require facilities for 80 cubic metres of storage of dangerous goods, which will include flammable and combustible liquids such as oils, lubricants and solvents associated with the facility, on-site substation, and BESS hub. The project site is located outside of an urban area, within 100 metres from the edge of a watercourse and within the critical biodiversity areas as identified in the Eastern Cape Biodiversity Conservation Plan (within Ecological Support Areas).***
GN R324, 08 December 2014 (as amended on 07 April 2017)	12(a)(i)(ii)	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 ***The wind energy facility and associated infrastructure is within a CBA and ESA area and will require the removal of an area greater than 300 square metres of indigenous vegetation.***
GN R324, 08 December 2014 (as amended on 07 April 2017)	14(ii)(a)(a)(i)(ff)	The development of: (ii) infrastructure or structures with a physical footprint of 10 square metres or more

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Describe each listed activity as per project description
		where such development occurs— (a) within a watercourse a. Eastern Cape (i) Outside urban areas (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans ***The wind energy facility will require the establishment of infrastructure (including internal access roads) with a physical footprint exceeding 10m² within or within 32m of drainage features, ephemeral washes or streams present within the project site. The project site is located within the critical biodiversity areas as identified in the Eastern Cape Biodiversity Conservation Plan (within Ecological Support Areas), and falls outside of an urban area.***
GN R324, 08 December 2014 (as amended on 07 April 2017)	18(a)(i)(ii)	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: (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; ***Existing farm roads within the project site will be widened to up to 8m. The project site is located in the Eastern Cape, outside of an urban area, and within 100m of the edge of a watercourse.***

7.2.2 National Water Act (No. 36 of 1998) (NWA)

In accordance with the provisions of the National Water Act (No. 36 of 1998) (NWA), all water uses must be licensed with the Competent Authority (i.e., the Regional Department of Water and Sanitation). Water use is defined broadly, and includes taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation.

Table 7.2 lists the possible Water Uses associated with the proposed project and identified in terms of the NWA which require licensing either in the form of a General Authorisation (GA), or in the form of a Water Use License (WUL). The table also includes a description of those project activities which relate to the applicable Water Uses.

Table 7.2: List of Water Uses published under Section 21 of NWA, as amended.

Activity No.	Description of Water Use
Section 21 (c)	Impeding or diverting the flow of water in a watercourse. ***The project site considered for the establishment of the wind energy facility is associated with the presence of drainage features, ephemeral washes or streams. Activities pertaining to the***

Activity No.	Description of Water Use
	establishment of the wind energy facility might encroach on the water features which may lead to an impediment and diversion of the flow of water in the features.
Section 21 (i)	Altering the bed, banks, course or characteristics of a watercourse. ***The project site considered for the establishment of the wind energy facility is associated with the presence of drainage features, ephemeral washes or streams. Activities pertaining to the establishment of the wind energy facility might encroach on the water features which may lead to an altering of the bed, banks, course or characteristics of the features.***

In the event that the flow of water in the water features is affected and the bed, banks or course characteristics are altered then licensing would be required. An application would need to be made for a WUL as internal access roads will cross watercourses. This will need to be in accordance with the requirements of the Regulations Regarding the Procedural Requirements for Water Use License Applications and Appeals (GN R267), or a GA registered in accordance with the requirements of Revision of General Authorisation.

7.2.3 National Heritage Resources Act (No. 25 of 1999) (NHRA)

The National Heritage Resources Act (No. 25 of 1999) (NHRA) provides an integrated system which allows for the management of national heritage resources and to empower civil society to conserve heritage resources for future generations. Section 38 of NHRA provides a list of activities which potentially require the undertaking of a Heritage Impact Assessment.

<u>Section 38: Heritage Resources Management</u>

1). *Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as –*
   - a. *the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*
   - b. *the construction of a bridge or similar structure exceeding 50m in length;*
   - c. *any development or other activity which will change the character of a site –*
     - i). *exceeding 5 000m² in extent; or*
     - ii). *involving three or more existing erven or subdivisions thereof; or*
     - iii). *involving three or more erven or divisions thereof which have been consolidated within the past five years; or*
     - iv). *the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;*

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

In terms of Section 38(8), approval from the heritage authority is not required if an evaluation of the impact of such development on heritage resources is required in terms of any other legislation (such as NEMA), provided that the consenting authority ensures that the evaluation of impacts fulfils the requirements of the relevant heritage resources authority in terms of Section 38(3) and any comments and recommendations of the relevant resources authority with regard to such development have been taken into account prior to the granting of the consent. However, should heritage resources of significance be affected by the FE Kudu

Wind Energy Facility, a permit is required to be obtained prior to disturbing or destroying such resources as per the requirements of Section 48 of the NHRA, and the SAHRA Permit Regulations (GN R668).

As the project is located within the Eastern Cape, the heritage decision-making authority will be the Eastern Cape Provincial Heritage Resources Authority. The Heritage Impact Assessment has been undertaken in line with the Guidelines for Heritage Impact Assessments required in terms of Section 38 of the National Heritage Resources Act (Act 25 of 1999) and the requirements of the Eastern Cape Provincial Heritage Resources Authority.

7.3 Overview of the Basic Assessment Process for the FE Kudu Wind Energy Facility

Key tasks undertaken for the Basic Assessment included:

» Consultation with relevant decision-making and regulating authorities (at National, Provincial and Local levels).
» Submission of the completed Application for Environmental Authorisation to the competent authority (i.e., DFFE) in terms of Regulations 5 and 6 of the EIA Regulations, 2014 (GNR 326), as amended.
» Undertaking a public participation process in accordance with Chapter 6 of GNR326, and the Department of Environmental Affairs (2017), Public Participation guidelines in terms of NEMA EIA Regulations, Department of Environmental Affairs, Pretoria, South Africa (hereinafter referred to as "the Guidelines") in order to identify issues and concerns associated with the proposed project.
» Undertaking of independent specialist studies in accordance with Appendix 6 of the EIA Regulations, 2014 (GNR326), as amended, and the requirements of the Specialist Protocols published in Regulation GNR 320, issued 20 March 2020 and 30 October 2020.
» Preparation of a Basic Assessment Report and EMPr in accordance with the requirements of Appendix 1 and Appendix 4 of GN R326.
» 30-day public and authority review period of the BA report.
» Compilation of a C&R report detailing the comments raised by I&APs, addressing these comments in detail and finalisation of the Basic Assessment report.
» Submission of a final Basic Assessment report to the DFFE for review and decision-making.

The tasks are discussed in detail in the sub-sections below.

7.3.1. Authority Consultation and Application for Authorisation in terms of the 2014 EIA Regulations (as amended)

In terms of Government Notice 779 of 01 July 2016, the National Department of Forestry, Fisheries and the Environment (DFFE) is the competent authority for all projects related to the IRP. As the project is located within the Eastern Cape Province, the Provincial Eastern Cape Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) is the commenting authority. Consultation with the regulating authorities (i.e., DFFE and DEDEAT) as well as with all other relevant Organs of State will continue throughout the BA process. To date, this consultation has included the following:

» Submission of the application form for Environmental Authorisation to the DFFE via the use of the DFFE Novell Filr System.
» Submission of the Basic Assessment Report for review and comment by:
    * The competent and commenting authorities.

* State departments that administer laws relating to a matter affecting the environment relevant to an application for Environmental Authorisation.
* Organs of State which have jurisdiction in respect of the activity to which the application relates.

The submissions, as listed above, were undertaken electronically, as required by the DFFE (in line with the directions for new Applications for Environmental Authorisations provided for in GNR650 of 05 June 2020).

A record of all authority correspondence undertaken during the Basic Assessment process is included in **Appendix B** and **Appendix C**.

7.3.2. Public Participation Process

Public participation is an essential and regulatory requirement for an environmental authorisation process and is guided by Regulations 41 to 44 of the EIA Regulations 2014 (GN R326) (as amended). The purpose of public participation is clearly outlined in Regulation 40 of the EIA Regulations 2014 (GN R326) (as amended) and is being followed for this proposed project.

The sharing of information forms the basis of the public participation process and offers the opportunity for I&APs to become actively involved in the Basic Assessment process from the outset. The public participation process is designed to provide sufficient and accessible information to I&APs in an objective manner. The public participation process affords I&APs opportunities to provide input into and receive information regarding the Basic Assessment process in the following ways:

During the Basic Assessment process:

» provide an opportunity to submit comments regarding the project;
» assist in identifying reasonable and feasible alternatives;
» contribute relevant local information and knowledge to the environmental assessment;
» allow registered I&APs to verify that their comments have been recorded, considered and addressed, where applicable, in the environmental investigations;
» foster trust and co-operation;
» generate a sense of joint responsibility and ownership of the environment; and
» comment on the findings of the environmental assessments.

During the decision-making phase:

» to advise I&APs of the outcome of the competent authority's decision, and how and by when the decision can be appealed.

The public participation process therefore aims to ensure that:

» Information containing all relevant facts in respect of the application is made available to potential stakeholders and I&APs for their review.
» The information presented during the public participation process is presented in such a manner, i.e. local language and technical issues, that it avoids the possible alienation of the public and prevents them from participating.
» Public participation is facilitated in such a manner that I&APs are provided with a reasonable opportunity to comment on the project.
» Various ways are provided to I&APs to correspond and submit their comments i.e. fax, post, email, SMS, WhatsApp or by sending a Please-call-me notification.

» An adequate review period is provided for I&APs to comment on the findings of the BA Report.

In terms of the requirement of Chapter 6 of the EIA Regulations of December 2014, as amended, the following key public participation tasks are required to be undertaken:

» Fix a notice board at a place conspicuous to the public at the boundary or on the fence of—
    (i) the site where the activity to which the application relates is or is to be undertaken; and
    (ii) any alternative site mentioned in the application;
» Give written notice to:
    (i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;
    (ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
    (iii) owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
    (iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;
    (v) the municipality which has jurisdiction in the area;
    (vi) any organ of state having jurisdiction in respect of any aspect of the activity; and
    (vii) any other party as required by the competent authority.
» Place an advertisement in one local newspaper.
» Open and maintain a register of I&APs and Organs of State.
» Release of a Basic Assessment Report for a 30-day review and comment period.
» Prepare a Comments and Responses report (CRR) which documents the comments received on the Basic Assessment process and during the 30-day review and comment period and the responses provided by the project team.

The Public Participation Process for FE Kudu Wind Energy Facility has been run concurrently with the public consultation for FE Tango Wind Energy Facility, located 20km east of the project site. The benefit to the stakeholder is that all information relevant to all related applications has been made available for review together, and not only for comments to be raised across the two (2) applications at one time, but also provided a complete picture of the potential for impacts and/or benefits related to the suite of projects located in close proximity to one another.

In compliance with the requirements of Chapter 6: Public Participation of the EIA Regulations, 2014 (as amended), the following summarises the key public participation activities implemented. The schematic below provides an overview of the tools that are available to I&APs and stakeholders to access project information and interact with the public participation team to obtain project information and resolve any queries that may arise, and to meet the requirements for public participation.

i. Stakeholder identification and register of I&APs	•Register as an I&AP on the online platform or via completion of a form and provison of contact information, by responding to an advert, or sending a 'please call me' which will be responded to with a telephone call. •State interest in the project. •Receive all project related information via email, post or other appropriate means.
ii. Advertisments and notifications	•Advertisement, site notices and notifications provide information and details on the projects and where to access project information. •Notifications regarding the BA process and availability of project report for public review to be sent via email, post or SMS notifications.
iii. Public Involvement and consultation	•Distribution of a BID providing details on the project and how I&APs can become involved in the process. •Submission of comments or queries via the online platform, email or post to the PP team. •Virtual presentations available via the online platform. •Availability of project information via the online platform, email, post and telephonic platforms such as WhatsApp, and including telephonic discussions to provide description of information verbally. •Opportunity for I&APs and stakeholders to request meetings with the project team. •Consutation in language of choice, and vary means of consultation to also accommodate disadvantaged
iv. Comment on the BA Report	•Availability of the project report via the online platform for 30-day comment period. Hard copies to be avaiable on request. •Submission of comments via the online platform, email or post to the PP team. •Comments recorded and responded to, as part of the process.
v. Identification and recording of comments	•Comments and Responses Report, including all comments received to be included in the reporting. •Comments received prior to report release for review to be included in BA report. •Comments received during report review to be included within the final BA Report for decision-making.

i. Stakeholder identification and Register of Interested and Affected Parties and the creation of an electronic database

42. A proponent or applicant must ensure the opening and maintenance of a register of I&APs and submit such a register to the competent authority, which register must contain the names, contact details and addresses of –
   (a) All persons who, as a consequence of the public participation process conducted in respect of that application, have submitted written comments or attended meetings with the proponent, applicant or EAP;
   (b) All persons who have requested the proponent or applicant, in writing, for their names to be placed on the register; and

(c) All organs of state which have jurisdiction in respect of the activity to which the application relates.

I&APs have been identified through a process of networking and referral, obtaining information from Savannah Environmental's existing stakeholder database, liaison with potentially affected parties in the greater surrounding area and a registration process involving the completion of a reply form. Key stakeholders and affected and surrounding landowners (including occupiers) have been identified and registered on the project database. Other stakeholders are required to formally register their interest in the project through either directly contacting the Savannah Environmental Public Participation team via phone, message (SMS and WhatsApp), email or fax, or registering their interest via the online stakeholder engagement platform. An initial list of the key stakeholders identified and registered is listed in **Table 7.3**.

Table 7.3: Initial list of Stakeholders identified for the inclusion in the project database during the public participation process for FE Kudu Wind Energy Facility

Organs of State
National Government Departments
Department Forestry, Fisheries and the Environment (DFFE)
Department of Mineral Resources and Energy (DMRE)
Department of Agriculture, Land Reform, and Rural Development (DALRRD)
Department of Water and Sanitation (DWS)
Department of Communications and Digital Technologies
South African National Defence Force
Government Bodies and State-Owned Companies
Eskom Holdings SOC Limited
National Energy Regulator of South Africa (NERSA)
Air Traffic Navigation Services (ATNS)
South African Civil Aviation Authority (SACAA)
South African Heritage Resources Agency (SAHRA)
South African National Roads Agency Limited (SANRAL)
South African Radio Astronomy Observatory (SARAO)
Telkom SA SOC Limited
Transnet SA SOC Limited
South African National Parks
South African Weather Services
Provincial Government Departments
Eastern Cape Department of Economic Development, Environmental Affairs and Tourism (DEDEAT)
Eastern Cape Department of Transport
Eastern Cape Provincial Heritage Resources Authority
Eastern Cape Department of Rural Development and Agrarian Reform
Local Government Departments
Sarah Baartman District Municipality
Dr Beyer Naude Local Municipality – including the Ward Councillor, ward committee members
Commenting Stakeholders
AgriSA: National & Eastern Cape Province
TLU SA: National & Eastern Cape Province
Rate Payers Association, Community Representative and Local Community Forums members

BirdLife South Africa
South African Bat Assessment Advisory Panel (SABAAP)
Endangered Wildlife Trust (EWT)
SENTECH
Wildlife and Environment Society of South Africa (WESSA)
Affected landowners, tenants and occupiers
Neighbouring landowners, tenants and occupiers

As per Regulation 42 of the EIA Regulations, 2014 (as amended), all relevant stakeholder and I&AP information has been recorded within a register of I&APs (refer to **Appendix C1** for a listing of the recorded parties). In addition to the above-mentioned EIA Regulations, point 4.1 of the Public Participation Guidelines has also been followed. The register of I&APs contains the names[1] of:

» all persons who requested to be registered on the database through the use of the online stakeholder engagement platform or in writing and disclosed their interest in the project;
» all Organs of State which hold jurisdiction in respect of the activity to which the application relates; and
» all persons who submitted written comments or attended virtual meetings and viewed the narrated presentations on the Savannah Environmental online platform during the public participation process.

I&APs have been encouraged to register their interest in the BA process from the onset of the project, and the identification and registration of I&APs will be on-going for the duration of the BA process. The database of I&APs will be updated throughout the BA process and will act as a record of the I&APs involved in the public participation process.

ii. Advertisements and Notifications

40.(2)(a)	Fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of – » (i) The site where the activity to which the application or proposed application relates is or is to be undertaken; and (ii) Any alternative site.
40.(2)(b)	Giving written notice, in any of the manners provided for in section 47D of the Act, to – » (i) The occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner or person in control of the site where the activity is or is to be undertaken and to any alternative site where the activity is to be undertaken; » (ii) Owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken and to any alternative site where the activity is to be undertaken; » (iii) The municipal councillor of the ward in which the site and alternative site is situated and any organisation of ratepayers that represent the community in the area; » (iv) The municipality which has jurisdiction in the area; » (v) Any organ of state having jurisdiction in respect of any aspect of the activity; and » (vi) Any other party as required by the competent authority.
40.(2)(c)	Placing an advertisement in – » (i) One local newspaper; or

[1] Contact details and addresses have not been included in the I&AP database as this information is protected by the Protection of Personal Information Act (No 4 of 2013).

	» (ii) Any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;
40.(2)(d)	Placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official Gazette referred to in paragraph (c)(ii); and
40.(2)(e)	Using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desirous of but unable to participate in the process due to –
	» (i) Illiteracy;
	» (ii) Disability; or
	» (iii) Any other disadvantage.
	»

The BA process was announced with an invitation to the Organs of State, potentially affected and neighbouring landowners (including occupiers) and general public to register as I&APs and to actively participate in the process. This was achieved through the following:

» Compilation of a background information document (BID) (refer to **Appendix C3**) providing technical details on the project, details of the BA process being undertaken and how I&APs can become involved in the BA process. The BID and the BA process notification letter announcing the BA process and inviting I&APs to register on the project database were distributed via email on 21 June 2023. The evidence of the distribution is contained in **Appendix C4** and **Appendix C5** of the BA Report. The BID is also available electronically on the Savannah Environmental website (https://savannahsa.com/public-documents/energy-generation/kudu-wind-energy-facility/).
» Placement of site notices announcing the BA process at visible points along the boundary of the project site (i.e., the boundaries of the affected property), in accordance with the requirements of the EIA Regulations. The site notices were placed on 22 June 2023, and photographs of the site notices are included in **Appendix C2** of the BA Report.
» An advert was placed in the Graaff-Reinet Advertiser (on 28 September 2023) prior to the commencement of the 30-day review and comment period (refer to **Appendix C2**). The advert:
  - announced the project details and commencement of the BA process,
  - announced the availability of the BA report, the review period, and where it is accessible for review, and invited comment on the BA Report,
  - provided all relevant details to access the Savannah Environmental online stakeholder engagement platform.
» A copy of the newspaper advert is included in **Appendix C2** of the BA Report. The newspaper advert tear sheet is included in the BA Report in **Appendix C2.**
» The BA Report was made available for review to I&APs for a 30-day review and comment period from 4 October 2023 to 3 November 2023**.** The BA Report has been made available on the Savannah Environmental website and all registered I&APs have been notified of the availability on 4 October 2023 via email, which included the link to access the report on the Savannah Environmental website.

I&APs were offered the opportunity to contact the public participation office by the following means, and in the language of their choice:
» telephone (landline or on the dedicated public participation mobile number);
» fax; or
» E-mail

iii. Public Involvement and Consultation

In order to accommodate the varying needs of stakeholders and I&APs within the surrounding area, as well as capture their views, comments, issues and concerns regarding the project, various opportunities have been and will continue to be provided to I&APs to note their comments and issues. I&APs are being consulted through the following means:

Table 7.4: Public involvement for the FE Kudu Wind Energy Facility

Activity	Date
Distribution of the BID, process notification letters and stakeholder reply form announcing the BA process and inviting I&APs to register on the project database. The BID and electronic reply form was also made available on the online stakeholder engagement platform.	21 June 2023
Placement of site notices along the affected property boundary at a visible and accessible location.	22 June 2023
Announcement of the availability of the BA Report for a 30-day review and comment period, including details on how to access the BA Report via the online stakeholder engagement platform, in the Graaff-Reinet Advertiser.	28 September 2023
Distribution of notification letters announcing the availability of the BA Report for a 30-day review and comment period. These letters were distributed to Organs of State, Government Departments, Ward Councillors, landowners within the surrounding area (including neighbouring landowners), registered I&APs and key stakeholder groups.	4 October 2023
30-day review and comment period of the BA Report.	4 October 2023 to 3 November 2023
Meetings through the use of virtual platforms or Face-to-Face, as determined through discussions with the relevant stakeholder group: » Authorities and key stakeholders (including Organs of State, local municipality and official representatives of community-based organisations. » Landowners, land occupiers and/or persons in control of the land » Where an I&AP did not have access to a computer and/or internet to participate in a virtual meeting, telephonic discussions (including WhatsApp video call where available) were set-up and minuted for inclusion. The preferred language of the I&AP was considered when setting up these discussions. Refer to Appendix C6 for notes of meetings.	To be held in October, during the 30-day review and comment period
On-going consultation (i.e., telephone liaison; e-mail communication) with all I&APs.	Throughout BA process

iv. Registered I&APs entitled to Comment on the BA Report

43.(1) A registered I&AP is entitled to comment, in writing, on all reports or plans submitted to such party during the public participation process contemplated in these Regulations and to bring to the attention of the proponent or applicant any issues which that party believes may be of significance to the consideration of the application, provided that the interested and affected party discloses any direct business, financial, personal or other interest which that party may have in the approval or refusal of the application.

(2) In order to give effect to section 24O of the Act, any State department that administers a law relating to a matter affecting the environment must be requested, subject to regulation 7(2), to comment within 30 days.

44.(1) The applicant must ensure that the comments of interested and affected parties are recorded in reports and plans and that such written comments, including responses to such comments and records of meetings, are attached to the reports and plans that are submitted to the competent authority in terms of these Regulations.

(2) Where a person desires but is unable to access written comments as contemplated in subregulation (1) due to –

(a) A lack of skills to read or write;
(b) Disability; or
(c) Any other disadvantage;

Reasonable alternative methods of recording comments must be provided for.

I&APs registered on the database have been notified via notification letter of the release of the Basic Assessment Report for a 30-day review and comment period, invited to provide comment on the Basic Assessment Report, and informed of the manner in which, and timeframe within which such comment must be made.

v. Identification and Recording of Comments

Comments raised by I&APs to date will be collated into a Comments and Responses (C&R) Report which will be included in Appendix C8 of the Final BA Report. The C&R Report includes detailed responses from members of the BA project team and/or the project proponent to the issues and comments raised.

Meeting notes of all meetings and discussions undertaken during the 30-day review and comment period will be included in Appendix C6 of the Final BA Report.

The C&R Report will be updated with all comments received during the 30-day review and comment period and will be included as Appendix C8 in the final Basic Assessment Report that will be submitted to the DFFE for decision-making.

7.4. Outcomes of the DFFE Web-Based Screening Tool

In terms of GN R960 (promulgated on 5 July 2019) and Regulation 16(1)(b)(v) of the 2014 EIA Regulations (as amended), the submission of a Screening Report generated from the national web based environmental screening tool is compulsory for the submission of applications in terms of Regulations 19 and 21 of the EIA Regulations.

The requirement for the submission of a Screening Report (included as **Appendix R** of the Basic Assessment Report) for the FE Kudu Wind Energy Facility is applicable as it triggers Regulation 19 of the EIA Regulations, 2014 (as amended). **Table 7.5** provides a summary of the specialist assessments identified in terms of the screening tool and responses to each assessment from the project team considering the project site under consideration. **Appendix P** contains the site sensitivity verification reports drafted by specialist consultants for the relevant themes as identified by the Screening Tool

Table 7.5: Sensitivity ratings from the DFFE web-based online Screening Tool associated with the development of FE Kudu Wind Energy Facility

Environmental Theme/Specialist Assessment	Sensitivity Rating Identified in Terms of the DFFE Screening Tool	Specialist Input on the Sensitivities Identified in Terms of the DFFE Screening Tool	Verification of Site-Specific Sensitivity and Motivation of the Need for Specialist Investigation
Agricultural Impact Assessment	Screening tool rating: **High** Required an agricultural impact assessment (in accordance with the protocol prescribed in GNR 320).	Verified Sensitivity rating by Specialist: **Low to Medium** The specialist disputes the Sensitivity Rating identified by the DFFE Screening Tool.	The specialist findings showed that most of the infrastructure components of the FE Kudu Wind Energy Facility are located well within areas with Medium Sensitivity. Medium agricultural sensitivity is mainly due to the high land capability of Low-Moderate (Class 07) areas and the depth of the soil which ranged between 0.6 and 1.5m. Low agricultural sensitivity is due to the Low (Class 05) land capability and the absence of any field crop boundaries. Areas shown as having field crops did not show any signs of cultivation during the site visit. The Low Sensitivity areas have shallow effective soil depth, and the arid climate reduces the land capability of the area significantly. Approximately 29 wind turbines are found on Low agricultural sensitivity, while the rest is on Medium agricultural sensitivity. A SSVR is included in **Appendix P5,** and a Soils and Agricultural Potential Impact Assessment is included as **Appendix L** of the Basic Assessment Report.
Landscape/Visual Impact Assessment Shadow Flicker Assessment	Screening tool rating: **Very High** (General Assessment Protocols)	Verified Sensitivity rating by Specialist: **High – Visual** **Medium – Shadow Flicker** The specialist disputes the Sensitivity Rating identified by the DFFE Screening Tool.	The very high sensitivity for landscape in the screening tool is owing to the slope of between 1:4 and 1:10, and mountains/high ridges. Based on the specialist findings, the overall sensitivity of the visual environment for the FE Kudu Wind Facility is disputed and is rated as high due to: » The avoidance of placement of turbines on any mountain tops or ridges » Possible placement of turbines on slopes of between 1:4 and 1:10 » Low occurrence of homesteads within 5km » Low VAC of the receiving environment » The placement of the development within the Beaufort REDZ » Scenic R61 arterial road located more than 3km from the site » Limited existing built infrastructure within the study area Based on the specialist findings, the shadow flicker sensitivity is moderate owing to the single homestead located in the development area, and it is assumed that they are in fact aware of and to a certain extent accepting of the shadow flicker associated with

			these turbines. No homesteads outside of the development envelope were identified during the preliminary shadow flicker assessment. A SSVR is included in **Appendix P8.** A Visual Impact Assessment has been undertaken for the FE Kudu Wind Energy Facility and is included in this BA Report as **Appendix I.**
Archaeological and Cultural Heritage Impact Assessment	Screening tool rating: **Low**	Verified Sensitivity rating by Specialist: **Very High or High** The specialist disputes the Sensitivity Rating identified by the DFFE Screening Tool.	The results of the Heritage Impact Assessment (including archaeology and cultural heritage) in terms of site sensitivity are summarised as follows: » The cultural value of the Karoo Landscape is very high and the location of the proposed development will impact this significance. » Some significant archaeological resources were identified in the development area giving it a high sensitivity. A SSVR is included in **Appendix P6.** A Heritage Impact Assessment (which covers both archaeological and cultural aspects of the development area and development footprint) has been undertaken for the FE Kudu Wind Energy Facility and is included in this Basic Assessment Report as **Appendix H.** The HIA complies with the requirements of the NHRA.
Palaeontology Impact Assessment	Screening tool rating: **Very High**	Verified Sensitivity rating by Specialist: **Very High** The specialist confirms the Sensitivity Rating	The results of the Heritage Impact Assessment (including palaeontology) in terms of site sensitivity are summarised as follows: » No highly significant palaeontological resources were identified within the development area,

		identified by the DFFE Screening Tool.	» However the geology underlying the development area is very sensitive for impacts to significant fossils giving it a very high sensitivity. A SSVR is included in **Appendix P6.** A Heritage Impact Assessment (which covers the paleontological aspects of the development area and development footprint) has been undertaken for the FE Kudu Wind Energy Facility and is included in this Basic Assessment Report as **Appendix H.** The HIA complies with the requirements of the NHRA.
Terrestrial Biodiversity Impact Assessment	Screening tool rating: **Very High** Required a terrestrial biodiversity impact assessment (Terrestrial Biodiversity Assessment Protocols)	Verified Sensitivity rating by Specialist: **Medium** The specialist disputes the Sensitivity Rating identified by the DFFE Screening Tool.	The overall combined Terrestrial Biodiversity theme indicates that the majority site consists of Very High sensitivity areas due to the presence of CBA2, ESA1 & ESA2. The site verification confirms that a small portion of the site is designated CBA 2 along the southern boundary with more extensive ESA 1 across the site associated with the alluvial areas and watercourses. Based on the presence of these features within the site, a full terrestrial biodiversity assessment is required. Based on the confirmed habitat and the field surveys, the classification of very high sensitivity for Terrestrial Biodiversity according to the Screening Tool is partially supported, as the verified sensitivity is very high for portions of the site, but fine scale mapping has reduced the overall sensitive area with portions designated medium sensitivity before mitigation. A SSVR is included in **Appendix P1**. A Terrestrial Biodiversity Impact Assessment has been undertaken for the FE Kudu Wind Energy Facility and is included as **Appendix D** of the Basic Assessment Report.
Aquatic Biodiversity Impact Assessment	Screening tool rating: **Very high** Required an Aquatic Biodiversity impact assessment (in accordance with the protocol prescribed in GNR 320, Aquatic Biodiversity Assessment Protocols).	Verified Sensitivity rating by Specialist: **Very high** The specialist confirms the Sensitivity Rating identified by the DFFE Screening Tool.	The baseline assessment investigated the watercourses present within the project site and identified numerous drainage features comprising of an extensive braided watercourse network, presenting ephemeral conditions with scattered vernal pools present within the project site. The non-perennial and ephemeral systems that drain the project area are largely unnamed and form tributaries of the Ouplaas River in the eastern portion of the project area, the 3 unnamed rivers in the middle portion of the project area, the Tulpleegte River in the western portion, and the Kariega River in the southern portion of the project area. Due to the sensitivity of the catchment and soils to erosion, together with the flat topography and braided alluvial fan nature of the watercourses within the project area,

			an increase in anthropogenic activities poses a risk to the ecological integrity of the watercourses notably from a hydrological perspective. The presence of aquatic macroinvertebrates and vernal biota highlights the sensitivity of the watercourses. Any proposed activities in proximity to the watercourses should not further contribute to the deterioration of the instream and riparian zones as this will compromise the ecological integrity of the reach and Management Class may not be achieved. According to the DFFE screening tool the aquatic systems have a very high sensitivity rating. Based on the survey findings, the specialist confirms the Very High aquatic theme sensitivity. A SSVR is included in **Appendix P2**. An Aquatic Impact Assessment has been undertaken for the FE Kudu Wind Energy Facility and is included as **Appendix E** of the Basic Assessment Report.
Avian Impact Assessment	Screening tool rating: **Low** Required an Avian Impact Assessment (in accordance with the protocol prescribed in GNR 320, Avian Biodiversity Assessment Protocols).	Verified Sensitivity rating by Specialist: **High** The specialist disputes the Sensitivity Rating identified by the DFFE Screening Tool.	The DFFE Screening tool classifies the site as having **low** avian sensitivity. However, the Screening Tool identified the animal species theme as having high sensitivity. This is based on the potential presence of the following Red Data (RD) species: » Southern Black Korhaan » Ludwig's Bustard The occurrence of SCC at the Project Site was confirmed during the six pre-construction monitoring surveys (January 2021 to October 2022) with observations of Ludwig's Bustard, Blue Crane (Globally Vulnerable and Regionally Near-threatened), Karoo Korhaan (Regionally Near-threatened), Kori Bustard (Globally and Regionally Near-threatened), Martial Eagle (Globally and Regionally Endangered), Southern Black Korhaan, Sclater's Lark (Globally and Regionally Near-threatened), and Lanner Falcon *Falco* (Regionally Vulnerable) recorded on-site. Based on the confirmed habitat and the field surveys, the classification of Low sensitivity for avifauna according to the Screening Tool is not supported, as sensitive bird species were identified and the sensitivity rating has been increased to High sensitivity. A SSVR is included in **Appendix P3**. An Avifauna Impact Assessment has been undertaken for the FE Kudu Wind Energy Facility and is included as **Appendix F** of the Basic Assessment Report. The assessment has been undertaken in accordance with the requirements of the BirdLife SA Best Practice Guidelines for Wind Developments.

Civil Aviation Assessment	Screening tool rating: **Low**	Verified Sensitivity rating: **Low** The Sensitivity Rating identified by the DFFE Screening Tool is confirmed.	The project site is not located within close proximity of any aerodromes, landing strips or infrastructure. The low rating is supported, and no study is required in this regard. The South African Civil Aviation Authority (SACAA) and Air Traffic Navigation Services (ATNS) will be consulted throughout the Basic Assessment process to obtain input and details of any requirements for further studies.
Defence Assessment	Screening tool rating: **Low**	Verified Sensitivity rating: **Low** The Sensitivity Rating identified by the DFFE Screening Tool is confirmed.	The project site is not located within close proximity of any military base or infrastructure. The low rating is supported, and no study is required in this regard. The South African National Defence Force will be consulted throughout the Basic Assessment process.
RFI Assessment	Screening tool rating: **Low**	Verified Sensitivity rating: **Low** The Sensitivity Rating identified by the DFFE Screening Tool is confirmed.	The project site is located within an area that as classified as having low sensitivity for telecommunication. Telecommunication stakeholders have been requested to provide comment on the proposed development. The low rating is supported, and no study is required in this regard
Social Impact Assessment	The screening report does not indicate a rating for this theme.		A Social Impact Assessment has been undertaken for the FE Kudu Wind Energy Facility and is included in the Basic Assessment Report as **Appendix K.** No SSVR is required for this theme.

Noise Impact Assessment	Screening tool rating: **Very High**	Verified Sensitivity rating by Specialist: **Low** The specialist disputes the Sensitivity Rating identified by the DFFE Screening Tool.	The DFFE Screening tool classifies the site as having Very High Sensitivity due to the potential presence of numerous sensitive noise receptors around the project site. However, there were no potential noise-sensitive receptors located in these areas and the finding of the screening tool is disputed. There is one structure (NSR04) used for residential purposes that was not identified by the screening tool report. During the Noise Impact Assessment, residential areas, and potential noise-sensitive developments/receptors/ communities (NSR) were identified using aerial images as well as a physical site visit, with only one location identified that is used on a temporary basis for residential purposes. According to the specialist the significance of the noise impact is of low sensitivity. A SSVR is included in **Appendix P7**. A Noise Impact Assessment has been undertaken for the FE Kudu Wind Energy Facility and is included in the Basic Assessment Report as **Appendix J.**
Bats Impact Assessment	Screening tool rating: **High**	Verified Sensitivity rating by Specialist: **High** The specialist confirms the Sensitivity Rating identified by the DFFE Screening Tool.	The DFFE Screening tool classifies the site as having high bat sensitivity. This is based on the presence of wetlands and watercourses that can potentially create optimal roosting habitats for sensitive bat species. No confirmed roosts have been identified on site to date. A SSVR is included in **Appendix P4**. A Bat Impact Assessment has been undertaken for the FE Kudu Wind Energy Facility and is included in the Basic Assessment Report as **Appendix I.** This study has been completed in accordance with the South African Best Practise Guidelines for Surveying Bats in Wind Energy Facility Developments.
Traffic Impact Assessment	The screening report does not indicate a rating for this theme.		A Traffic Impact Assessment has been undertaken for the FE Kudu Wind Energy Facility and is included in the Basic Assessment Report as **Appendix M.** No SSVR is required for this theme.
Plant Species Assessment	Screening tool rating: **Medium** Necessitating a plant species assessment (General Assessment Protocols).	Verified Sensitivity by Specialist: **Low** The specialist disputes the Sensitivity Rating identified by the DFFE Screening Tool.	The DFFE Screening Tool indicates that there are potentially several sensitive plant species from the FE Kudu Wind Energy Facility study area, with the result that the majority of the site is mapped as Medium Sensitivity for the Plant Species Theme. Based on site investigations and site sensitivity verification, no flora Species of Conservation Concern, including endemic, or range restricted species, or having an

			elevated conservation status were found to occur. **No plant species assessment is required**. A SSVR is included in **Appendix P1**. A Terrestrial Biodiversity Impact Assessment has been undertaken for the FE Kudu Wind Energy Facility and is included as **Appendix D** of the Basic Assessment Report.
Animal Species	Screening tool rating: **High** Necessitating an animal species assessment (in accordance with Animal Species Assessment Protocols prescribed in GN 43855)	Verified Sensitivity rating by Specialist: **Low** The specialist disputes the Sensitivity Rating identified by the DFFE Screening Tool.	The DFFE Screening Tool identified the entire site as having a medium and high animal sensitivity theme due to the presence of several bird species of concern. A medium sensitivity was assigned due to the possible presence of the Karoo Padloper, *Chersobius boulengeri*. Given the scarcity and low activity levels of this species, this indicates that it is unlikely to be present. The presence of the Karoo Padloper was not confirmed at the site. The site inspection suggests that it is highly unlikely that this species is present on the site as the low gravel hills present do not contain much rock shelter for this species. In some areas it may occur within plains habitats. However, as this species was not observed, it is considered unlikely that the Karoo Padloper is present. As such, the site is considered low sensitivity for this species. No animal species assessment (in accordance with Animal Species Assessment Protocols prescribed in GN 43855) is required. A SSVR is included in **Appendix P1**. A Terrestrial Biodiversity Impact Assessment has been undertaken for the FE Kudu Wind Energy Facility and is included as **Appendix D** of the Basic Assessment Report.

7.5. Assessment of Issues Identified through the BA Process

Issues identified as requiring investigation, as well as the specialist consultants involved in the assessment of these impacts are indicated in **Table 7.6** below.

Table 7.6: Specialist consultants appointed to evaluate the potential impacts associated with the FE Kudu Wind Energy Facility

Specialist	Field of Study	Appendix
Jamie Pote as an Independent Specialist	Terrestrial Ecology[23]	Appendix D
Dale Kindler of The Biodiversity Company	Aquatics	Appendix E
Albert Froneman of AvriAvian Environmental	Avifauna	Appendix F
Craig Campbell of ERM Southern Africa	Bats	Appendix G
Mariné Pienaar of Terra Africa	Soils and Agricultural Potential	Appendix H
Jenna Lavin of CTS Heritage	Heritage (including archaeology and palaeontology)	Appendix I
Lourens du Plessis of LOGIS	Visual	Appendix J
Morné de Jager of Enviro Acoustic Research	Noise	Appendix K
Tony Barbour as an Independent Specialist	Social	Appendix L
Iris Wink of iWink Consulting	Traffic	Appendix M

Specialist studies considered direct and indirect environmental impacts associated with the development of all components of the FE Kudu Wind Energy Facility. Issues were assessed in terms of the following criteria:

» The **nature**, a description of what causes the effect, what will be affected, and how it will be affected;
» The **extent**, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international. A score of between 1 and 5 is assigned as appropriate (with a score of 1 being low and a score of 5 being high);
» The **duration**, wherein it is indicated whether:
  * The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  * The lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  * Medium-term (5–15 years) – assigned a score of 3;
  * Long term (> 15 years) - assigned a score of 4;
  * Permanent - assigned a score of 5.
» The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
  * 0 is small and will have no effect on the environment;
  * 2 is minor and will not result in an impact on processes;
  * 4 is low and will cause a slight impact on processes;
  * 6 is moderate and will result in processes continuing but in a modified way;
  * 8 is high (processes are altered to the extent that they temporarily cease);
  * 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
» The **probability of occurrence**, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:
  * Assigned a score of 1–5, where 1 is very improbable (probably will not happen);

[23]This includes a Terrestrial Biodiversity Impact Assessment, a plant species assessment and an animal species assessment.

    * Assigned a score of 2 is improbable (some possibility, but low likelihood);
    * Assigned a score of 3 is probable (distinct possibility);
    * Assigned a score of 4 is highly probable (most likely);
    * Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).
» The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high;
» The **status**, which is described as either positive, negative or neutral;
» The degree to which the impact can be reversed;
» The degree to which the impact may cause irreplaceable loss of resources;
» The degree to which the impact can be mitigated.

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

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

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

The **significance weightings** for each potential impact are as follows:
» **< 30 points:** Low (i.e., where this impact would not have a direct influence on the decision to develop in the area);
» **30-60 points:** Medium (i.e., where the impact could influence the decision to develop in the area unless it is effectively mitigated);
» **> 60 points:** High (i.e., where the impact must have an influence on the decision process to develop in the area).

Specialist studies also considered cumulative impacts associated with similar developments within a 30km radius of the proposed project. The purpose of the cumulative assessment is to test if such impacts are relevant to the proposed project in the proposed location (i.e., whether the addition of the proposed project in the area will increase the impact). In this regard, specialist studies considered whether the construction of the proposed development will result in:

» Unacceptable risk
» Unacceptable loss
» Complete or whole-scale changes to the environment or sense of place
» Unacceptable increase in impact

A conclusion regarding whether the proposed development will result in any unacceptable loss or impact considering all the projects proposed in the area is included in the respective specialist reports.

As the proponent has the responsibility to avoid or minimise impacts and plan for their management (in terms of the EIA Regulations, 2014 (as amended)), the mitigation of significant impacts is discussed. An assessment of impacts with mitigation is made in order to demonstrate the effectiveness of the proposed mitigation measures. An Environmental Management Programme (EMPr) that includes all the mitigation measures recommended by the specialists for the management of significant impacts is included as **Appendix N**. The Generic Environmental Management Programme (EMPr) for the Development and Expansion of Substation Infrastructure for the Transmission and Distribution of Electricity (as gazetted in GNR 435 of March 2019) is included for the on-site facility substation.

7.6 Assumptions and Limitations of the BA Process

The following assumptions and limitations are applicable to the studies undertaken within this Basic Assessment process:

» All information provided by the developer and I&APs to the environmental team was correct and valid at the time it was provided.
» It is assumed that the project site and development footprint identified by the developer represents a technically suitable site for the establishment of the FE Kudu Wind Energy Facility which is based on the design undertaken by technical consultants for the project.
» This report and its investigations are project-specific, and consequently the environmental team did not evaluate any other power generation alternatives.

The specialist studies in **Appendices D – M** include specialist study-specific limitations.

7.7 Legislation and Guidelines that have informed the preparation of this Basic Assessment Report

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

» National Environmental Management Act (Act No. 107 of 1998);
» EIA Regulations of December 2014, published under Chapter 5 of NEMA (as amended);
» Department of Environmental Affairs (2017), Public Participation guidelines in terms of NEMA EIA Regulations;
» Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation; and
» International guidelines – the Equator Principles, the IFC Performance Standards, the Sustainable Development Goals, World Bank Environmental and Social Framework, and the and World Bank Group Environmental, Health, and Safety Guidelines (EHS Guidelines).

Table 7.7 provides an outline of the legislative permitting requirements applicable to the FE Kudu Wind Energy Facility as identified at this stage in the project process.

Table 7.7: Applicable Legislation, Policies and/or Guidelines associated with the development of the FE Kudu Wind Energy Facility

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Legislation			
Constitution of the Republic of South Africa (No. 108 of 1996)	In terms of Section 24, the State has an obligation to give effect to the environmental right. The environmental right states that: "*Everyone has the right –* » *To an environment that is not harmful to their health or well-being, 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 development*."	Applicable to all authorities	There are no permitting requirements associated with this Act. The application of the Environmental Right however implies that environmental impacts associated with proposed developments are considered separately and cumulatively. It is also important to note that the "right to an environment clause" includes the notion that justifiable economic and social development should be promoted, through the use of natural resources and ecologically sustainable development.
National Environmental Management Act (No 107 of 1998) (NEMA)	The 2014 EIA Regulations have been promulgated in terms of Chapter 5 of NEMA. Listed activities which may not commence without EA are identified within the Listing Notices (GNR 327, GNR 325 and GNR 324) which form part of these Regulations (GNR 326). In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must	DFFE – Competent Authority DEDEAT – Commenting Authority	The listed activities triggered by the project have been identified and are being assessed as part of the BA process. The Basic Assessment process will culminate in the submission of a final Basic Assessment Report to the competent authority in support of the application for EA.

	be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation. Considering the location of the project site within the Beaufort West Renewable Energy Development Zone and the requirements GNR114 of 16 February 2018, a Basic Assessment Process is required to be undertaken for the proposed project. All relevant listing notices for the project (GN R327, GN R325 and GN R324) will be applied for.		
National Environmental Management Act (No 107 of 1998) (NEMA)	In terms of the "Duty of Care and Remediation of Environmental Damage" provision in Section 28(1) of NEMA every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment. In terms of NEMA, it is the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.	DFFE DEDEAT	While no permitting or licensing requirements arise directly by virtue of the proposed project, this section finds application through the consideration of potential cumulative, direct, and indirect impacts. It will continue to apply throughout the life cycle of the project.
Environment Conservation Act (No. 73 of 1989) (ECA)	The Noise Control Regulations in terms of Section 25 of the ECA contain regulations applicable for the control of noise in the	DFFE DEDEAT	Noise impacts are expected to be associated with the construction and operation phases of the project.

	Provinces of Limpopo, North West, Mpumalanga, Northern Cape, Eastern Cape, and KwaZulu-Natal Provinces. The Noise Control Regulations cover the powers of a local authority, general prohibitions, prohibitions of disturbing noise, prohibitions of noise nuisance, use of measuring instruments, exemptions, attachments, and penalties. In terms of the Noise Control Regulations, no person shall make, produce or cause a disturbing noise, or allow it to be made, produced or caused by any person, machine, device or apparatus or any combination thereof (Regulation 04).	Dr Beyers Naude Local Municipality	A Noise Impact Assessment (**Appendix J**) has been undertaken for the FE Kudu Wind Energy Facility which indicates that the impact of the project will be of low significance, with the implementation of mitigation measures.
National Water Act (No. 36 of 1998) (NWA)	A water use listed under Section 21 of the NWA must be licensed with the Regional DWS, unless it is listed in Schedule 1 of the NWA (i.e., is an existing lawful use), is permissible under a GA, or if a responsible authority waives the need for a licence. Water use is defined broadly, and includes consumptive and non-consumptive water uses, taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation.	Regional Department of Water and Sanitation	The project site considered for the establishment of the wind farm and associated infrastructure is associated with the non-perennial and ephemeral systems that drain the project area are largely unnamed and form tributaries of the Ouplaas River in the eastern portion of the project area, the 3 unnamed rivers in the middle portion of the project area, the Tulpleegte River in the western portion, and the Kariega River in the southern portion of the project area. The river systems draining the project area flows in a southerly direction into the Kariega River at the quaternary catchment boundary south of the project area as identified in the Aquatic Impact Assessment (**Appendix E**).

	Consumptive water uses may include taking water from a water resource (Section 21(a)) and storing water (Section 21(b)). Non-consumptive water uses may include impeding or diverting of flow in a water course (Section 21(c)), and altering of bed, banks or characteristics of a watercourse (Section 21(i)).		Where the development activities impede or divert the flow of water in a watercourse, or alter the bed, banks, course or characteristics of a watercourse, Section 21(c) and 21(i) of the NWA (Act 36 of 1998) would be triggered and the project proponent would need to apply for a WUL or register a GA with the DWS.
Minerals and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA)	In accordance with the provisions of the MPRDA a mining permit is required in accordance with Section 27(6) of the Act where a mineral in question is to be mined, including the mining of materials from a borrow pit.	Department of Mineral Resources and Energy (DMRE)	Any person who wishes to apply for a mining permit in accordance with Section 27(6) must simultaneously apply for an Environmental Authorisation in terms of NEMA. No borrow pits are expected to be required for the construction of the project, and as a result a mining permit or EA in this regard is not required to be obtained.
	Section 53 of the MPRDA states that any person who intends to use the surface of any land in any way which may be contrary to any object of the Act, or which is likely to impede any such object must apply to the Minister for approval in the prescribed manner.		In terms of Section 53 of the MPRDA approval is required from the Minister of Mineral Resources and Energy to ensure that the proposed development does not sterilise a mineral resource that might occur on site.
National Environmental Management: Air Quality Act (No. 39 of 2004) (NEM:AQA)	The National Dust Control Regulations (GNR 827) published under Section 32 of NEM:AQA prescribe the general measures for the control of dust in all areas, and provide a standard for acceptable dustfall rates for residential and non-residential areas. In accordance with the Regulations (GNR 827) any person who conducts any activity in such a way as to give rise to dust in	DEDEAT Sarah Baartman District Municipality	In the event that the project results in the generation of excessive levels of dust the possibility could exist that a dustfall monitoring programme would be required for the project, in which case dustfall monitoring results from the dustfall monitoring programme would need to be included in a dust monitoring report, and a dust management plan would need to be developed. However, with mitigation

	quantities and concentrations that may exceed the dustfall standard set out in Regulation 03 must, upon receipt of a notice from the air quality officer, implement a dustfall monitoring programme. Any person who has exceeded the dustfall standard set out in Regulation 03 must, within three months after submission of the dustfall monitoring report, develop and submit a dust management plan to the air quality officer for approval.		measures implemented, the FE Kudu Wind Energy Facility is not anticipated to result in significant dust generation with mitigation.
National Heritage Resources Act (No. 25 of 1999) (NHRA)	Section 07 of the NHRA stipulates assessment criteria and categories of heritage resources according to their significance. Section 35 of the NHRA provides for the protection of all archaeological and palaeontological sites, and meteorites. Section 36 of the NHRA provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority. Section 38 of the NHRA lists activities which require developers or any person who intends to undertake a listed activity to notify the responsible heritage resources authority and furnish it with details regarding the location, nature, and extent of the proposed development. Section 44 of the NHRA requires the compilation of a Conservation	South African Heritage Resources Agency (SAHRA) Eastern Cape Provincial Heritage Resources Authority	A full Heritage Impact Assessment (HIA) (with field work) has been undertaken as part of the Basic Assessment process (refer to **Appendix H** of this Basic Assessment Report). Sites of varying significance, including cultural landscapes, have been identified within the project site and specific mitigation measures have been recommended by the specialist with regards to each identified find. Should a heritage resource be impacted upon, a permit may be required from SAHRA or Eastern Cape Provincial Heritage Resources Authority in accordance with of Section 48 of the NHRA, and the SAHRA Permit Regulations (GN R668). This will be determined as part of the final walk-through survey once the final location of the development footprint and its associated infrastructure has been determined.

	Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction.		
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)	Section 53 of NEM:BA provides for the MEC / Minister to identify any process or activity in such a listed ecosystem as a threatening process. Three government notices have been published in terms of Section 56(1) of NEM:BA as follows: » Commencement of TOPS Regulations, 2007 (GNR 150). » Lists of critically endangered, vulnerable and protected species (GNR 151). » TOPS Regulations (GNR 152). It provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), and vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of	DFFE DEDEAT	Under NEM:BA, a permit would be required for any activity that is of a nature that may negatively impact on the survival of a listed protected species. Based on site investigations, no flora Species of Conservation Concern, being endemic or range restricted species or having an elevated conservation status were found to occur. The Terrestrial Biodiversity Impact Assessment (**Appendix D**) and Avifauna Impact Assessment (**Appendix F**) has however, identified faunal species of conservation concern present at the project site. The Ludwig's Bustard, Blue Crane, Karoo Korhaan, Kori Bustard, Martial Eagle, Southern Black Korhaan, Sclater's Lark, Lanner Falcon and the Karoo Padloper are potential animal species of conservation concern known to occur within the broader area. The Karoo Padloper were not found during the site visits, and occurrence is unlikely. There is

	listing ecosystems, and summary statistics and national maps of listed ecosystems (NEM:BA: National list of ecosystems that are threatened and in need of protection, (Government Gazette 37596, GNR 324), 29 April 2014).		limited suitable rocky habitat for the Karoo padloper within the site. The avifauna species identified, were recorded on site.
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)	Chapter 5 of NEM:BA pertains to alien and invasive species, and states that a person may not carry out a restricted activity involving a specimen of an alien species without a permit issued in terms of Chapter 7 of NEM:BA, and that a permit may only be issued after a prescribed assessment of risks and potential impacts on biodiversity is carried out. Applicable, and exempted alien and invasive species are contained within the Alien and Invasive Species List (GNR 864).	DFFE DEDEAT	The Terrestrial Biodiversity Impact Assessment (**Appendix D**) has been undertaken as part of the BA process to identify the presence of any alien and invasive species present on site.
Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA)	Section 05 of CARA provides for the prohibition of the spreading of weeds. Regulation 15 of GN R1048 published under CARA provides for the classification of categories of weeds and invader plants, and restrictions in terms of where these species may occur. Regulation 15E of GN R1048 published under CARA provides requirement and methods to implement control measures for different categories of alien and invasive plant species.	Department of Agriculture, Land Reform and Rural Development (DALRD)	CARA will find application throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies need to be developed and implemented. In addition, a weed control and management plan must be implemented. In terms of Regulation 15E (GN R1048) where Category 1, 2 or 3 plants occur a land user is required to control such plants by means of one or more of the following methods: » Uprooting, felling, cutting or burning.

			» Treatment with a weed killer that is registered for use in connection with such plants in accordance with the directions for the use of such a weed killer. » Biological control carried out in accordance with the stipulations of the Agricultural Pests Act (No. 36 of 1983), the ECA and any other applicable legislation. » Any other method of treatment recognised by the executive officer that has as its object the control of plants concerned, subject to the provisions of sub-regulation 4. » A combination of one or more of the methods prescribed, save that biological control reserves and areas where biological control agents are effective shall not be disturbed by other control methods to the extent that the agents are destroyed or become ineffective.
National Forests Act (No. 84 of 1998) (NFA)	According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. Notice of the List of Protected Tree Species under the National Forests Act (No. 84 of 1998) was published in GNR 734. The prohibitions provide that "no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or	DFFE	A licence is required for the removal of protected trees. It is therefore necessary to conduct a survey that will determine the number and relevant details pertaining to protected tree species present in the development footprint for the submission of relevant permits to authorities prior to the disturbance of these individuals. The Terrestrial Biodiversity Impact Assessment undertaken as part of the BA Report included the survey of any

	dispose of any protected tree, except under a licence granted by the Minister".		protected tree species which may require a license in terms of the NFA (No. 84 of 1998) within the development footprint. However, no protected trees were identified (refer to **Appendix D** of this BA Report).
National Veld and Forest Fire Act (No. 101 of 1998) (NVFFA)	Chapter 4 of the NVFFA places a duty on owners to prepare and maintain firebreaks, the procedure in this regard, and the role of adjoining owners and the fire protection association. Provision is also made for the making of firebreaks on the international boundary of the Republic of South Africa. The applicant must ensure that firebreaks are wide and long enough to have a reasonable chance of preventing a veldfire from spreading to or from neighbouring land, it does not cause soil erosion, and it is reasonably free of inflammable material capable of carrying a veldfire across it. Chapter 5 of the Act places a duty on all owners to acquire equipment and have available personnel to fight fires. Every owner on whose land a veldfire may start or burn or from whose land it may spread must have such equipment, protective clothing and trained personnel for extinguishing fires, and ensure that in his or her absence responsible persons are present on or near his or her land who, in the event of fire, will extinguish the fire or assist in doing so, and take all reasonable steps to alert the owners of adjoining land and the relevant fire protection association, if any.	DFFE	While no permitting or licensing requirements arise from this legislation, this Act will be applicable during the construction and operation of the FE Kudu Wind Energy Facility, in terms of the preparation and maintenance of firebreaks, and the need to provide appropriate equipment and trained personnel for firefighting purposes.

Hazardous Substances Act (No. 15 of 1973) (HAS)	This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger, to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products. » Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance » Group IV: any electronic product, and » Group V: any radioactive material. The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.	Department of Health (DoH)	It is necessary to identify and list all Group I, II, III, and IV hazardous substances that may be on site and in what operational context they are used, stored or handled. If applicable, a license would be required to be obtained from the Department of Health (DoH).
National Environmental Management: Waste Act (No. 59 of 2008) (NEM:WA)	The Minister may by notice in the Gazette publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. The Minister may amend the list by –	DFFE– Hazardous Waste DEDEAT – general waste	No waste listed activities are triggered by the FE Kudu Wind Energy Facility, therefore, no Waste Management License is required to be obtained. General and hazardous waste handling, storage and disposal will be required during construction and

	» Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. In terms of the Regulations published in terms of NEM:WA (GNR 912), a BA or EIA is required to be undertaken for identified listed activities. Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that: » The containers in which any waste is stored, are intact and not corroded or in » Any other way rendered unlit for the safe storage of waste. » Adequate measures are taken to prevent accidental spillage or leaking. » The waste cannot be blown away. » Nuisances such as odour, visual impacts and breeding of vectors do not arise, and » Pollution of the environment and harm to health are prevented.		operation. The National Norms and Standards for the Storage of Waste (GNR 926) published under Section 7(1)(c) of NEM:WA will need to be considered in this regard.
National Road Traffic Act (No. 93 of 1996) (NRTA)	The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the	South African National Roads Agency (SANRAL) – national roads Eastern Cape Department of Transport	An abnormal load/vehicle permit will be required to transport the various components to site for construction. These include:

	transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts. The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.		» Route clearances and permits will be required for vehicles carrying abnormally heavy or abnormally dimensioned loads. » Transport vehicles exceeding the dimensional limitations (length) of 22m. » Depending on the trailer configuration and height when loaded, some of the project components may not meet specified dimensional limitations (height and width).
Astronomy Geographic Advantage Act (Act No. 21 of 2007)	The Astronomy Geographic Advantage (AGA) Act (No. 21 of 2007) provides for the preservation and protection of areas within South Africa that are uniquely suited for optical and radio astronomy; for intergovernmental co-operation and public consultation on matters concerning nationally significant astronomy advantage areas and for matters connected thereto. Chapter 2 of the Act allows for the declaration of astronomy advantage areas	Department of Science and Technology.	The site proposed for the development of the FE Kudu Wind Energy Facility is located within the Eastern Cape Province and therefore falls outside of the area considered to be uniquely suited in terms of nationally significant astronomy advantage areas.

	whilst Chapter 3 pertains to the management and control of astronomy advantage areas. Management and control of astronomy advantage areas include, amongst others, the following: * Restrictions on use of radio frequency spectrum in astronomy advantage areas * Declared activities in core or central astronomy advantage area * Identified activities in coordinated astronomy advantage area; and * Authorisation to undertake identified activities.		
Aviation Act (Act No 74 of 1962) 13th amendment of the Civil Aviation Regulations (CARS) 1997	Any structure exceeding 45m above ground level or structures where the top of the structure exceeds 150m above the mean ground level, the mean ground level considered to be the lowest point in a 3km radius around such structure. Structures lower than 45m, which are considered as a danger to aviation shall be marked as such when specified. Overhead wires, cables etc., crossing a river, valley or major roads shall be marked and in addition their supporting towers marked and lighted if an aeronautical study indicates it could constitute a hazard to aircraft.	South African Civil Aviation Authority (SACAA)	This Act will find application during the operation phase of FE Kudu Wind Energy Facility. Appropriate marking on the project infrastructure is required to meet the specifications as detailed in the CAR Part 139.01.33. An obstacle approval for the wind energy facility is required to be obtained from the SACAA

	Section 14 of Obstacle limitations and marking outside aerodrome or heliport – CAR Part 139.01.33 relates specifically to appropriate marking of wind energy facilities.		
Provincial Policies / Legislation			
Nature and Environmental Conservation Ordinance (Act 19 of 1974) as amended.	The Nature and Environmental Ordinance 19 of 1974 defines the protection status of plants as follows: • ''endangered flora'' means flora of any species which is in danger of extinction and is specified in Schedule 3 or Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington, 1973; provided that it shall not include flora of any species specified in such Appendix and Schedule 4; (therefore all Schedule 3 species) • ''protected flora'' means any species of flora specified in Schedule 4 or Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington, 1973; provided that it shall not include any species of flora specified in such Appendix and Schedule 3 • ''indigenous unprotected flora'' means any species of indigenous flora not specified in Schedule 3 or 4.	Eastern Cape DEDEAT	Where protected plants are to be disturbed or destroyed by the development of the wind farm, the relevant permits need to be obtained. A collection/destruction permit must be obtained from the Eastern Cape DEDEAT for the removal of any protected plant or animal species found on site. Ground truthing confirmed Species of Conservation Concern to be present within the study area (**Appendix D**). Based on the SANBI POSA records for the site and surrounding area, other species of conservation concern are potentially present on the site.

7.7.1 *The IFC EHS Guidelines*

The IFC EHS Guidelines are technical reference documents with general and industry specific examples of Good International Industry Practice (GIIP). The following IFC EHS Guidelines have relevance to the FE Kudu Wind Energy Facility:

» IFC EHS General Guidelines
» IFC EHS Guidelines for Electric Power Transmission and Distribution

The General EHS Guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines. The application of the General EHS Guidelines should be tailored to the hazards and risks associated with a project, and should take into consideration site-specific variables which may be applicable, such as host country context, assimilative capacity of the environment, and other project factors. In instances where host country regulations differ from the standards presented in the EHS Guidelines, whichever is the more stringent of the two in this regard should be applied.

The General EHS Guidelines include consideration of the following:

» Environmental:
  * Air Emissions and Ambient Air Quality
  * Energy Conservation
  * Wastewater and Ambient Water Quality
  * Water Conservation
  * Hazardous Materials Management
  * Waste Management
  * Noise
  * Contaminated Land
» Occupational Health and Safety:
  * General Facility Design and Operation
  * Communication and Training
  * Physical Hazards
  * Chemical Hazards
  * Biological Hazards
  * Radiological Hazards
  * Personal Protective Equipment (PPE)
  * Special Hazard Environments
  * Monitoring
» Community Health and Safety:
  * Water Quality and Availability
  * Structural Safety of Project Infrastructure
  * Life and Fire Safety (L&FS)
  * Traffic Safety
  * Transport of Hazardous Materials
  * Disease Prevention
  * Emergency Preparedness and Response
» Construction and Decommissioning:
  * Environment

* Occupational Health & Safety
* Community Health & Safety

7.7.2 IFC Environmental, Health and Safety Guidelines for Wind Energy (August, 2015)

The EHS Guidelines for wind energy include information relevant to environmental, health, and safety aspects of onshore and offshore wind energy facilities. It should be applied to wind energy facilities from the earliest feasibility assessments, as well as the environmental impact assessment, and continue to be applied throughout the construction and operation phases.

The guidelines list issues associated with wind energy facilities which need to be considered. These include:

- Environmental impacts associated with the construction, operation, and decommissioning of wind energy facilities activities may include, among others, impacts on the physical environment (such as noise or visual impact) and biodiversity (affecting birds and bats, for instance).
- Due to the typically remote location of wind energy facilities, the transport of equipment and materials during construction and decommissioning may present logistical challenges (e.g., transportation of long, rigid structures such as blades, and heavy tower sections).
- Environmental issues specific to the construction, operation, and decommissioning of wind energy projects and facilities include the following:
  * Landscape, Seascape, and Visual impacts
  * Noise
  * Biodiversity
  * Shadow Flicker
  * Water Quality

These issues, as well as others identified, have been addressed through this BA report.

CHAPTER 8: DESCRIPTION OF THE RECEIVING ENVIRONMENT

This chapter provides a description of the local environment that will be affected by the development of FE Kudu Wind Energy Facility. This information is provided to assist the reader in understanding the features present within the project site and the possible effects of the project on the environment within which it is proposed. Aspects of the biophysical, social, and economic environment that could be directly or indirectly affected by, or could affect, the proposed development have been described. This information has been sourced from both existing information available for the area as well as collected field data by specialist consultants and aims to provide the context within which this BA process is being conducted.

8.1 Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the BA report includes the following information required in terms of the EIA Regulations, 2014 - Appendix 1: Content of basic assessment reports:

Requirement	Relevant Section
3(h)(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects	The environmental attributes associated with the project site, as well as the broader environment, are described and considered within this chapter and includes the following: » The regional setting within which the project site is located is described in section 8.2. » The climatic conditions of the area within which the project site is located is discussed in section 8.3. » The biophysical characteristics of the project site and the surrounding areas is described in section 8.4. This includes the topography and terrain, geology, soils and agricultural potential and the ecological profile of the site (i.e. broad-scale vegetation patterns, fine-scale vegetation patterns, critical biodiversity areas and broad-scale processes, surface water features, terrestrial fauna, bats and avifauna). » The heritage of the project site and the surrounding areas (including the archaeology, palaeontology, and cultural landscape) is discussed in section 8.5. » The noise levels and developments sensitive to noise are described in section 8.6. » The visual quality of the affected environment is discussed in section 8.7. » The current traffic conditions for the area surrounding the project site are included in section 8.8. » The social context within which the project site is located is described in section 8.9.

A more detailed description of each aspect of the affected environment is included in the specialist reports included as **Appendices D - M**.

8.2. Regional Setting

The project site is located within the Ward 1 of the Dr Beyers Naude Local Municipality which forms part of the greater Sarah Baartman District Municipality. The Sarah Baartman District Municipality is a Category C municipality situated in the northwest section of the Eastern Cape. The District Municipality is the biggest municipality in the province covering an area of 58 245km² and is also one of the largest contributors to the provincial GDP. Large commercial farms in the Karoo produce high-quality meat, wool and mohair, while the coastal belt has dairy farming and some forestry. The Kouga Valley is a large producer of deciduous fruit, while the Kirkwood/Addo area is known for its abundance of citrus. The Sarah Baartman District Municipality has three of the region's national parks and several private game farms. The seat of the Sarah Baartman District Municipality is the city of Gqeberha although Gqeberha is not itself in the district. Other prominent cities and towns located within the DM include, Cookhouse, Graaff- Reinet, Makhanda and Somerset East. The main agricultural production within this district municipality includes red meat, wool and mohair, dairy, poultry, pork, chicory, and pineapple. The three biggest sectors in 2016 were Trade (21%), Community Services (19%) and Agriculture (16%).

The Sarah Baartman DM comprises seven (7) local municipalities (LMs), namely Blue Crane Route, Dr Beyers Naude, Kouga, Koukamma, Makana, Ndlambe, and Sundays River Valley (refer to **Figure 8.1**).

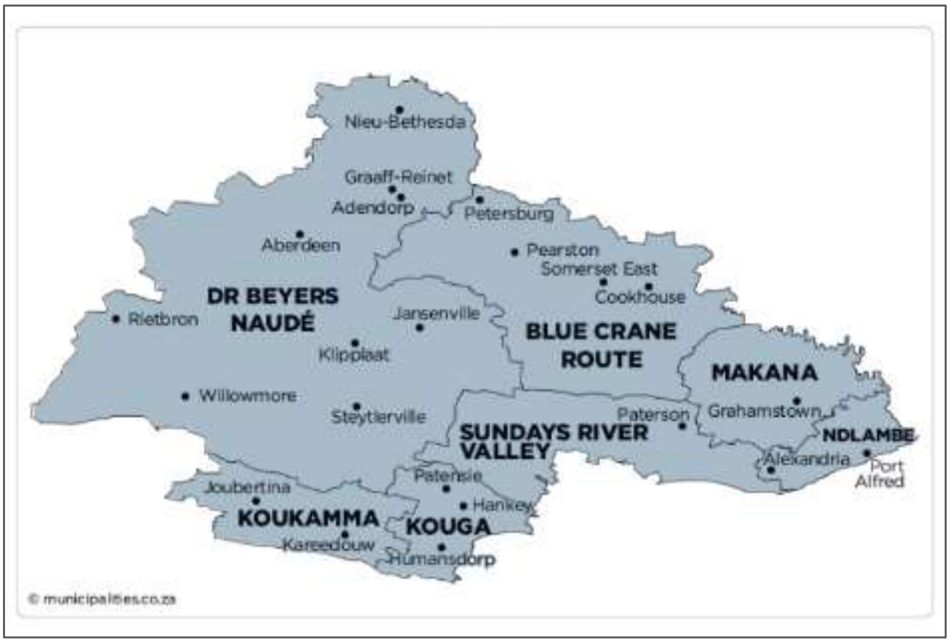

Figure 8.1: Local Municipalities of the Sarah Baartman DM (Source: Municipalities of South Africa)

The project site for the development of the FE Kudu Wind Energy Facility is located within the Dr Beyers Naude Local Municipality, which is a Category B municipality.

The FE Kudu Wind Energy Facility project site is situated in the northern portion of the vast Central Karoo plain, near the transition into the Great Escarpment, ~40km west Aberdeen. Aberdeen, while being a small town, is the largest town in the Beyers Naude Local Municipality and serves as a regional services centre. The town is located at the intersection of the R61and R338 regional roads and the N9 national road which all pass through the town. Aberdeen is typical of a Karoo grid kerkdorp, and is renowned for its Victorian architecture and, wool and mohair. Aberdeen and surrounding farmsteads are the only major urban settlements within the local area. The area is sparsely populated (less than 10 people per km^2) and consists of very little development. The soils, low rainfall and scarcity of water has as a consequence resulted that the region has not been transformed by dryland agriculture.

The Kariega River is located in the western portion of the study area and flows from the north to the south. The non-perennial Kraai River also drains from the southern slops of the Cambedoo Mountains to the east towards the Aberdeen Nature Reserve (also known as the Fonteinbos Nature Reserve) which features a natural spring. The perennial spring, known as *Die Oog* (The Eye), supplies water to the town of Aberdeen. A number of man-made farm dams are also scattered through the study area.

The site is nestled north of the R61 arterial road linking the towns of Aberdeen and Beaufort West and the Camdeboo Mountains. The R61 is one of two major routes which provides motorised access to the region from the town of Aberdeen. Access to the facility will be via an existing (unnamed) gravel road originating off the DR02310 which turns off from the R61 between Beaufort West and Aberdeen.

Figure 8.2 indicates the regional setting of the FE Kudu Wind Energy Facility project site. The entire project site is located within the Beaufort West Renewable Energy Development Zone (REDZ) (**Figure 8.3**) and adjacent to the authorised Eskom Aberdeen Wind Farm and the Aberdeen Wind 1, 2 and 3 Facilities.

The town of Aberdeen as viewed from the N9 approaching from Willowmore.

The general environment within the study area.

View of the secondary gravel road leading to the proposed development site from the R61.

Figure 8.2: Photographs providing a sense of the general landscape within which the FE Kudu Wind Energy Facility project site is located

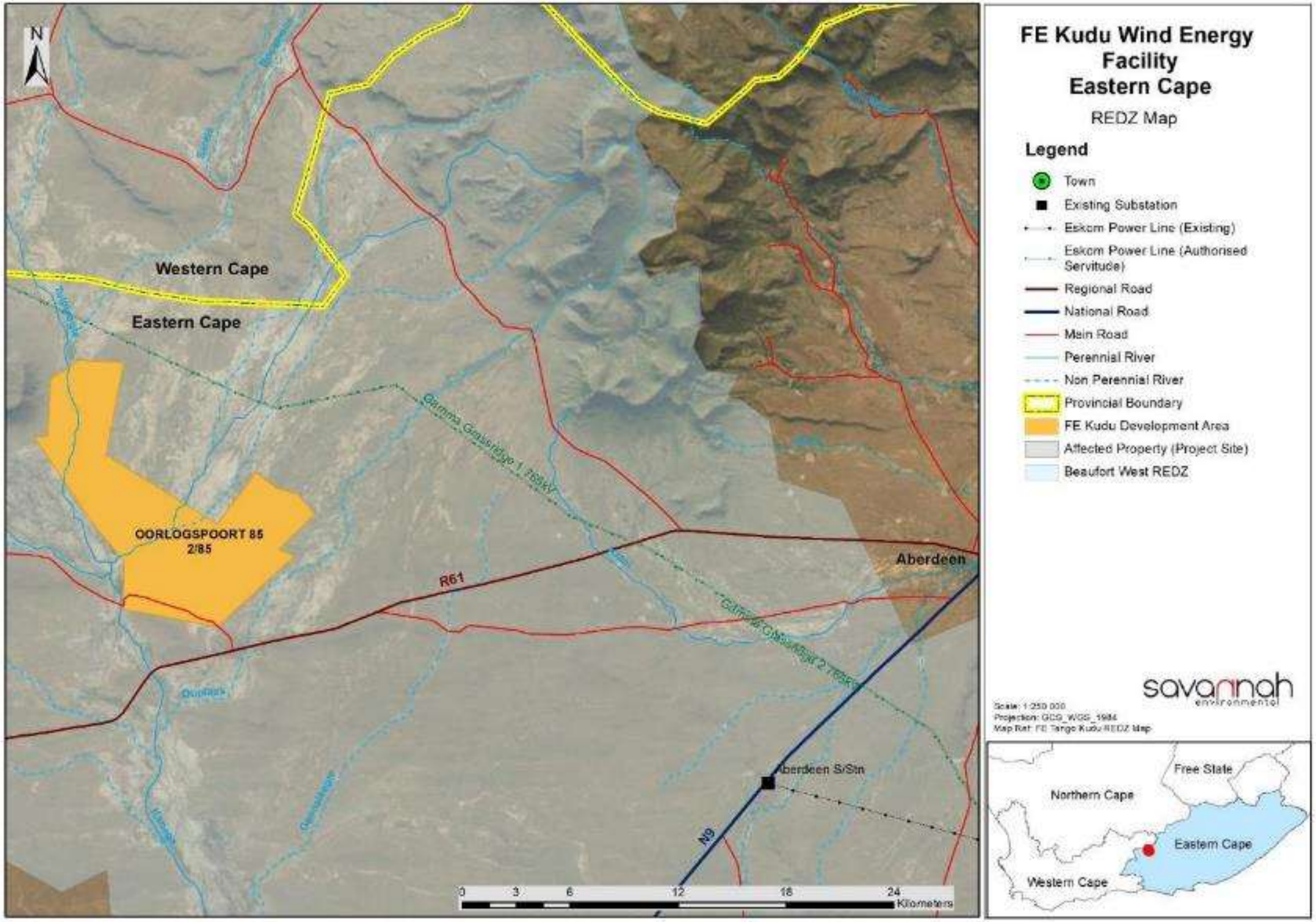

Figure 8.3: Map indicating the location of FE Kudu Wind Energy Facility west of Aberdeen, north of the R61 and within the Beaufort West REDZ

8.3. Climatic Conditions

The Aberdeen area is considered cold semi-arid to arid. The average annual temperature is 17.5°C and the average annual rainfall is 260mm. The driest month is June with an average of 15mm of precipitation, with precipitation peaking in March with an average of 58mm. At an average temperature of 22.7 °C, January is the hottest month of the year and July is the coldest month, with temperatures averaging 11.6°C (refer to **Figure 8.4**).

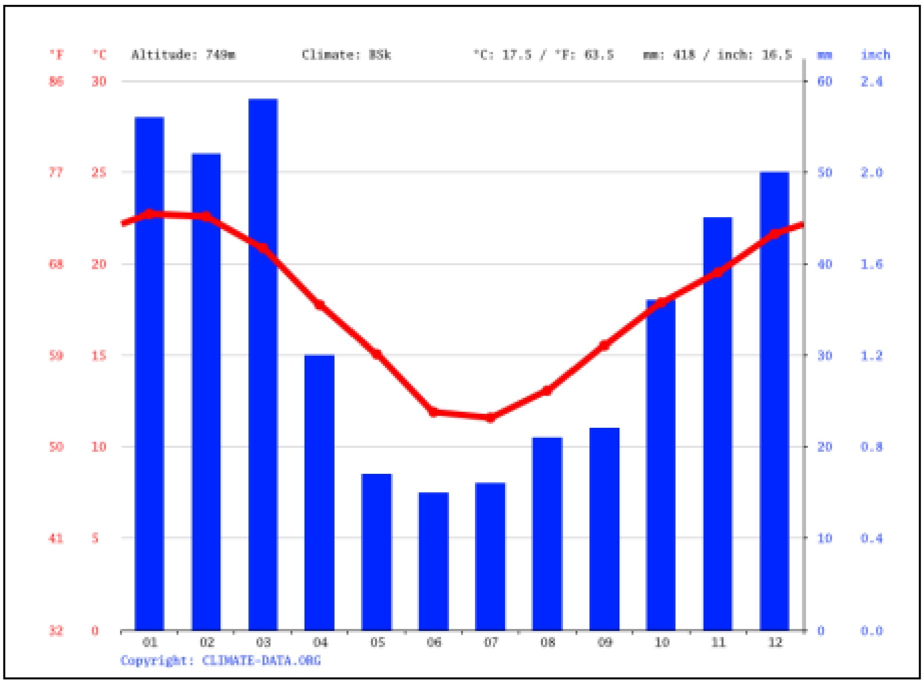

Figure 8.4: Climate graph indicating temperature and rainfall of Aberdeen, Eastern Cape Province (https://en.climate-data.org/africa/south-africa/eastern-cape/aberdeen-11239/)

The immediate study area and surrounding plain is classified as arid (100-200 mm/a). Rainfall increases progressively from the site eastwards and northwards as elevation increases. The study area is prone to extended periods of drought and is currently recovering from a severe decade-long drought.

8.4. Biophysical Characteristics of the FE Kudu Wind Energy Facility Project Site and surrounding area.

8.4.1. Topography and Terrain

The study site ranges in elevation from approximately 800m (in the southern and eastern portion of the study area) to 2300m (at the top of the Camdeboo Mountains east of the site) (refer to **Figure 8.5**). The terrain surrounding the proposed development area is predominantly flat with an even slope towards the south-west and north-east respectively. This valley, or large plain, known as the Plains of Camdeboo, is flanked to the north east by the Camdeboo Mountains (Kamdebooberg) and the Oorlogspoortberge (directly adjacent to the development site to the west) (refer to **Figure 8.6**).

The proposed development site itself is located at an average elevation of 800 - 900m above sea level. The site is predominantly flat, with limited undulation. The overall terrain morphological description of the study area is *Plains interrupted by some dolerite dykes, butts and mesas*.

Figure 8.5: The Camdeboo Mountains located to north east of the proposed development site.

Figure 8.6: The Oorlogspoortberge located directly west of the proposed development site.

The larger region is known as the Great Karoo, consisting predominantly of plains framed by mountains to the north and lower hills in the east. Due to the flat topography and arid climate, the area is characterised by the occurrence of many non-perennial drainage lines traversing across the study area.

8.4.2. Geology, Soils and Agricultural Potential

Geological Setting of the Project Site

The project site consists of flat or gently sloping pediments composed of mudstone and resistant sandstones of the Beaufort Group (Adelaide Subgroup), Ecca sediments and Dwyka tillites in the south, with some Jurassic dolerite intrusions in the north. Much of the area is clothed in sparse to dense karroid bossieveld with unvegetated pans and extensive open alluvial plains; woody vegetation dominated by thorn trees is mainly restricted to larger drainage lines. This portion of the Great Karoo region is located between outliers of the Great Escarpment represented by the Kamdebooberge in the east and the Oorlogspoortberge in the west. The bedrocks underlying the study area are currently mapped within the lower portion of the Teekloof Formation (Pt) of the Lower Beaufort Group (Adelaide Subgroup, Karoo Supergroup) that is predominantly fluvial in origin.

The Beaufort Group bedrocks in the project area are extensively folded along E-W axes into low, open folds; this region accordingly lies within the northern margins of the Permo-Triassic Cape Fold Belt. Short, illustrated accounts of the poorly-exposed Abrahamskraal Formation and overlying Poortjie Member bedrocks in this northern subregion of the Aberdeen Vlaktes have been provided by Almond (2022b, 2023). Apart from scattered, low ridges and bands of highly fractured channel wackes and small areas of cleaved, grey-green siltstone with occasional rusty-brown ferruginous carbonate concretions in the vlaktes, as well as occasional borrow pit excavations showing folded and cleaved, weathered, calcrete-veined mudrocks (grey-green and minor purple-brown facies) and thin wackes, the best exposures of Beaufort Group bedrocks in the FE Kudu Wind Energy Facility project area are found on the lower eastern footslopes of the Oorlogspoortberge, close to the project area boundary.

About half the area has red-yellow, apedal, freely drained soils, <300mm deep, with a high base status (Ag land type). Recent sandy-clayey alluvial deposits rich in salt occurring on mudrocks and sandstones of the Adelaide Subgroup (Beaufort Group of the Karoo Supergroup) that support soils typical of Ia land type. Torrential convectional rains in summer cause sudden flood surges which remodel the riverbed and adjacent alluvium.

Soil Form, Land Capability and Agricultural Potential of the Project Site

The FE Kudu Wind Energy Facility project site is divided between land with low soil sensitivity and land with medium soil sensitivity. The areas with low soil sensitivity are associated with shallow effective soil depth, and the arid climate reduces the land capability of the area significantly. Medium Sensitivity areas have deeper effective depth of the soil, and the soil has a higher land capability.

Six different soil forms were identified within the development area. The soil forms include the Addo, Clovelly, Glenrosa, Mispah, Swartland and Valsrivier soil forms. **Figure 8.7** provides a map of the soil forms present.

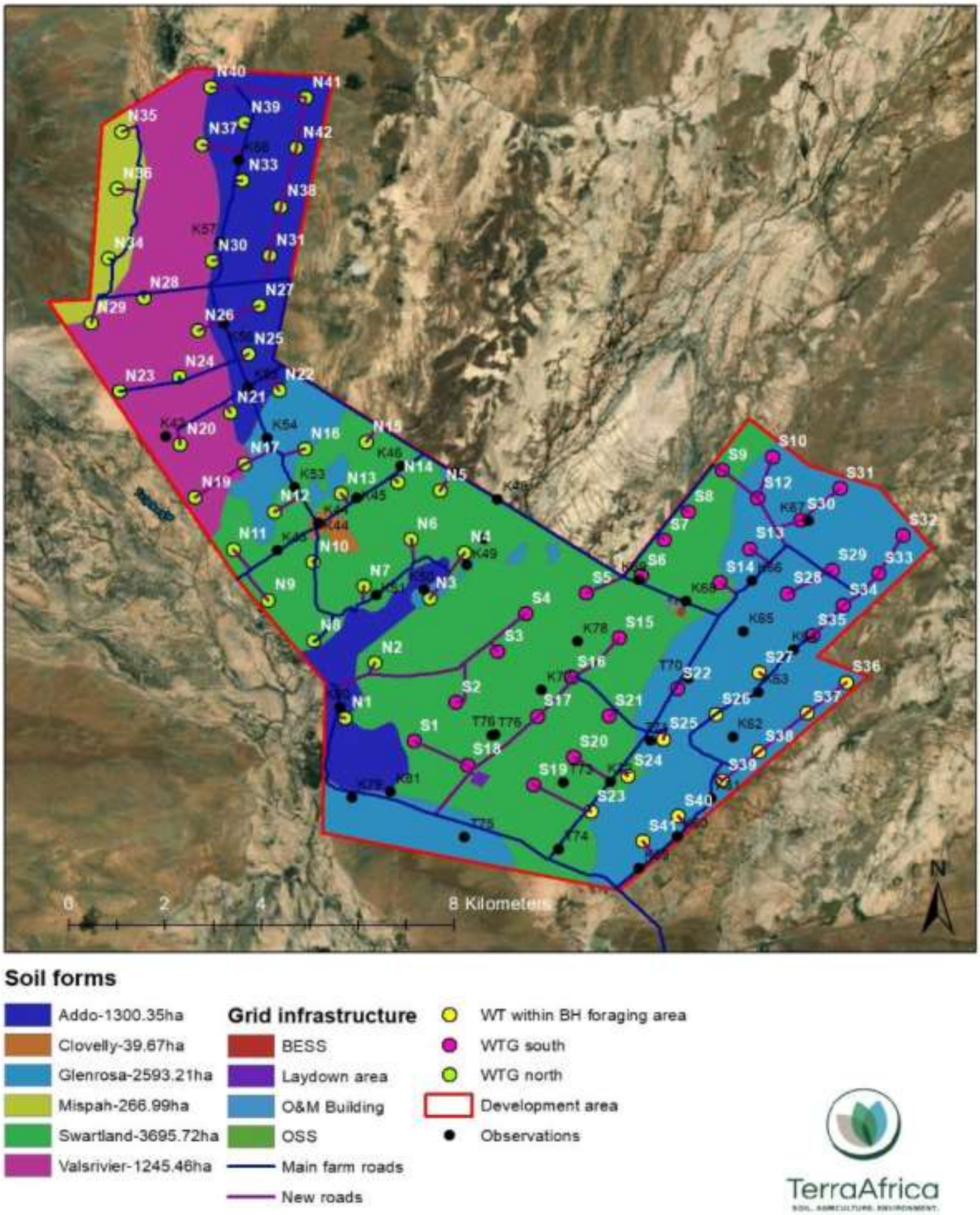

Figure 8.7: Soil classification of the FE Kudu Wind Energy Facility development area

The development area can be classified into three different land capability classes (refer to **Figure 8.8**). Most of the development area has Low-Moderate (Class 07) land capability (4941.19ha) with most of the wind turbines falling within these areas. Turbines N21, 25, 27, 30, 31, 33, 38, 39, 40, 41 and 42, are the only turbines falling on a higher land capability of Moderate (Class 08). The Low-Moderate and Moderate land capability is attributed to the deep effective soil depth of the Swarrland, Addo and Valsrivier soil forms, whereas the Low land capability is assigned to the Gkenrosa and Mispah soil forms which have a shallow effective soil depth. The BESS, O&M building, OSS and Laydown area all fall on Low-Moderate (Class 07) land capability areas.

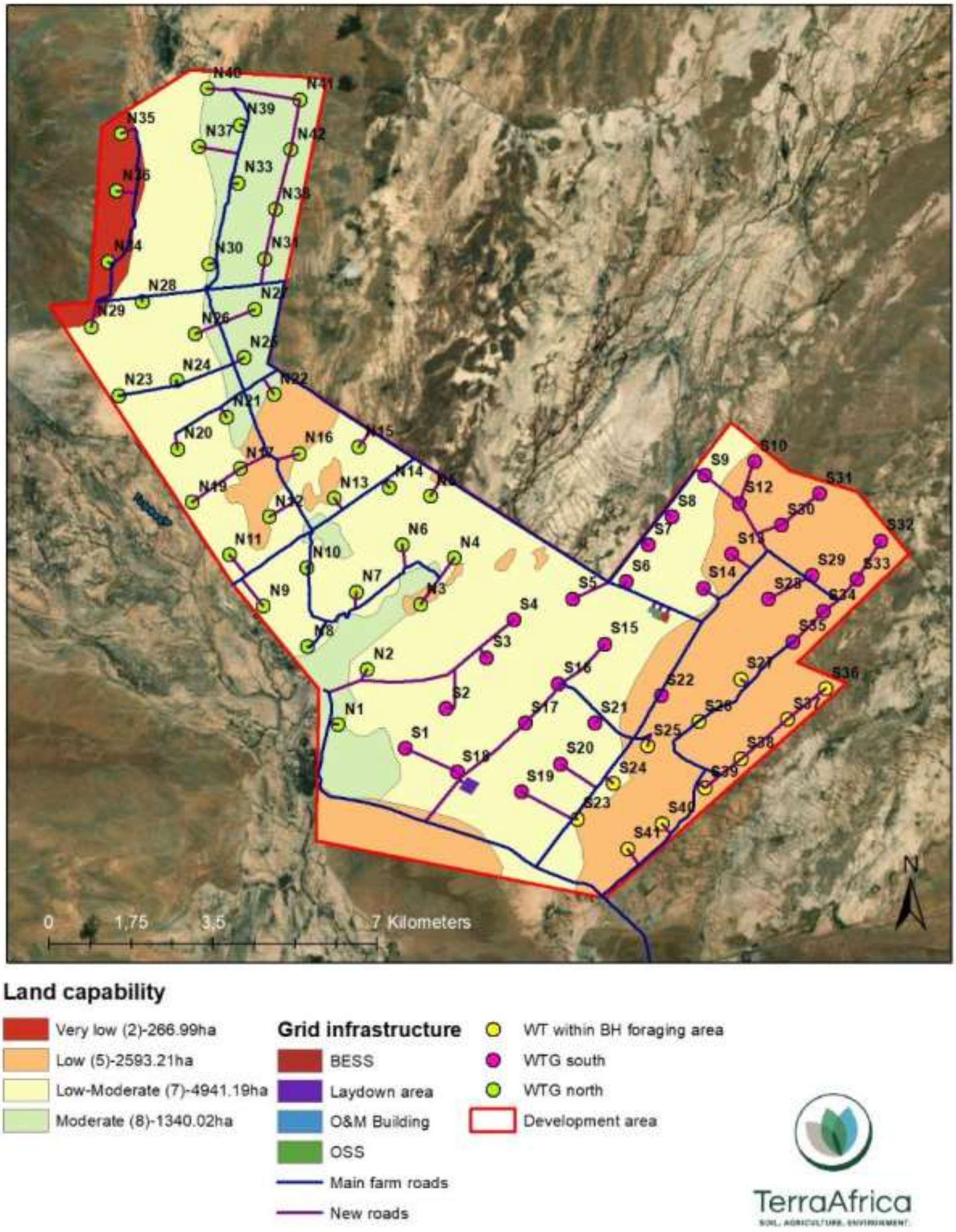

Figure 8.8: Land capability classification of the FE Kudu Wind Energy Facility development area

The development area is mainly used for grazing and clear signs of water provision are observed on site (**Figure 8.9)**. The field crop boundary map (refer to **Figure 8.9**) shows that rainfed annual crops/planted pastures are present within the development area. During the site visit no other agricultural uses were identified and no crop fields or planted pastures were found.

Figure 8.9: Evidence of grazing small stock within the study area with signs of water provision for animals

8.4.3. Ecological Profile of the Broader Study Area and the Project Site

i. Broad-Scale Vegetation Patterns

Three vegetation units are primarily affected by the proposed project (Mucina & Rutherford, 2006). The site is located almost entirely within Eastern Lower Karoo, Southern Karoo Riviere and Gamka Karoo (all currently having a Least Concern conservation status) vegetation units. These are briefly described below and illustrated in **Figure 8.10**.

» *Southern Karoo Riviere*

Southern Karoo Riviere is a vegetation type found in the Western and Eastern Cape Provinces of South Africa. It is characterized by narrow riverine flats supporting *Vachellia karroo* or *Tamarix usneoides* thickets, bordered by *Salsola* (saltbush)-dominated shrubland, especially on heavier (and salt-laden) soils on very broad alluvia. The vegetation type occurs on the alluvial plains of among other the Buffels, Dwyka and Gamka Rivers. Altitude ranges considerably between 250m and 1550m. It is home to a variety of plant species, including *Vachellia karroo, Tamarix usneoides, Salsola spp., Acacia karroo, Rhigozum trichotomum*, and *Euphorbia tirucalli*. The vegetation type is also home to a variety of animal species, including Cape fox, Cape ground squirrel, Cape hare, and Cape porcupine. The vegetation type is threatened by a number of factors, including habitat loss, fragmentation, and invasive alien plants. The vegetation type is also threatened by climate change, which is causing the region to become drier. There are a number of conservation initiatives underway to protect the vegetation type including the establishment of protected areas, such as the Karoo National Park, and the implementation of land management practices that are designed to conserve the vegetation type.

» *Eastern Lower Karoo*

The Eastern Lower Karoo is a semi-arid region of South Africa that lies between the Great Karoo and the Eastern Cape Midlands. It is a vast and sparsely populated region, with a landscape that is characterised by low-lying hills, rocky outcrops, and dry grasslands. The Eastern Lower Karoo is home to a variety of plant and animal species, including succulents, shrubs, and antelope. The dominating vegetation is low to middle-height *microphyllous* shrubland with drought-resistant 'white' grasses becoming abundant in places, especially on sandy and silty bottomlands. Leaf-succulent dwarf shrubs of the families *Aizoaceae* and *Crassulaceae* can also be encountered.

» *Gamka Karoo*

The Gamka Karoo is a low-lying vegetation type in the semi-arid Nama Karoo in the south-western part of South Africa with extensive rangelands used for livestock ranching and wildlife. The vegetation unit is characterized by a shrubby vegetation with a dominance of *Acacia karroo*, *Rhigozum trichotomum* and *Euphorbia tirucalli*. The vegetation type is found on the alluvial plains of the Gamka River and its tributaries, as well as on the lower slopes of the surrounding mountains. The Gamka Karoo is a dry region, with an average annual rainfall of about 250 millimetres. The vegetation type is adapted to this dry climate and is able to store water in its leaves and stems. The unit is home to a variety of plant and animal species, including succulents, shrubs, antelope, and birds.

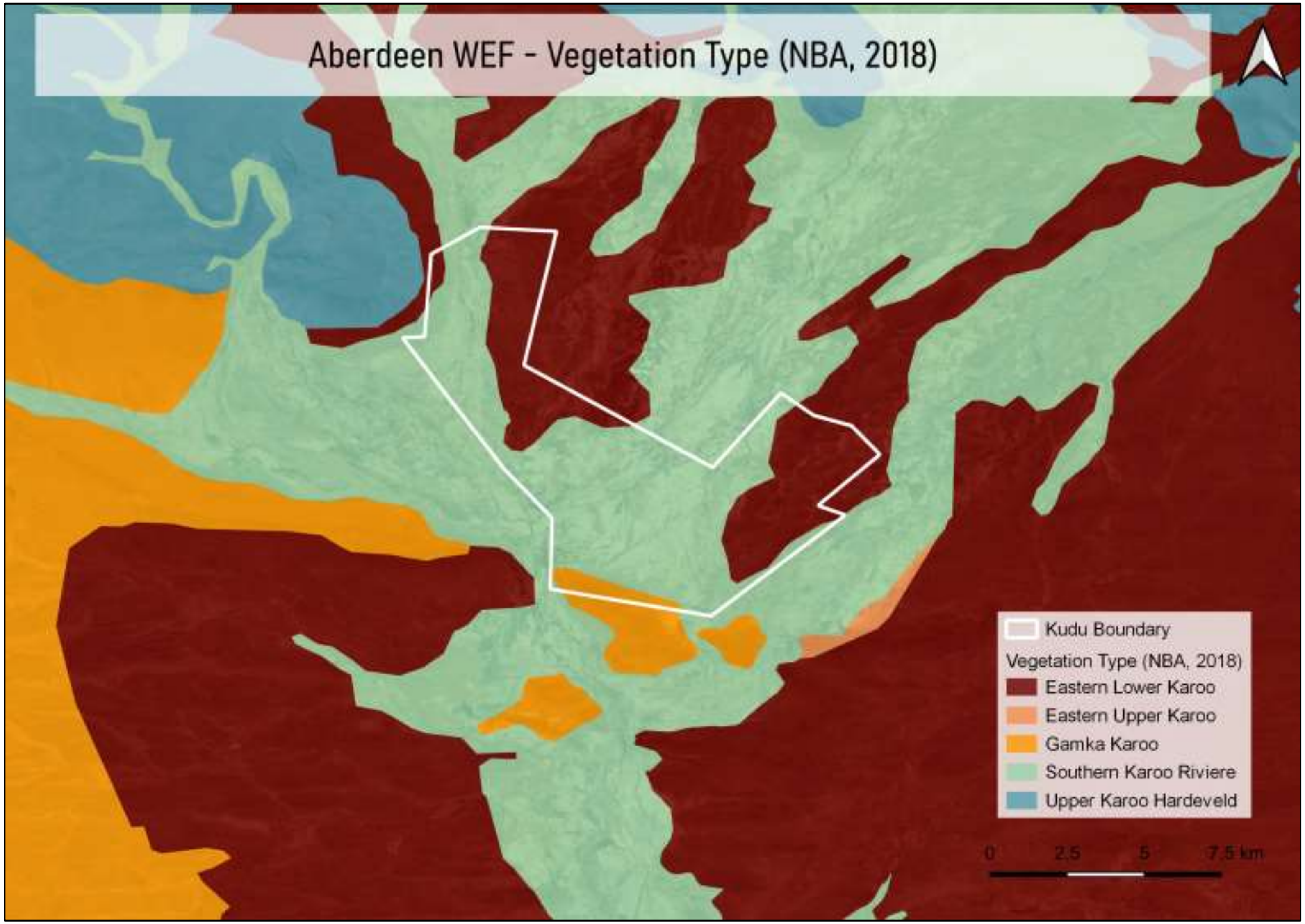

Figure 8.10: Vegetation types, as per the national vegetation showing that the FE Kudu Wind Energy Development area consists of the Eastern Lower Karoo, Southern Karoo Riviere and Gamka Karoo vegetation types

ii. Listed Plant Species

According to the DFFE Screening Tool, there are several plant species of concern that may occur within the FE Kudu Wind Energy Facility site (**Table 8.1**). However, none were found to be present during the site visit and are furthermore not deemed likely to be present, as the site is outside of their known range. No other plant Species of Conservation Concern (SCC) were observed within the site.

Table 8.1: Sensitive Species as listed by the DFFE Screening Tool for the FE Kudu Wind Energy Facility site and the likely presence of these species within the site

Name	IUCN Status	Possible presence within the FE Kudu Wind Energy Facility site
Peersia frithii	VU	A species previously collected widely throughout the southern of the Karoo with an historic extent of occurrence (EOO) of 28913 km². It has only been recorded seven times since 1990 and is suspected to be extant at 6 locations from a current EOO of 690 km². Decline is suspected to be the result of livestock overgrazing and trampling. No historical records near the site but it does fall within east-west distribution range. Possibly present, Not recorded.
Nananthus vittatus	DDT (Data Deficient, Taxonomically Problematic)	Not endemic to South Africa. Free State, Northern Cape, North-West provinces. Found on the edges of alluvial areas. Confirmed present in the Kudu site.
Tridentea virescens	Rare	A widespread species that occurs as sporadic small subpopulations of up to six plants. No threats are known to impact this species. Warmbad in southern Namibia to Kakamas and Prieska in the Northern Cape stretching east to Prince Albert and Aberdeen. Possibly present, Not recorded.
Dierama grandiflorum	EN	An Eastern Cape endemic (EOO 3444 km²), known from two confirmed locations and possibly still extant at three other locations where it is known from historical records. It is declining due to ongoing habitat degradation. Range is from Graaff-Reinet and Somerset East. An extremely rare and localized endemic known from less than 10 collections. Recent observations of subpopulations on the Bosberg indicate that plants occur in small, sparsely scattered clumps of fewer than 100 plants. Possibly present, Not recorded.
Erica passerinoides	EN	This species is known from between three and five locations and has an extent of occurrence (EOO) of 4312 km². It is continuing to decline due to expanding forestry plantations and alien invasive encroachment. This species is endemic to the mountains of the Eastern Cape interior, where it is known from a few scattered subpopulations in the Sneeuberg in the Koudeveld Mountains, Katberg Pass and Cata Forest Reserve. It occurs on south-facing slopes in karoo-grassland ecotones. The Kamdeboo Mountain subpopulation is large and healthy, with two distinct large stands having been monitored on different summits within the range in the past 10 years. Possibly present, Not recorded.
Sensitive Species 1212	VU	EOO <7 000 km², known from fewer than 10 locations and habitat quality and number of mature individuals are declining as a result of livestock (sheep and goat) overgrazing and illegal collection for the succulent plant trade. Potentially threatened at some locations by prospecting for uranium mining. Willowmore to Beaufort West and Aberdeen. Possibly present, Not recorded.

Sensitive Species 1039	VU	This taxon has a restricted distribution range, with an extent of occurrence (EOO) of 5 594 km². It is known from eight locations and is declining for unknown reasons. This taxon occurs in the southern Great Karoo from Aberdeen and Graaff-Reinet southwards to Rietbron and eastwards to Willowmore, Klipplaat and Steytlerville. Possibly present, Not recorded.

iii. Critical Biodiversity Areas (CBA) and Broad-Scale Processes

The FE Kudu Wind Energy Facility site is situated within areas designated ESA 1, CBA 2 and ONA (refer to **Figure 8.11**). The ESA corridors are broadly aligned with Southern Karoo Riviere vegetated watercourses with associated adjacent alluvial areas.

In terms of the conservation planning priorities and features of the site, there are no NPAES Focus Areas within the site. Given the low transformation rate and extensive nature of the affected vegetation types, the development would have minimal impact on the future ability to meet conservation targets for these vegetation types.

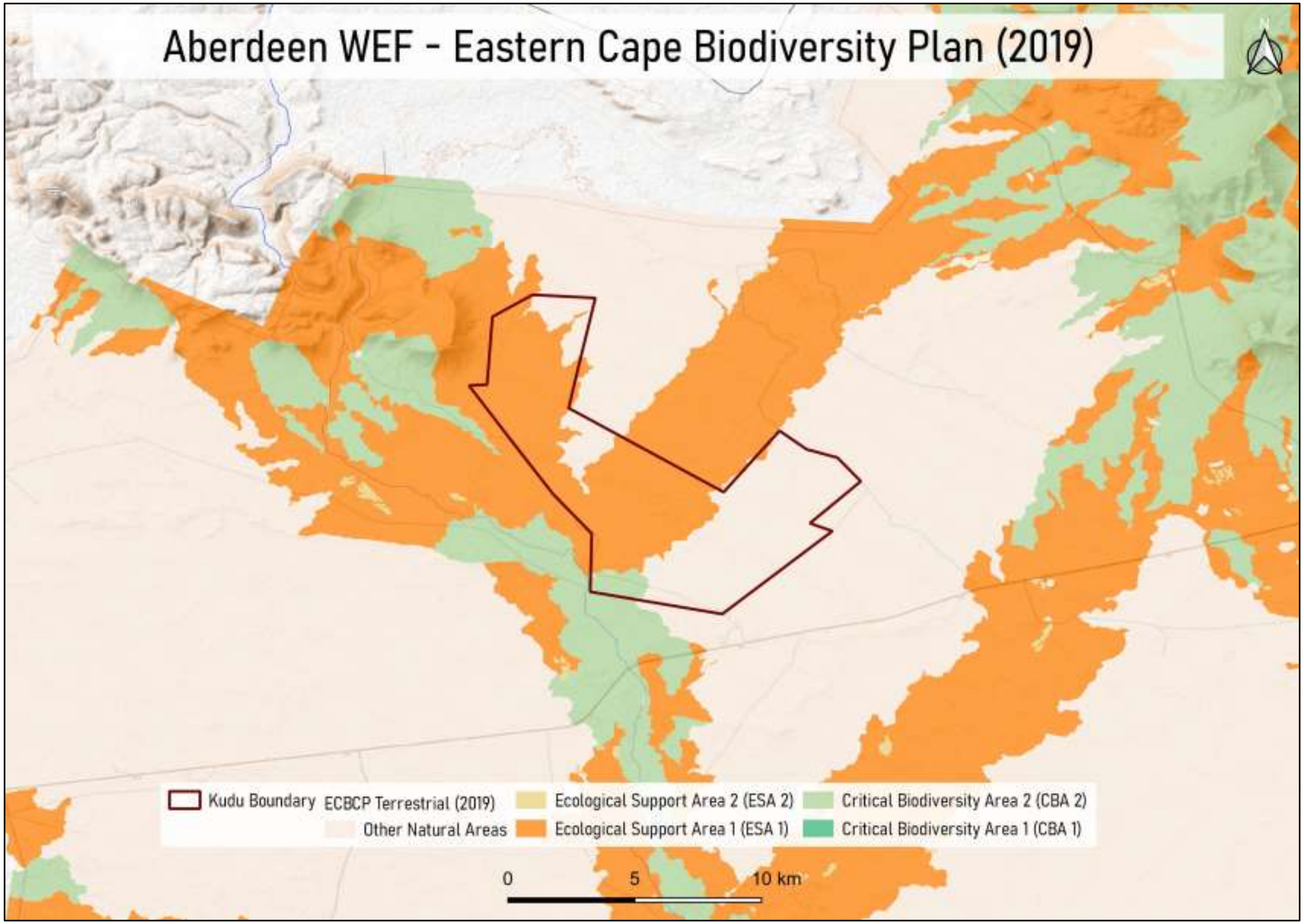

Figure 8.11: Eastern Cape Terrestrial CBA map showing the mapped terrestrial CBAs within the FE Kudu Wind Energy Facility development area

iv. Freshwater resources and Aquatics

The study area is located across a single Freshwater Ecoregion, the Karoo, with the rivers draining directly into the Indian Ocean (e.g., Gamtoos River). The succulent Karoo is separated from the Nama Karoo by the Bokkeveldberg Mountains. The aquatic fauna of the Karoo Freshwater Ecoregion, in comparison to northern African river systems is depauperate with a southern temperate (Cape) *ichthyofauna* (Abel *et al.*, 2008). Dry for most of the year, riverbeds in the Nama Karoo descend sharply from escarpments to meander across the flat plains of the Central Plateau. Lined by belts of riverine *Vachellia karroo* thicket, the riverbeds create a network of riparian habitats that extends across the landscape. Other riparian species include *Tamarix usneoides* and *Euclea, Ozoroa*, and *Acacia shrubs* (Barnes & Anderson, 1998). Notable aquatic ecology in these basins include the several endemic *Cyprinid* species. According to the expected fish species list, a total of three indigenous species are expected within the Kariega River system, with fewer species expected within the associated tributaries based on species habitat requirements. The species assemblage expected within the study area are typically widely distributed over a large geographic range.

The FE Kudu Wind Energy Facility project site is dominated by four types of natural aquatic features and a small number of wetland features:

- Ephemeral main watercourse - Numerous drainage features are present comprising of an extensive braided watercourse network, presenting ephemeral conditions. Only two watercourses were flowing at the time of the survey and these were assessed for aquatic biota. These were the Ouplaas River and one of its tributaries
- Ephemeral watercourses in arid environments – Present as vernal pools that intermittently hold water for short periods (from a few days to months) following sufficient rainfall, where by the standing surface water may support vernal biota (refer to **Figure 8.12**).
- Artificial dams; and
- Several wetland features.

Figure 8.12: Photograph showing a vernal pool within the FE Kudu Wind Energy Development Area.

The project site is drained by several ephemeral and non-perennial watercourses, which fall within the L22C, L22D, L23A and L23B quaternary catchments (sub-catchment), and the larger Mzimvubu-Tsitsikama Water

Management Area (refer to **Figure 8.13**). The non-perennial and ephemeral systems that drain the project area are largely unnamed and form tributaries of the Ouplaas River in the eastern portion of the project area, the three unnamed rivers in the middle portion of the project area, the Tulpleegte River in the western portion, and the Kariega River in the southern portion of the project area. The river systems draining the project area flows in a southerly direction into the Kariega River at the quaternary catchment boundary south of the project area. The Kariega River falls within the upper reaches of the Gamtoos drainage basin, which drains into the Indian Ocean.

The study area falls within the Great Karoo Level 1 aquatic ecoregion. The arid ecoregion is characterised by plains with moderate to low relief. The study area is not located within a Strategic Water Resource Area. Therefore, the proposed wind energy facility is unlikely to have any significant impact to downstream water resources.

The project overlaps with a freshwater ESA1 which is associated with the watercourses, while portions of the project area overlap with ONA's. The infrastructure does not overlap with CBAs. (Refer to **Figure 8.14**).

A total of three fish species are expected to occur within the watercourses potentially influenced (cumulatively) by the project and these are presented in **Table 8.2**. The small barb species previously known as *Enteromius anoplus* (Chubbyhead barb) is expected within the downstream systems and was thought to be widely distributed across southern Africa with an IUCN listed status of Least Concern (LC) due to an extensive distribution range. However, according to a recent genetic study conducted, *Enteromius anoplus* was reclassified into four distinct genetic lineages separated by selected major river systems, indicating distinct species endemic to different drainage basins. These results render the current IUCN Red List assessment of *E. anoplus* obsolete. Kambikambi *et al.* (2021), suggest that there is thus the need for generating baseline information, including knowledge of ecological requirements, habitat utilization, distribution, life history and feeding ecology to support conservation and protection of these endemic fish. In absence of a threatened status these fish should be conserved through the precautionary principle and be treated as highly threatened for proposed developments until otherwise proven to be less threatened. The Gamtoos drainage basin was not included in the aforementioned study, therefore the expected *E. anoplus* should be treated as a highly threatened Gamtoos endemic species that remains undescribed.

An additional indigenous species of conservational concern is expected within the downstream Kariega River (*Fish Sanctuary Area*) namely *Pseudobarbus asper* (Smallscale Redfin), which is listed as Vulnerable (VU) requiring management of water quality, habitat and predation impacts from invasive fish species. Both *Enteromius anoplus* and *Pseudobarbus asper* are SCC taxa potentially influenced from the proposed project on a cumulative scale with water quality impacts of key concern to their survival.

Table 8.2 Expected fish species for the SQRs potentially influenced by the project

Species	Common Name	IUCN (2023)*	Ouplaas and Gannaleegte	Downstream Kariega River
Enteromius anoplus	Chubbyhead barb	Unknown	Yes	Yes
Labeo umbratus	Moggel	LC		Yes
Pseudobarbus asper	Smallscale Redfin	VU		Yes
Total expected species	**3**		**1**	**3**
*LC – Least Concern; VU – Vulnerable				

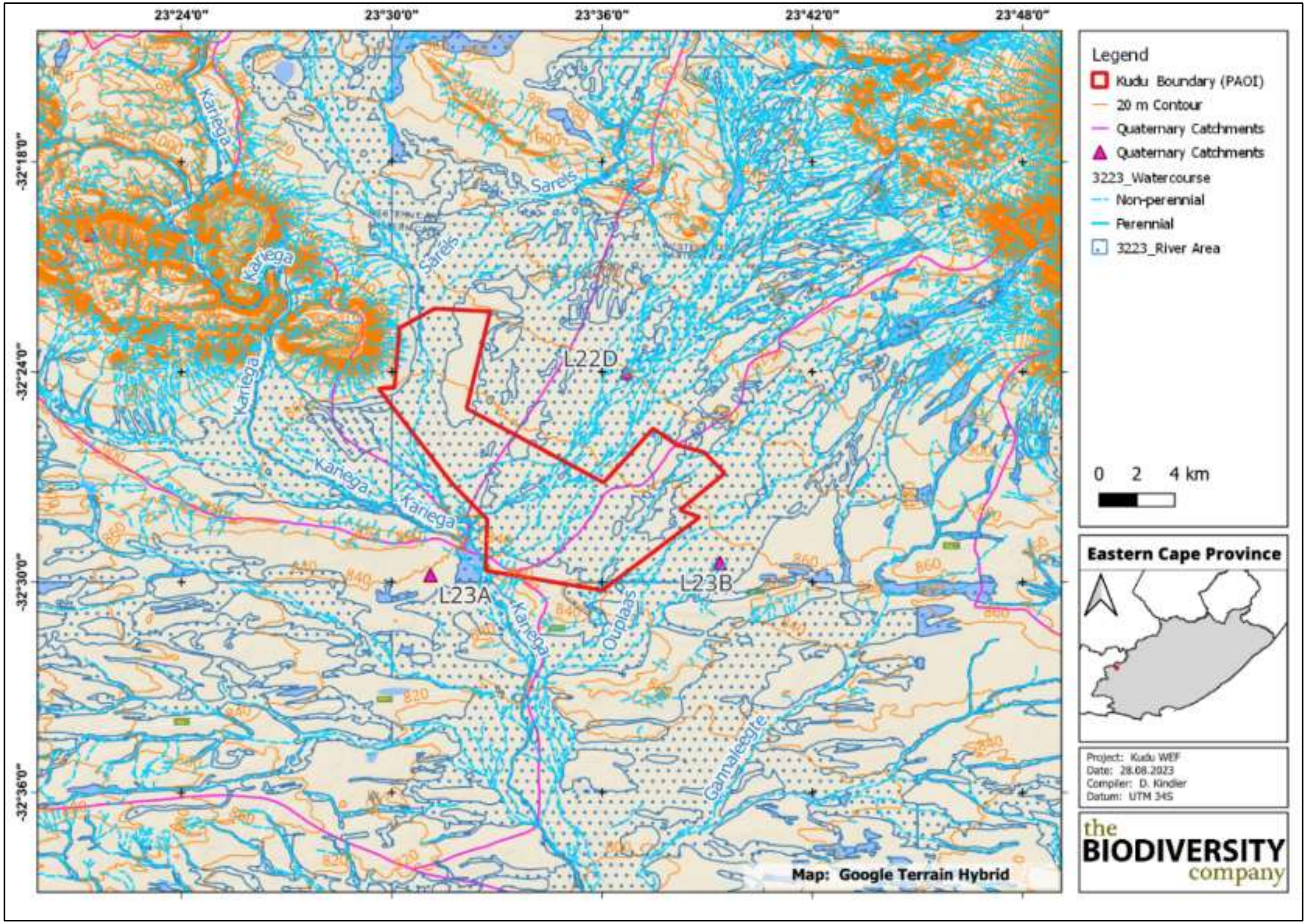

Figure 8.13: Map indicating the various quaternary catchments and mainstem rivers within the FE Kudu Wind Energy Facility Development Area

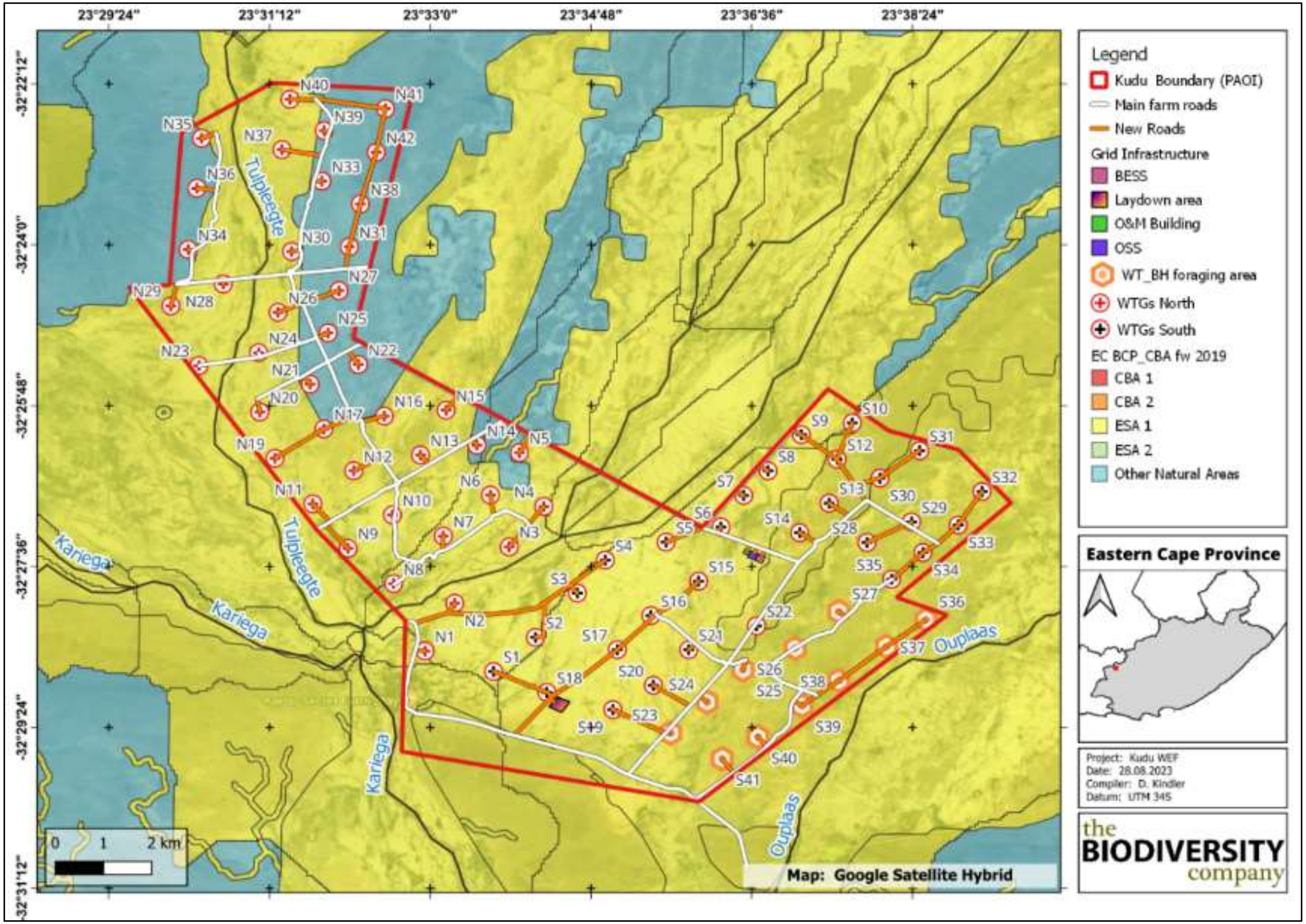

Figure 8.14: Illustration of the freshwater Critical Biodiversity Areas within the FE Kudu Wind Energy Facility

v. Terrestrial Fauna

Mammals

The National Environmental Screening Tool identifies no mammal species. Riverine Rabbit is not anticipated to be present. The Black-footed Cat is also known from occasional records from the wider area, but prefers areas with a mix of more open and higher cover areas. As this is a shy and secretive species, it is difficult to confirm as absent or present within a site. However, given the generally sparse cover at the site, it is considered to have a low favourableness for this species. No other mammals of concern were observed at the site and it is unlikely that any such species are present.

Reptiles

Reptiles such as lizards, snakes and tortoises may be present. The National Environmental Screening Tool identifies *Chersobius boulengeri* (Karoo Padloper), as possibly occurring in the area. Initial site investigations suggest that this species is unlikely to be present due to unsuitability of habitat in the lower lying areas of the sites, where development would occur.

Amphibians

The National Environmental Screening Tool identifies no amphibian species of conservation concern as possibly being in the area. Amphibians are likely to be present due to the prevalence of watercourses and wetland areas, however no species of conservation concern are flagged for the site.

vi. Bats

The pre-construction monitoring was designed to monitor bat activity across the proposed project site, but mainly within considered the full extent of the Aberdeen WEF Cluster Study Area[24]. The monitoring was undertaken in accordance with South African best practice. During this period the baseline environment was investigated by using acoustic monitoring to document bat activity. **Table 8.3** shows detected and potentially occurring bat species in the study area. **Figure 8:15** shows the locality of the proposed wind energy facility in proportion to the Aberdeen WEF Cluster Study Area.

[24] The area of interest ('AOI'), collectively known as the 'Aberdeen WEF Cluster Study Area' is approximately ~19 440 hectares in extent. The FE Kudu WEF makes up ~9 170 ha of this AOI.

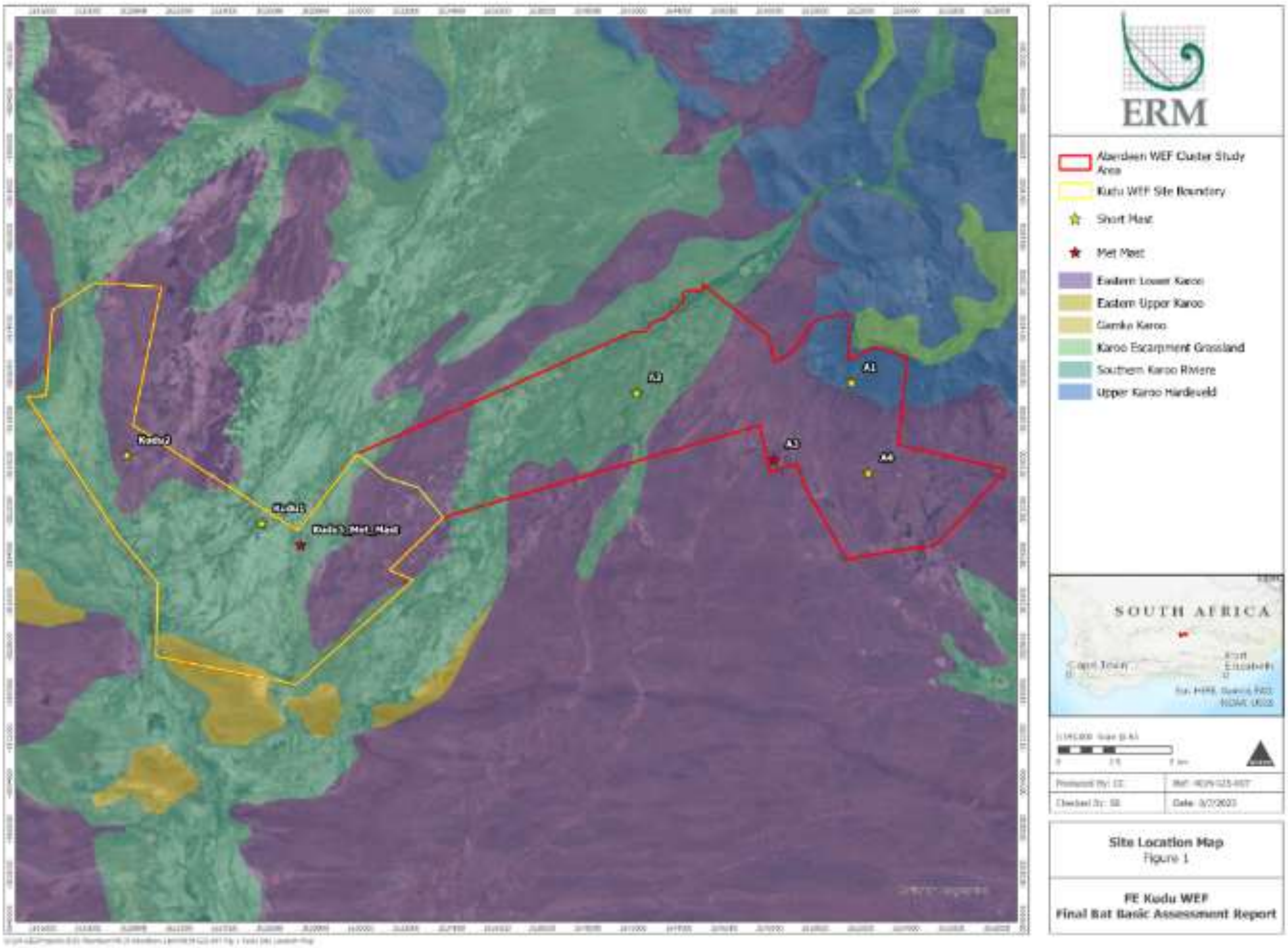

Figure 8.15: Site location map for the proposed FE Kudu Wind Energy Facility

Based on available species records and published distribution maps, 13 bat species potentially occur in the study area (see **Table 8.3**). Of these, 10 species were detected on-site. This includes six high risk species (Egyptian free-tailed bat, Cape serotine, Long-tailed serotine, Natal long-fingered bat, Zulu Serotine, and Lesser Long-fingered bat), one medium-high risk species (Temminks Hairy bat), and three low risk species (Lesueur's Hairy bat, Cape Horseshoe bat, and Geoffroy's Horseshoe bat). All of species detected have a Red List conservation status of Least Concern.

Of the detected species, the following three listed bat species are regarded by the specialist as having the highest global conservation priority:

- Temminks Hairy Bat (*Myotis tricolor*)
- Lesueur's Hairy Bat (*Cistugo lesueuri*)
- African Straw-coloured Fruit Bat (*Eidolon helvum*)

Table 8.3: Bat species anticipated and confirmed to occur at the project site

SPECIES	COMMON NAME	Conservation Status[25]		TURBINE FATATLITY RISK
		Global	National	
Tadarida aegyptiaca	Egyptian Free-tailed Bat	LC	LC	**High**
Eptesicus hottentotus	Long-tailed Serotine Bat	LC	LC	**High**
Neoromicia capensis	Cape Serotine Bat	LC	LC	**High**
Miniopterus natalensis	Natal Long-fingered Bat	LC	LC	**High**
Cistugo lesueuri	Leseur's Hairy Bat	NT	LC	Low
Myotis tricolor	Temminck's Hairy Bat	NT	LC	**Medium-High**
Neoromicia zuluensis	Zulu Serotine	LC	LC	**High**
Miniopterus fraterculus	Lesser Long-fingered Bat	LC	LC	**High**
Nycteris thebaica	Egyptian Slit-faced Bat	LC	LC	Low
Rhinolophus capensis	Cape Horseshoe Bat	LC	LC	Low
Rhinolophus clivosus	Geoffroy's Horseshoe Bat	LC	LC	Low
Eidolon helvum	African straw-coloured fruit bat	NT	LC	**High**
Rousettus aegyptiacus	Egyptian fruit bat	LC	LC	**High**

Data obtained from the full monitoring campaign yielded a total of 259 743 bat passes recorded across all detectors. The Egyptian Free-tailed bat and Cape Serotine dominated the recorded activity, accounting for 80% and 15% of the total bat passes, respectively. All other species accounted for less than 5% of activity. The Egyptian Free-tailed bat was also the most abundant species recorded at rotor sweep height, accounting for 98% of passes at both 55 m and 110 m. This suggests that during operation of the wind farm, this species will comprise most of the turbine-related bat fatalities.

Species diversity is typical for arid regions in South Africa, with Egyptian Free-tailed and Cape Serotine being the most recorded species during the study period. Several other bat species susceptible to wind energy impacts were also present, with varying levels of risk. Wind energy is however an emerging impact that may not be fully considered yet by the Red List of Mammals of South Africa and IUCN Red List. Fatality records of the Egyptian Free-tailed bat and Cape Serotine, specifically, are known from operating wind farms across parts of South Africa, and careful consideration should be made during the wind farm planning phase, to reduce the likelihood of impacts to such species, regardless of the conservation status.

Resources present within the project site that are important for foraging bats include rivers, farms dams, and reservoirs. Secondary drainage lines also serve as areas for drinking, foraging, navigation, and movement. Buildings and woody vegetation also serve as areas where bats may potentially roost. Areas with dolerite which may be associated with karst formations (although no obvious cavities suitable for bat roosting were observed within the Project Site). The absence of large caves in the study area suggests limited potential for large bat colonies, though the mountainous areas in the north have the potential to provide suitable roosting habitat and certain existing building infrastructures have the potential to also accommodate larger bat colonies.

[25] Child, M.F., Roxburgh, L., Do Linh San, E., Raimondo, D., Davies-Mostert, H.T. eds., 2016. The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.

Water sources are vital for bats, as drinking resources may not only be used to sustain bats directly, but are also attractors of insects and vegetation growth (e.g., riparian vegetation), making them suitable foraging and roosting sites. For this reason, reservoirs and farm dams in the study area are likely to attract bats, along with rivers and drainage lines used for foraging and commuting. Some water resources are non-perennial, restricting availability to bats during specific periods, which may limit potential impacts to certain times of the year. Cultivated land is important for foraging, as some species hunt insect pests in agricultural fields, though such areas are not that prevalent across the site.

vii. Avifauna

The Southern African Bird Atlas Project (SABAP2) data indicates that 194 bird species have been recorded and could potentially occur within the Broader Area. Of these, 28 species are classified as priority species for wind energy developments and 14 of these priority species are also South African Red List species. Of the 28 priority species, 17 are likely to occur regularly in the Project Site (refer to **Table 8.4**).

Six seasonally timed site visits conducted over the course of 17 months (January 2021 - October 2022) across the entire study area were undertaken to record all flights of Priority species. Two surveys did not include transect counts. Flight patterns of priority species were recorded for 144 hours (12 hours per VP) at 2 vantage points at the FE Kudu Wind Energy Facility Site. The total combined flight observation time for priority species after six surveys was 1 hour, 05 minutes, and 45 seconds.

Table 8.4 Priority species potentially occurring at the Project Site (Red List species are indicated with red text). 14 Red listed species were identified to potentially occur at the project site, however only 9 of these species were recorded during the pre-construction monitoring campaign

Species	Scientific name	Regional Status	Recorded On—Site During Monitoring	Likelihood of Regular Occurrence
African Harrier-Hawk	*Polyboroides typus*	-		Low
African Rock Pipit	*Anthus crenatus*	Near Threatened		Low
Amur Falcon	*Falco amurensis*	-		Low
Black Harrier	*Circus maurus*	Endangered		Low
Black Stork	*Ciconia nigra*	Vulnerable		Low
Black-winged Kite	*Elanus caeruleus*	-		Low
Blue Crane	*Grus paradisea*	Near Threatened	x	High
Booted Eagle	*Hieraaetus pennatus*	-	x	Medium
Brown Snake Eagle	*Circaetus cinereus*	-	x	Medium
Burchell's Courser	*Cursorius rufus*	Vulnerable		Low
Common Buzzard	*Buteo buteo*	-	x	Medium
Double-banded Courser	*Rhinoptilus africanus*	-	x	High
Greater Kestrel	*Falco rupicoloides*	-	x	Medium
Grey-winged Francolin	*Scleroptila afra*	-	x	Low

Jackal Buzzard	*Buteo rufofuscus*	-	x	Medium
Karoo Korhaan	*Eupodotis vigorsii*	Near Threatened	x	High
Kori Bustard	*Ardeotis kori*	Near Threatened	x	High
Lanner Falcon	*Falco biarmicus*	Vulnerable	x	Medium
Lesser Kestrel	*Falco naumanni*	-	x	Low
Ludwig's Bustard	*Neotis ludwigii*	Endangered	x	High
Martial Eagle	*Polemaetus bellicosus*	Endangered	x	Medium
Pale Chanting Goshawk	*Melierax canorus*	-	x	High
Sclater's Lark	*Spizocorys sclateri*	Near Threatened		Low
Secretarybird	*Sagittarius serpentarius*	Vulnerable	x	Medium
Southern Black Korhaan	*Afrotis afra*	Vulnerable	x	High
Spotted Eagle-Owl	*Bubo africanus*	-		High
Verreaux's Eagle	*Aquila verreauxii*	Vulnerable	x	Low
White Stork	*Ciconia ciconia*	-	x	Low

There are no Important Bird Areas (IBAs) within a 50km radius of the proposed FE Kudu development area. The closest IBAs to the Project Site are the Karoo National Park (IBA SA102), located 83km to the west, and the Camdeboo National Park, 85km to the east. It is unlikely that the proposed development will have a negative impact on these IBAs due to the distance from the Project Site.

8.5. Integrated Heritage including Archaeology, Palaeontology and the Cultural Landscape

8.5.1 Cultural landscape

The concept of cultural landscape gives spatial and temporal expression to the processes and products of the interaction between people and the environment. It may therefore be conceived as a particular configuration of topography, geology, vegetation, land use and settlement pattern and associations which establishes some coherence of natural and cultural processes.

The overall landscape of the study area is a vast, open, barren, largely featureless plain. It lies to the west of an area of high scenic value framed to the north by the south-west sector of the Camdeboo Mountains, notably the Sleeping Giant. The R61 and N9 are regional linkage routes traversing a representative Karoo landscape and having some scenic heritage value in terms of its sense of remoteness.

The Camdeboo Plains and mountain backdrop, with its core lying east of the proposed development area, is of high local historical, aesthetic architectural and social significance. Of particular heritage significance is the town of Aberdeen, which is worthy of Grade IIIA heritage status in terms of the following:

» Historical value dating to the mid-19th century and including its local role in the South African War.
» Architectural and aesthetic value in terms of its street pattern, streetscape and townscape, concentration of conservation worthy buildings, and its relationship with its setting, notably its mountain backdrop to the north.

» Cultural landscape value as providing a focal and destination point within a vast open flat landscape and at the intersection of two regional routes.

The cultural landscape to the west of Aberdeen and forming part of the landscape affected by the proposed wind farm has historical value in terms of forming part of a pattern of land grants dating to the mid-19th century. Natural features and patterns of use over time contribute to its landscape character (watercourses, topographical features, routes, farmsteads, stone kraals). While the landscape itself is not worthy of formal protection in terms of the NHRA, it possesses conservation-worthy landscape elements for aesthetic (visual, place making) and historical reasons.

Various Landscape Elements of Cultural Value have been identified within and around the FE Kudu Wind Energy Facility project site (**Figure 8.16**):

- Topographical Features
  - Wolwekop peak situated just north of the R61 near the Murraysburg secondary road. This is a distinctive landmark feature. It is recommended that the nearest turbine be located more than 2.5km from this peak.
  - Camdeboo Mountains and the "Sleeping Giant" formation framing the long views northwards.
- Watercourses and infrastructure
  - The route of the periodical Kraai River crossing a portion of the site and informing a pattern of settlement.
  - Dams, wind pumps and water furrows.
- Planting Patterns
  - Clumps of trees typically founds around homesteads as shelter from the sun/wind and as place-making elements.
- Scenic and historic routes
  - The R61 as a regional linkage route of some scenic value with dramatic views towards the mountain backdrop to the north.
  - The combination of the intersection of the R61 and the Murraysberg Road, change in topography and the landmark qualities of the Wolwekop providing a threshold condition.
  - The east-west historic route running parallel to the R61 and through the site, which has structured a historical pattern of settlement.
- Settlements
  - Aberdeen town of suggested Grade IIIA heritage value and situated approximately 40km east of the wind farm site.
  - A number of farmsteads and stone kraals situated within or adjacent to the development area of mostly Grade IIIC heritage value and in some instances of suggested Grade IIIB heritage value.

8.5.2. Archaeology

A survey of the project site was conducted by an archaeologist between 20 to 24 June 2023. Different areas were sampled across the landscape. The historic to modern farming use of the landscape has contributed to the built environment pattern of settlement in the area with typical Karoo werfs, many now ruined, dotting the landscape. A number of farm dams have been made in the past by using earthmoving equipment to push up dirt banks along the watercourses. Nearly 60 additional observations were made of various archaeological sites falling within the Kudu Wind energy Facility area. Two areas previously recorded during the neighbouring proposed Kariega Wind Energy Facility study identified ruins and built environment heritage located near the northeastern end of the Kudu Wind Energy Facility associated with a stock kraal settlement on the way to the Benekraal werf as well as the Rooidraai werf near the southern end of the development area noted earlier. No impacts on these built environment heritage resources are anticipated but are noted as part of the broader assessment of heritage resources in the region.

Given the lack of natural rock shelters on the landscape and absence of dolerite boulders favoured by rock engravers during the Later Stone Age, the vast majority of the observations consisted of open-air scatters of Middle and Later Stone Age artefact scatters. The vast majority of the archaeological sites recorded consisted of Middle Stone Age open site scatters of tools made of hornfels and siltstone which are abundant and easily sourced within the local area. The Later Stone Age scatters tended to contain high quality hornfels that appeared to be introduced into the area and were far less patinated and weathered than the extensive MSA material. Artefacts were seen throughout the study site and areas within the floodplain of the Kariega Rivier containing less visible surface material are likely to hold buried archaeological material. The modern dirt furrows and sand banks created in the 1950s have no doubt contributed substantially to the build-up of sediment burying many of these scatters.

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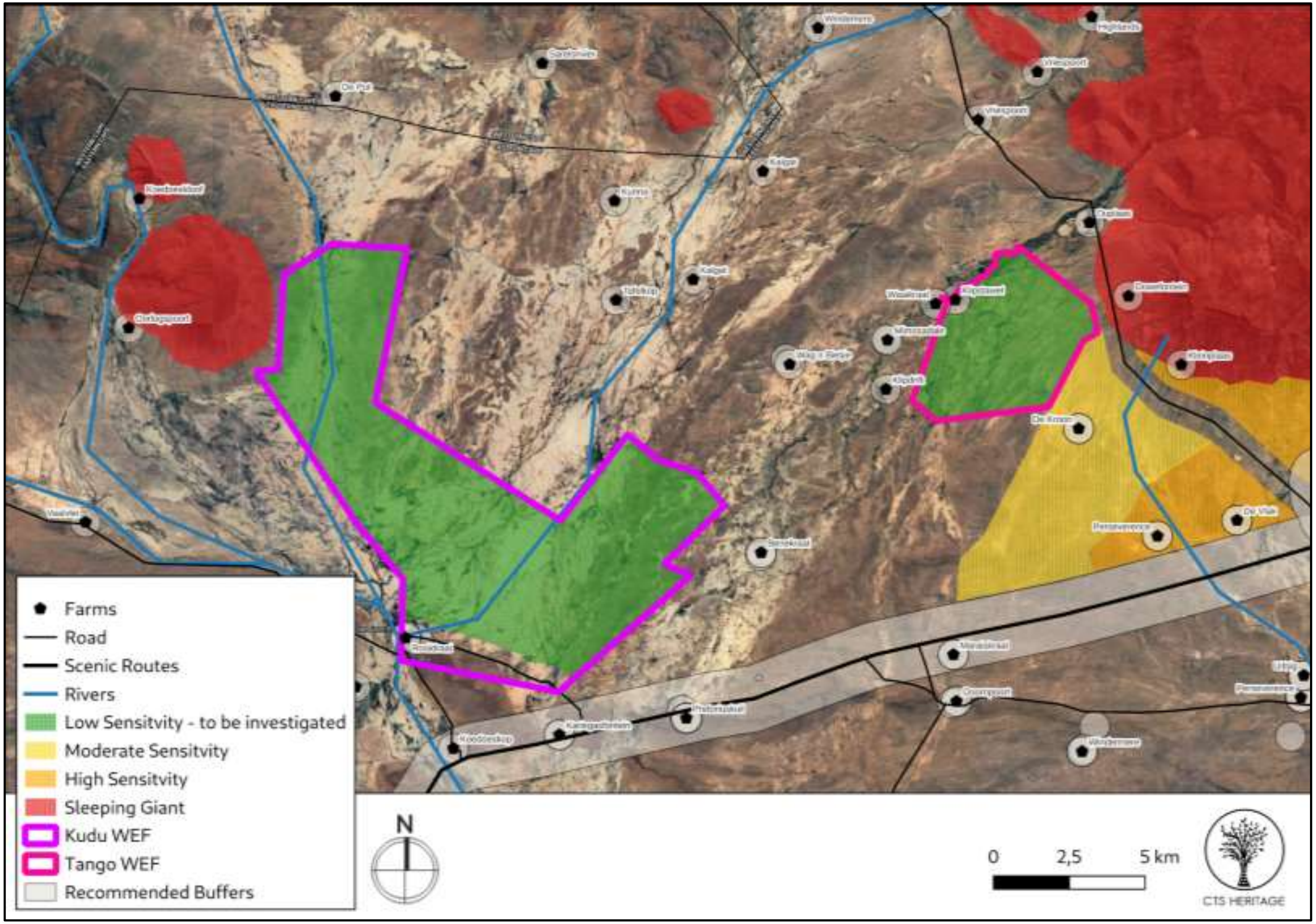

Figure 8.16: Map indicating cultural landscape elements within and surrounding the FE Kudu Wind Energy Facility (and the FE Tango Wind Energy Facility)

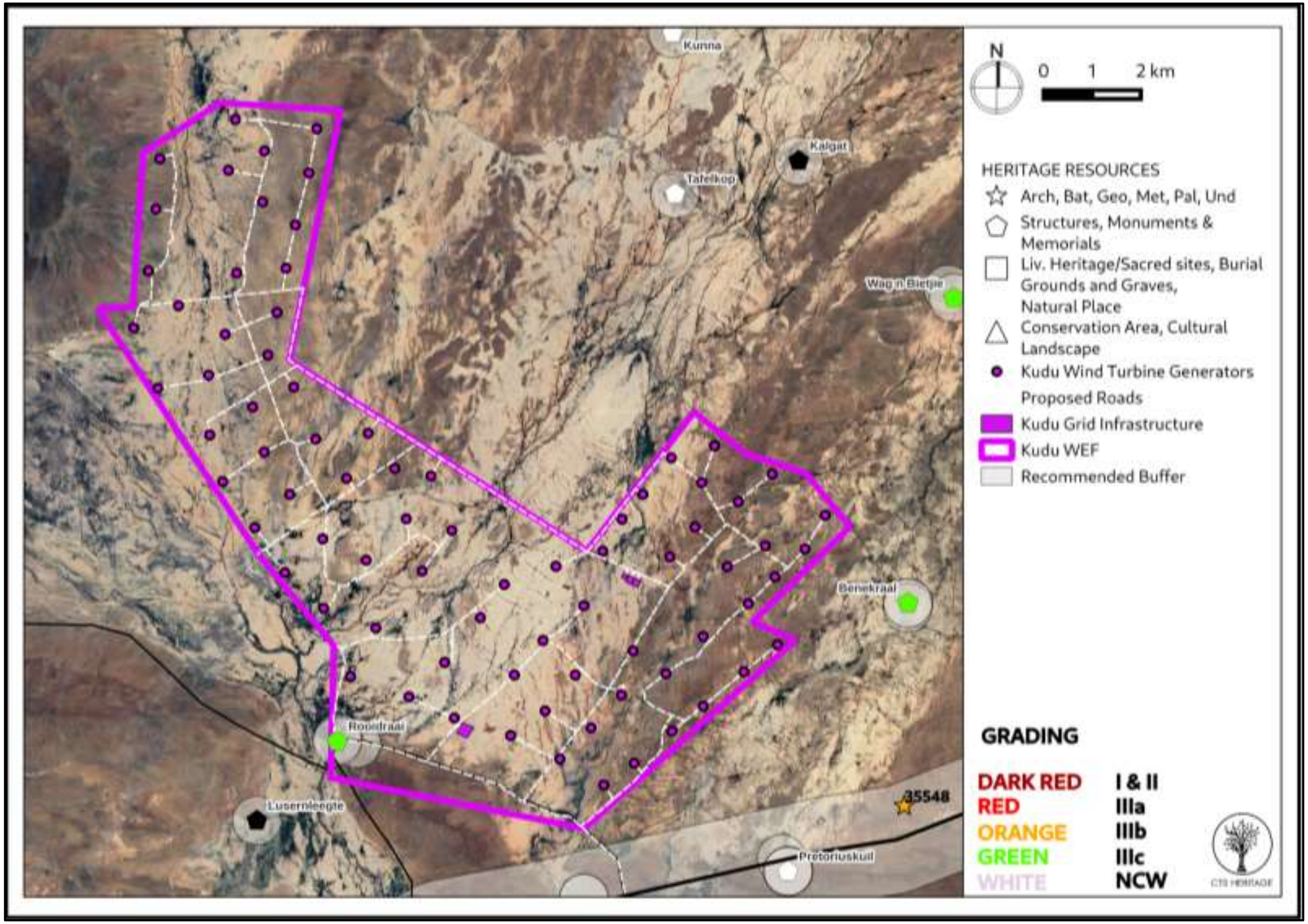

Figure 8.17: Map indicating Archaeological resources within and surrounding the FE Kudu Wind Energy Facility development area

8.5.3. Palaeontology

The FE Kudu wind project area on the northern margins of the Aberdeen Vlaktes is underlain at depth by potentially fossiliferous continental (fluvial / lacustrine) bedrocks of the Lower Beaufort Group (Adelaide Subgroup). These bedrocks probably belong largely or entirely to the Middle Permian Abrahamskraal Formation rather than the Late Permian Teekloof Formation as currently mapped. There are no historical records of fossil vertebrates from the project area; this is probably largely due to the extremely poor levels of bedrock exposure found here. Fragmentary remains of large dinocephalians have recently been recorded from the Aberdeen Vlaktes just to the south as well as from the slopes of the Oorlogskloofberge to the west. During the recent 3-day palaeontological field visit (20-24 June 2023) no occurrences of fossil vertebrates were recorded.

A background scatter of petrified (silicified) wood blocks reworked from the Lower Beaufort Group bedrocks occurs within surface gravels of eluvial and alluvial origin in several sectors of the development area. Locally abundant, ferruginised moulds and poorly preserved petrified wood occurs in association with channel sandstone basal conglomerates on the north west margins of the Kudu Wind Energy Facility project area (Oorlogspoortberge eastern footslopes) (refer to **Figure 8.18**). Most of the fossil wood material is poorly preserved and of very limited scientific value. Mitigation of the recorded fossil wood sites is not recommended here, given the abundance and widespread occurrence of better-preserved material regionally in the northern Aberdeen vlaktes and the fact that the material is not in situ.

Most of the low-relief terrain within the deveopment area is covered by a thin to thick blanket of Late Caenozoic superficial deposits, including alluvial gravels and sands, eluvial and colluvial surface gravels, calcrete hard pans, pan sediments and gravelly to sandy soils. Apart from reworked fossil wood blocks and Late Caenozoic calcretised plant root casts of widespread occurrence and limited palaeontological interest, no fossils of Caenozoic age have been recorded within these younger sediments.

Table 8.5 Palaeontological resources recorded within and surrounding the FE Kudu Wind Energy Facility development area

POINT ID	Description	Co-ordinates		Grading
306	Portion 2 of Farm Oorlogspoort 85. Sparse blocks of colour-banded petrified wood within eluvial surface gravels. Proposed Field Rating IIIC. No mitigation recommended.	-32.498458	23.606089	IIIC
331	Portion 2 of Farm Oorlogspoort 85. Isolated block of colour-banded petrified wood within band of relict "High Level" alluvial gravels. Proposed Field Rating IIIC. No mitigation recommended.	-32.446002	23.619753	IIIC
332	Portion 2 of Farm Oorlogspoort 85. Dense surface scatter of cobbly eluvial to alluvial gravels with occasional reworked blocks of poorly-preserved silicified wood showing amorphous structure (possibly partially decomposed before silicification). Proposed Field Rating IIIC. No mitigation recommended.	-32.450711	23.616316	IIIC
333	Portion 2 of Farm Oorlogspoort 85. Dense surface scatter of cobbly eluvial to alluvial gravels with occasional reworked blocks of poorly-preserved silicified wood showing amorphous structure (possibly partially decomposed before silicification). Proposed Field Rating IIIC. No mitigation recommended.	-32.451702	23.616341	IIIC
335	Portion 2 of Farm Oorlogspoort 85. Sheet-washed eluvial surface gravels within pan-like brak-koll in sandy vlaktes with occasional small blocks of well-preserved, cherty, grey-green petrified wood. Proposed Field Rating IIIC. No mitigation recommended.	-32.485734	23.591707	IIIC

343	Portion 2 of Farm Oorlogspoort 85. Patch of dark greyish, pebbly surface gravels with occasional small blocks of poorly-preserved, reworked petrified wood. Proposed Field Rating IIIC. No mitigation recommended.	-32.455503	23.563173	IIIC
351	Portion 2 of Farm Oorlogspoort 85. Surface colluvial to eluvial gravels mantling eastern footslopes of Oorlogspoortberge with sparse blocks of poorly-preserved silicified wood downwasted from channel sandstone package upslope to the west. Proposed Field Rating IIIC. No mitigation recommended.	-32.390249	23.507883	IIIC
353	Portion 2 of Farm Oorlogspoort 85. Mudclast breccias at base of thin package of yellowish-brown channel wackes (uppermost Abrahamskraal Fm or basal Poortjie Member, Teekloof Fm) containing abundant rusty-brown moulds of reworked woody plant axes. Proposed Field Rating IIIC. No mitigation recommended.	-32.390722	23.50385	IIIC
354	Portion 2 of Farm Oorlogspoort 85. Surface colluvial to eluvial gravels mantling eastern footslopes of Oorlogspoortberge with sparse blocks of poorly-preserved silicified wood downwasted from channel sandstone package upslope to the west. Proposed Field Rating IIIC. No mitigation recommended.	-32.392891	23.504234	IIIC
355	Portion 2 of Farm Oorlogspoort 85. Locally abundant blocks of poorly-preserved silicified wood weathered-out from channel sandstone package just above. Proposed Field Rating IIIC. No mitigation recommended.	-32.392969	23.504141	IIIC

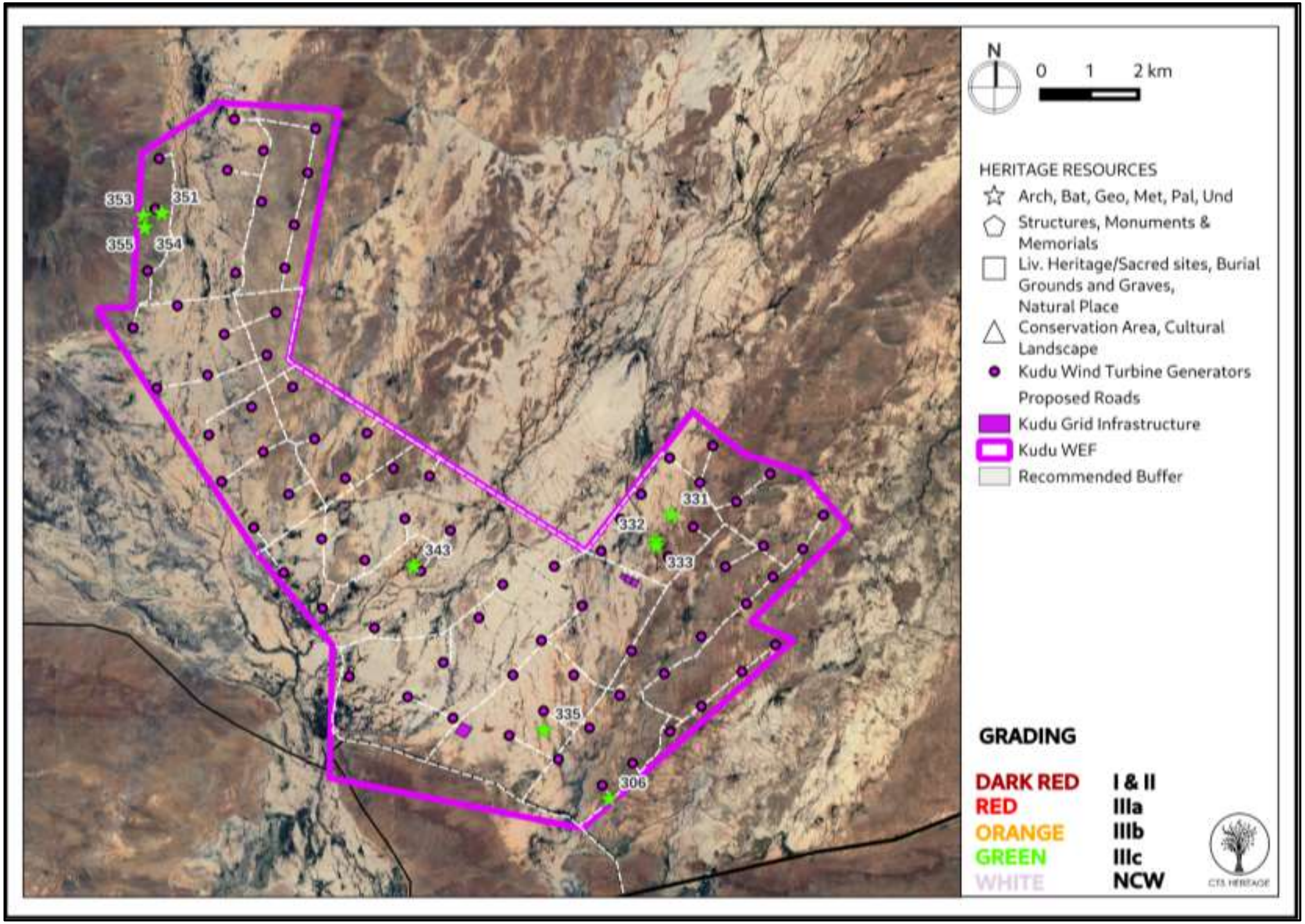

Figure 8.18: Locations of Paleontological resources identified within and surrounding the FE Kudu Wind Energy Facility development area

8.6. Ambient sound levels and Noise Sensitive Developments

Most dwellings featuring in the vicinity of FE Kudu Wind Energy Facility are scattered in a heterogeneous fashion, typical of a rural farming area. Most of the surrounding areas can be considered wilderness with tourism (and game farming) as well as agricultural activities (sheep farming). None of these activities will influence the ambient sound levels. Ambient sound levels are generally less during the colder months (due to less faunal communication) and higher during the warmer months do, increase as wind speeds increase.

Residential areas and potential noise-sensitive developments/receptors/communities (NSR) were identified using aerial images as well as a physical site visit, with only one location identified that is used on a temporary basis for residential purposes within the project site (refer to **Figure 8.19**).

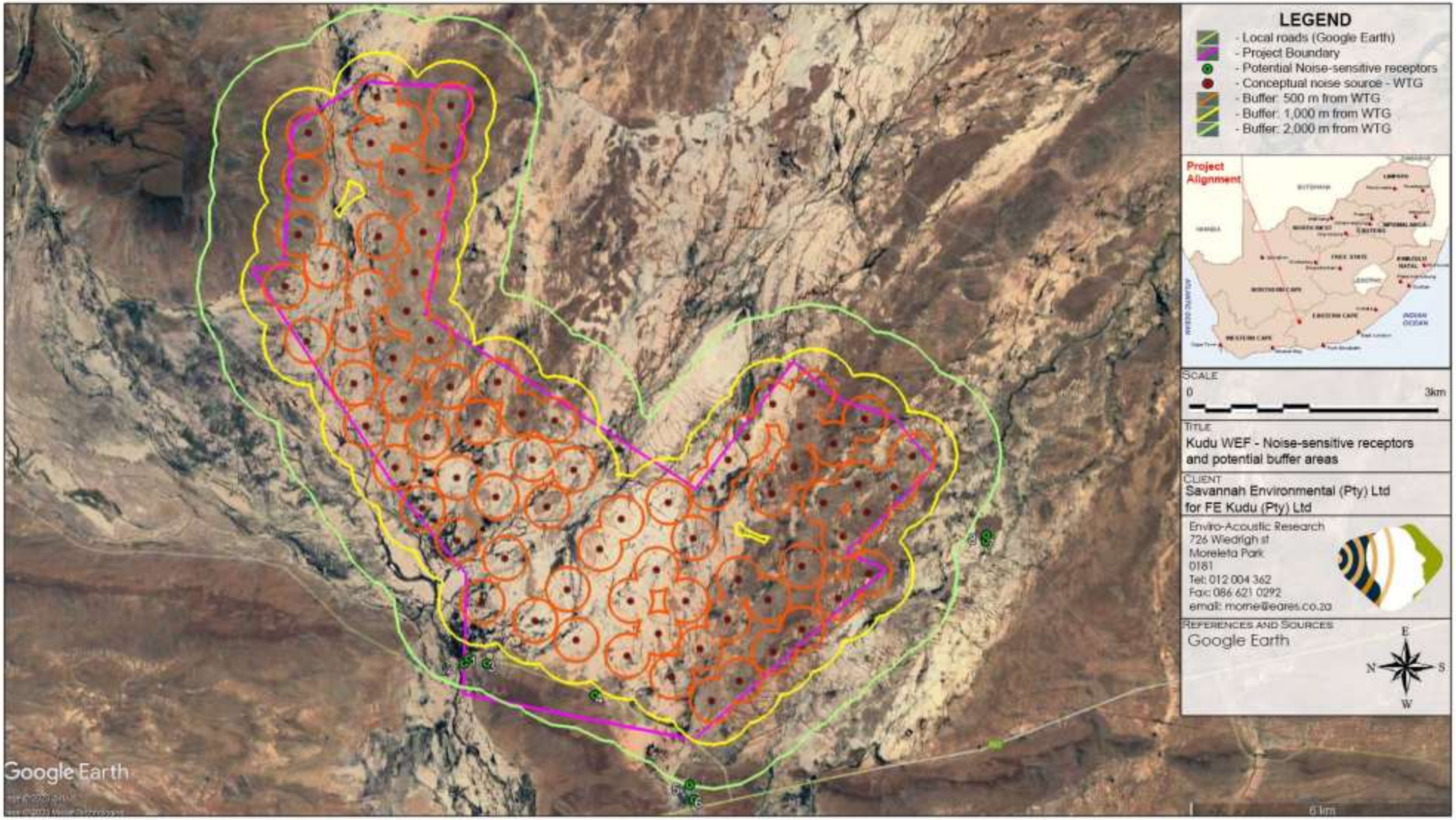

Figure 8.19: Location of noise-sensitive receptors located within the surrounding area and the project site of FE Kudu Wind Energy Facility

8.7. Visual Quality

Viewers located within the area include the following homesteads and roads:

Less than 5km from the wind turbines:

- Kariegasfontein (in process Kariega Wind Facility Cluster)[1]
- Pretoriuskuil (in process Kariega Wind Facility Cluster)
- Rooidraai- Karoo Secret Farm Stay (FE Kudu Wind Energy Facility)
- Benekraal (in process Kariega Wind Facility Cluster)
- Observers travelling along the R61 and secondary road located to the south and west of the proposed wind energy facility respectively (i.e. DR02310)

Located within a 5 - 10km radius:

- Kiewietskuil
- Lower Kiewietskuil
- Upper Kiewietskuil
- Maraiskraal (authorised Eskom Aberdeen Wind Farm)
- Vaalvlei
- Klipdrift
- Mimosadale (in process Kariega Wind Facility Cluster)
- Oorlogspoort
- Waaikraal (in process Kariega Wind Facility Cluster)
- Tafelkop (in process Kariega Wind Facility Cluster)
- Kunna (in process Kariega Wind Facility Cluster)
- Sarelsrivier (in process Kariega Wind Facility Cluster)
- Observers travelling along the R61 and secondary road located to the south west and west of the proposed wind energy facility respectively (i.e. DR02310)

Located within a 10 - 20km radius:

Residents of/visitors to:

- Graafwater
- Bakoond
- Gannaleegte
- Springbokvlakte
- Klipkoppies
- Teerputs
- Rooidam
- Kraanvoelkuil (Aberdeen 1, 2 & 3 Wind Farms)
- Vlakfontein
- Omdraai
- Windermere (Aberdeen 1, 2 & 3 Wind Farms)
- Perseverance (Aberdeen 1, 2 & 3 Wind Farms)
- De Kroon (authorised Eskom Aberdeen Wind Farm)
- Klipstawel (in process Kariega Wind Facility Cluster)
- Dowefontein
- The Ranges
- Ouplaas

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[1] Facilities listed in parenthesis indicate the location of this specific sensitive receptors on other proposed renewable energy facility development sites within the study area. This includes facilities that are already authorized and ones where authorization is still in process.

- Kalkgat (in process Kariega Wind Facility Cluster)
- Vriespoort (2)
- Windmere
- Glencliff
- Sarelsrivier (in process Kariega Wind Facility Cluster)
- Kykrug
- Harmonie
- Langrug
- Goedehoop
- Stellenboschvlei
- Bokvlei
- Karreepoort
- De Puts
- Observers travelling along the R61 and secondary road located to the south west and west of the proposed wind energy facility respectively (i.e., DR02310)

Located beyond 20km:

- Wapadsleegte
- Jongetjiesleegte
- New Farm
- Blouboskuil
- Benekuil
- Sypher
- Rooidam
- Steenbokvlakte
- Voorspoed
- Graafwater
- Van der Bergskuil
- Eureka
- Bakoond
- Gannaleegte
- Springbokvlakte Noord
- Klipkoppies
- Teerputs
- Rooidam
- Kaapse Poortjie
- Vlakfontein
- Omdraai
- Nuwerus
- Kiewietskuil
- Lower Kiewietskuil
- Fairwell
- Upper Kiewietskuil
- Belmont
- Fairview
- Maxton
- Fairview

- Vaalvlei
- Langrug
- Goedehoop
- Stellenboschvlei
- Winterberg
- Bokvlei
- De Panne
- De Puts
- Paardedam
- Veedam
- Middelplaats
- Barendskuil
- Observers travelling along portions of the N9 national road
- Aberdeen Nature Reserve
- Residents of the outskirts of the town of Aberdeen

It must be noted that the sensitive visual receptors of farm and homesteads listed above, as indicated in parentheses, who could be affected visually by the proposed FE Kudu Wind Energy Facility are in fact located on properties included in either the adjacent and authorised Eskom Aberdeen Wind Farm, or Aberdeen 1, 2 and 3 Wind Farms; or the in process Kariega Wind Facility Cluster or Tango Wind Energy facility. This is particularly relevant to sensitive visual receptors located within 20km of the proposed site. It is therefore assumed that these sensitive receptors are in fact aware of, and to a certain extent accepting, of the visual intrusion associated with wind energy facilities in general as a result of their involvement.

It is envisaged that the structures, where visible from short to medium distances (e.g. less than 10km), may constitute a high visual prominence, potentially resulting in moderate to high visual impacts.

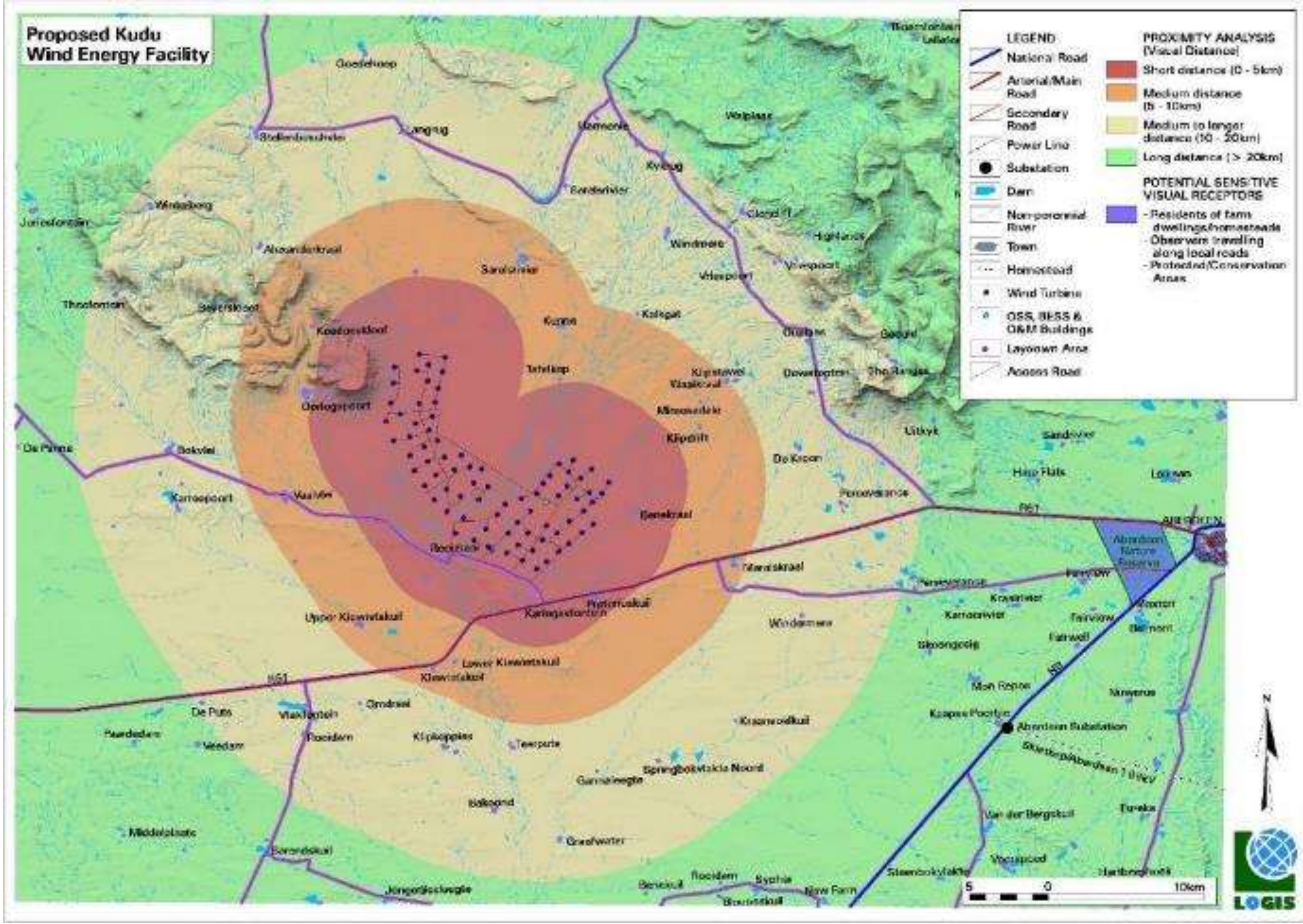

Figure 8.20: Proximity analysis and potential sensitive visual receptors that may be affected by the development of the wind farm

8.8 Traffic Conditions

» The project site is located north of the R61 and north east of the DR02310 turning off from the R61. The road classification of the surrounding road network as per the Road Infrastructure Strategic Framework for South Africa (RISFSA).

»

» The R61 can be classified as a Rural Class 2 route, which belongs to the major arterial roads that typically carry inter-regional traffic between:
  » Smaller cities and medium to large towns (population typically greater than about 25 000);
  » Smaller border posts;
  » Class 1 and other Class 2 routes;
  » Important regions, transport nodes and commercial areas that generate large volumes of freight and other traffic such as seaports and international airports.
  » Smaller centres than the above when travel distances are relatively long (longer than 200 km).

»

» Three possible access points are available for the FE Kudu Wind Energy Facility project (refer to **Figure 8.21**).

Figure 8.21: Map and photo of the DR02310 at intersection with R61 providing direct access to the project site via an existing farm track.

8.8.1. Access 1

Access 1 is located at an existing farm track (see **Figure 8.22**). The access will need to be upgraded to accommodate turning movements of the largest construction vehicle when entering and exiting the access safely.

Figure 8.22: Aerial View of Access 1 location

Required minimum shoulder sight distances are acceptable in both directions accessing the DR02310 from the access (see **Figure 8.23**). However, any trees and shrubbery, obstructing sight lines, will need to be cut back and maintained.

8.8.2. Access 2

This access point is recommended at a location along the straight section of the DR02310 where an existing farm track is visible (see **Figure 8.24**). Accessing the site will be easy for construction vehicles as the terrain in the vicinity of this access is relatively flat.

The access point will need to be upgraded to accommodate all construction vehicles.

Figure 8.23: Shoulder Sight Distances on DR02310 from Access 1

Figure 8.24: Aerial View of Access 2 location

The required minimum shoulder sight distances are met in both directions accessing the DR02310 from the access road (see **Figure 8.25**).

Figure 8.25: Shoulder Sight Distances on DR02310 from Access 2

8.8.3. Access 3

This access road is an existing farm road onto the project site (see **Figure 8.26**), which may need to be upgraded to cater for large construction vehicles. The elevation profile in **Figure 8.27** indicates suitable gradients for heavy loads vehicles to navigate.

The required minimum shoulder sight distances are met in both directions accessing the DR02310 from the access road.

Figure 8.26: Aerial view of Access 3 location

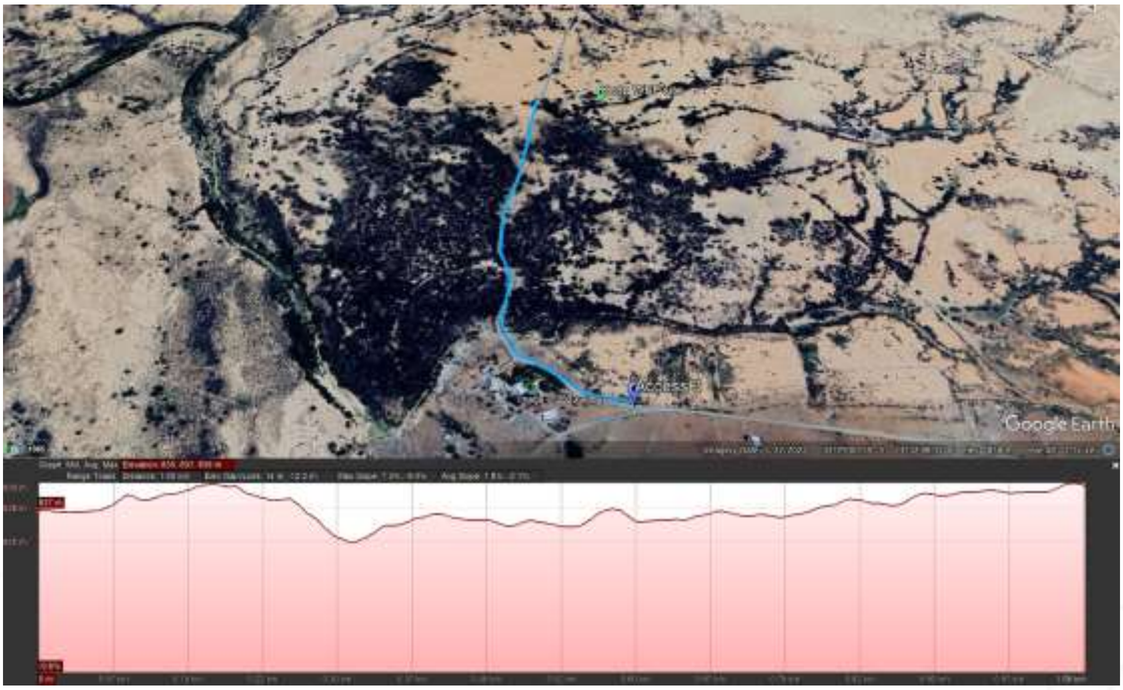

Figure 8.27: Elevation profile for Access Road 3

8.9 Socio-Economic Context

The study area is located in the northern portion of the Central Karoo plain, near the transition into the Great Escarpment. Kamdebooberg is located just to the east of the site, across the Murraysburg gravel road.

The FE Kudu Wind Energy Facility project site is located approximately 38 km (linear) west of the small town of Aberdeen. Graaff-Reinet, located approximately 85 km north-east of the site, is the largest town in the Beyers Naudé LM, and also serves as its administrative seat and regional services centre. Other settlements in the LM include Jansenville, Steylerville, Willowmore and Klipplaat. The large town of Beaufort West (Western Cape Province) and the N1 corridor are located approximately 83 km west of the site.

The Sarah Baartman District Municipality is the third largest economy in the Eastern Cape Province, and the largest economy outside the largely "urban economies" of the Nelson Mandela Bay Municipality and Buffalo City Municipality. The predominant sectors in terms the District's economy are agriculture and tourism. The three biggest sectors in 2016 were Trade (21%), Community Services (19%) and Agriculture (16%).

Dr Beyer Naude Local Municipality has a population of approximately 82 197 people comprising of approximately 20 749 households. The Dr Beyers Naude Local Municipality accounts for 17.5% of the population within the Sarah Baartman District Municipality. In the Dr Beyer Naude Local Municipality 5.4% of the population over the age of 20 has had no form of schooling.

A large portion of the population in the Sarah Baartman District Municipality are unemployed (30% - 33%). In comparison the Dr Beyer Naude Local Municipality similarly has a high unemployment rate (26% - 33%). An estimated 27% of the Ward 1 population is unemployed, with a larger amount employed (35%) and 37% not economically active.

Within Ward 1 in which the project site is based, 14.7% of the population over the age of 20 had no education. Around 26.6% of the population over the age of 20 in Dr Beyer Naude Local Municipality have matric. Within Ward 1, 11.6% had matric, and 3% has an undergraduate qualification. The low education levels in Ward 1 are linked to the rural nature of the area and create challenges in terms of meeting local employment targets during the construction phase. The ward has an unemployment rate of 27% with unemployment a major challenge identified for the area.

The study area economy is strongly anchored in agriculture, with extensive small stock grazing the predominant land use. Cropping activities are limited, and largely confined to the banks of ephemeral watercourses. Relatively few employment opportunities are associated with extensive stock farming. The study area settlement pattern is sparse. This is linked to the nature of extensive stock farming. Farming units are typically large and consist of a number of properties. In many instances, inhabitation is limited to one or two properties, with the balance serving only as stock posts.

Little dedicated tourism is associated with the study area. Tourist accommodation in and around Aberdeen is mainly linked to passing traffic. Only one proclaimed nature reserve is located in the broader study area, namely the small Fonteinbos/ Aberdeen Nature Reserve located west of Aberdeen, approximately 30 km to the east of the FE Kudu development area.

The only tourism operation in any significant proximity to proposed activities and infrastructure is Karoo Secret on the subject property itself. The context is a working Karoo stock farm, and the facilities are operated by the owner as a secondary enterprise. The operation provides accommodation (total capacity of 13) in two facilities - Karoo Secret and Lark Cottage. Both are located along the Nelspoort gravel road to the east of the Rooidraai farmstead complex on Farm 85/2. The operation caters to overnight visitors (travellers) as well as destination visitors associated with the Karoo farm stay experience, and birding. More recently, environmental consultants working on the various projects in the Aberdeen area have been contributing substantially to occupation. Both facilities are located <40m of the affected portion of the Nelspoort Rd, and exposed to potential dust, noise, and traffic impacts during the construction phase. The laydown area is proposed off the Nelspoort road portion between the two facilities, approximately 850m north-west of Lark Cottage, i.e., necessitating traffic past Lark Cottage. The nearest turbines would be located 1.1km and 1.4km north of Lark Cottage and Karoo Secret, respectively. The substation hub is not located in significant proximity (>5 km) to either receptor.

Site access is proposed off the R61 via the Nelspoort public gravel road. The relevant road portion traverses only two properties, Portion 2 of Farm Oorlogspoort 89 and Remaining Extent of Pretorius Kuil 89 (on which the R61/ Nelspoort road intersection is located). Apart from the residential and tourism receptors on the subject property, no social receptors are in significant proximity to the relevant road portion. Only five turbines would necessitate traffic via the Rooidraai farmstead complex on Portion 2 of Farm 85 and Karoo Secret. The access road to these 5 turbines passes approximately 60m to the east of the farmstead, potentially exposing it to dust and noise impacts. These receptors would not be directly affected by traffic associated with the laydown are or substation/ BESS/ O&M hub.

The Remaining Extent of Farm Oorlogspoort 89 is itself the subject of other wind farm project applications. No major energy generation or transmission infrastructure is currently constructed within the immediate study area. The site property borders onto the concurrently proposed Kariega wind farm cluster to the east. The Kariega suite site properties in turn border onto several further authorised wind farm projects to the east and south, including Eskom’s approved Aberdeen Wind Farm located 3.2 km east of the FE Kudu site. Turbines are therefore likely to become part of the study area landscape and sense of place before the end of the decade, if not sooner.

CHAPTER 9: SENSITIVITY ANALYSIS

This chapter serves to provide the reader with an understanding of the sensitivities associated with the environmental features, areas and habitats as identified within the affected environment (Chapter 8) within which the FE Kudu Wind Energy Facility is proposed to be developed. With an understanding of the sensitivities applied to the environmental characteristics present, the reader can place value on the features present within the area that may be impacted by the proposed development. It must be noted that this analysis is based on quantitative information and specialist field studies with on-the-ground findings. Consideration of social aspects (including viewsheds) and traffic are not included here as these aspects do not directly influence the micro-siting of infrastructure within the project site.

Where specific features or areas of sensitivity have been identified which need to be considered for the placement of infrastructure, these features are analysed and detailed in the sections which follow. The impact assessment provided in Chapter 10 is based on the sensitivity analysis and the outcomes detailed in this chapter. The sensitivity analysis focusses on the development area and the development footprint of the FE Kudu Wind Energy Facility and provides input considered as part of the mitigation hierarchy applied to the project, with the main objective being avoidance of sensitive features and areas within the affected environment.

The development footprint assessed within this BA Report was designed by the project developer in order to respond to and avoid the sensitive environmental and social features located within the development area. Based on sensitivities identified by the specialists during the impact assessments, the project developer designed an adjusted final layout in which turbine N20 was moved outside of a turbine exclusion zone as identified by the avifauna specialist (refer to Chapter 12). This approach ensured the application of the mitigation hierarchy (i.e., avoid, minimise, mitigate and offset).

9.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the BA report includes the following information required in terms of the EIA Regulations, 2014 - Appendix 1: Content of basic assessment reports:

Requirement	Relevant Section
3(l)(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers	The chapter provides an overall understanding of the areas of sensitivity of the project site, and specifically the development area (including a detailed sensitivity map) against the development footprint and informed the necessary avoidance measures required through the micro-siting/placement of infrastructure.

9.2. Terrestrial Ecological Features and Associated Sensitivity

Various ecological features and habitats are present within the development area within which the development footprint has been sited. These features, their location within the development area and the associated ecological sensitivity are described below. An ecological sensitivity map has been included in **Figure 9.1**.

An area and feature mapped as high ecological sensitivity identified within the development area, which consist primarily of water features and associated thicket vegetation and include:

- » Major riverine watercourses (and their buffers) with riparian thicket vegetation. These areas are noted to be important ecologically within an arid environment. These areas must be avoided by turbine and other associated infrastructure placement, other than strategic and necessary access road crossings.
- »

Where linear features of high sensitivity (for example major drainage lines) need to be traversed, existing roads or disturbance footprints should be used as far as possible. The recommended approach will be to avoid higher sensitivity areas as far as is technically possible and prioritise medium and lower sensitivity areas for development.

Areas and features of medium ecological sensitivity are distributed across the development area, and include general natural or near natural Karoid and alluvial vegetation where the National conservation status is not elevated.

Areas and features of low ecological sensitivity are located within the project site which includes all transformed areas including old lands.

The northern and central portions of the site intersect with ECBCP (2019) designated Ecological Support Areas (ESA 1) and a small area of Critical Biodiversity Area 2 (CBA 2) is demarcated in the south western corner of the property along the southern boundary (refer to **Figure 9.2)**. In terms of Regional Planning guidelines, a footprint would be feasible that would minimise loss of CBA and disruption to corridors in ESA areas. The development footprint is acceptable as it largely avoids CBA area as a result of preliminary sensitivity mapping and layout revisions. This is achieved in the optimised facility layout. The residual impact as a result of the optimised facility layout will be negligible, as only a small section of road (280m) falls within designated CBA area. The impact of the development on the CBA2 is therefore considered local in nature and of an acceptable magnitude. Conservation targets for the vegetation units will not be affected due to the extensive regional coverage and small development footprint of the FE Kudu wind energy facility. Biodiversity Offsets are not triggered by the proposed activity based on the most recent Biodiversity Offset Guidelines, as the residual impact after mitigation is assessed to be low.

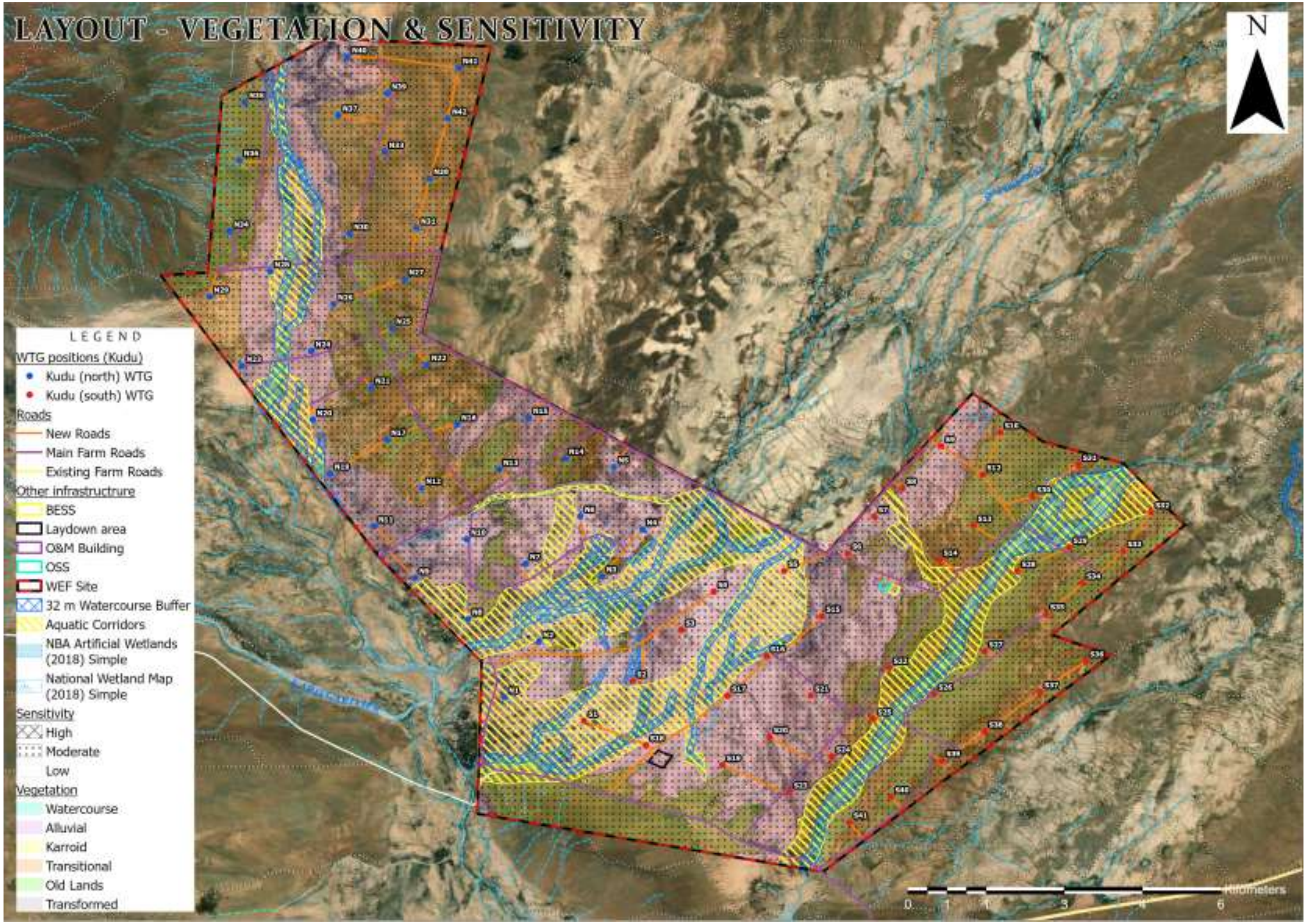

Figure 9.1: Ecological sensitivity map illustrating the sensitive ecological areas and features present within the development area and the ecological sensitivity ratings associated with the identified features.

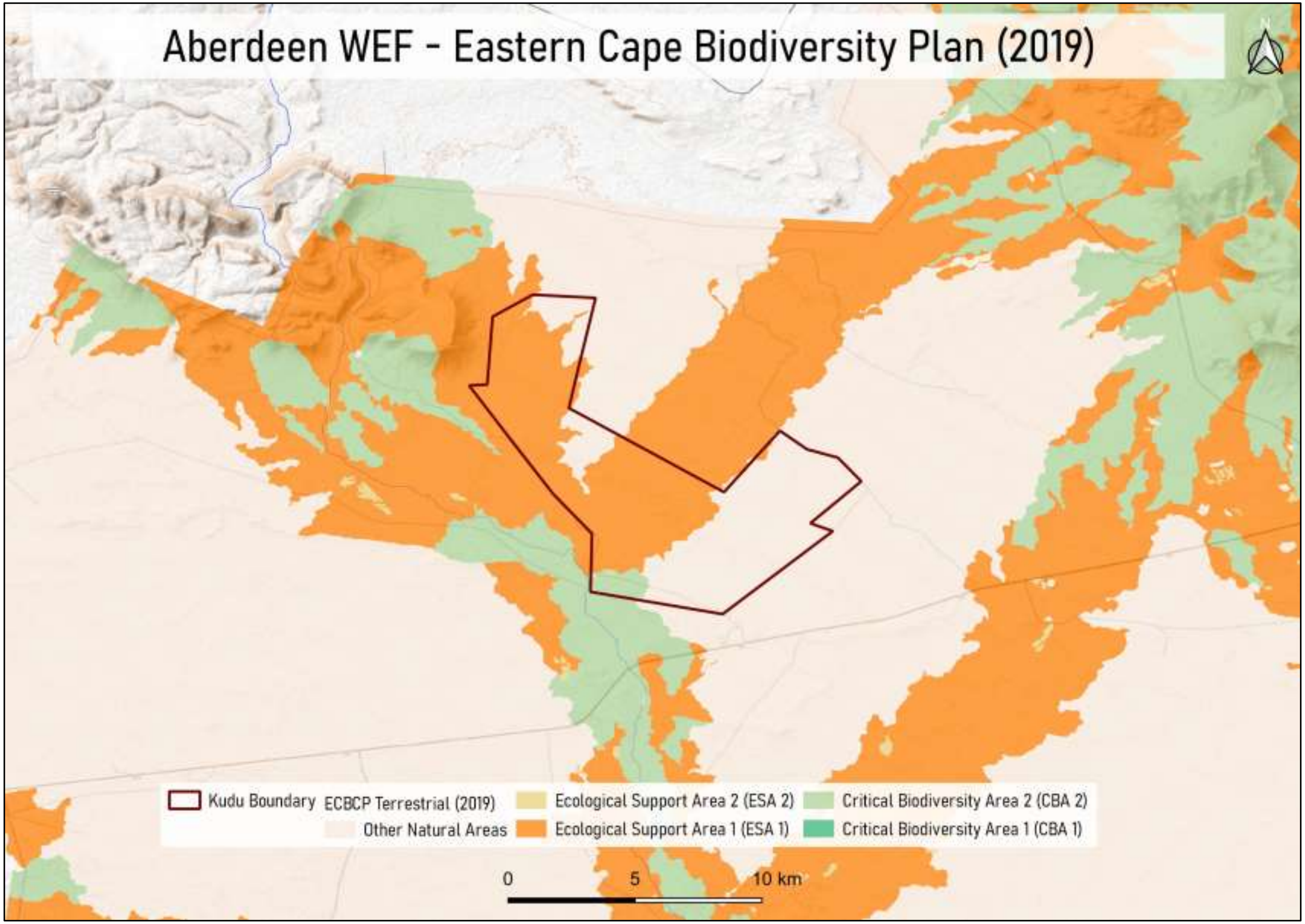

Figure 9.2: Extract of the Eastern Cape CBA map for the FE Kudu Wind Energy Facility and surrounding areas

9.2.1 Sensitivity Analysis against the development footprint

A detailed assessment of the development footprint showed that approximately 380m of access road to turbine S18 will pass through designated CBA2 area, the impact thereof being negligible in terms of loss to a vegetation unit that has low transformation levels as well as any disruptions to ecological processes. This alignment is associated with an existing road alignment. Four turbines (S1, S5, N1 and N8) are within the aquatic corridors, but these are unlikely to significantly compromise any ecological functioning since the remainder of the corridors are not affected and are therefore assessed as being acceptable. No turbines are situated within the watercourse buffers and the mitigation strategy has eliminated several crossings from watercourses and buffers. Only necessary access road crossings, mostly along existing farm tracks remain, which are deemed acceptable.

The process undertaken for the identification and delineation of the aquatic corridors are discussed in Section 9.3.1 below.

The development of the FE Kudu Wind Energy Facility would avoid significant impact on the major ecological features of the site. As a result, there are no fatal flaws. Only an existing road alignment traverses the CBA2. Given the avoidance of sensitive features at the site by the facility layout no high impacts are likely to occur as a result of the development.

9.3. Aquatics and Associated Sensitivity

All freshwater resource features are ephemeral. The Tulpleegte and Kariega rivers are the primary drainage features within the development area. The FE Kudu Wind Energy Facility project site is dominated by two types of natural aquatic features, some artificial features, and a small number of wetland features. The aquatic areas and drainage systems occur in the development area and have been buffered by 32m:

- Ephemeral main watercourse - alluvial systems with or without riparian vegetation. Numerous drainage features are present comprising of an extensive braided watercourse network, only active during peak flood events with no permanent aquatic habitat presenting ephemeral conditions. Several watercourses presented surface water at the time of the survey, however not all of them were suitable for the assessment of aquatic biota. The sampled watercourses were tributaries of the Tulpleegte and Kariega rivers.
- Ephemeral watercourses in arid environments – Present as vernal pools that intermittently hold water for short periods (from a few days to months) following sufficient rainfall, whereby the standing surface water may support vernal biota.
- Artificial dams; and
- Wetland features.

9.3.1 Sensitivity Analysis against the development footprint

The facility layout has implemented the avoidance strategy and positioned majority of the turbine platforms and road networks outside the buffer areas. The facility layout indicates limited impacts on the aquatic environment as the micro-siting ensured that the wind turbine positions were all located outside of the delineated aquatic features and recommended buffer areas identified as no-go areas or high sensitivity areas. Turbines S1, S5, N1 & N8 are located within the aquatic corridors which is medium sensitivity and within acceptable limits.

The aquatic corridors were mapped to incorporate the well-defined watercourses. Numerous smaller drainage lines and channels have not been delineated, due to the large number present within the very flat alluvial landscape. In terms of the freshwater resources and processes within the PAOI, the minor watercourses and drainage lines are not a significant priority, and would be deemed an acceptable loss, provided measures are implemented to accommodate flows as mentioned above. This could include box (or other non-flow concentrating type) culverts under raised access roads to allow lateral movement of water and to minimise localised flooding and/or drying out along the road network.

There are however some watercourse road crossings, and these are deemed acceptable and appropriately placed. New road infrastructure is of moderate sensitivity to aquatic features and considered acceptable. Existing road crossings are considered to have a low sensitivity to all delineated watercourse and acceptable to be used/upgraded.

Several artificial and natural vernal pools are located in close proximity to some of the roads. Road infrastructure (specifically the roads between turbines N23 and N24, and turbines S37 and S38) should be re-aligned to avoid the 32m vernal pool buffers while catering for natural surface runoff (box culverts) to **continue** to feed into these aquatic features to sustain the functioning of these systems and their likely vernal biota. Ensuring that aquatic features and buffers are intact increases the resilience of a watercourse to future disturbances. These buffers would ensure adequate ecological integrity maintenance from the adjacent proposed wind energy facilities.

The development footprint is considered as acceptable in terms of aquatic resources.

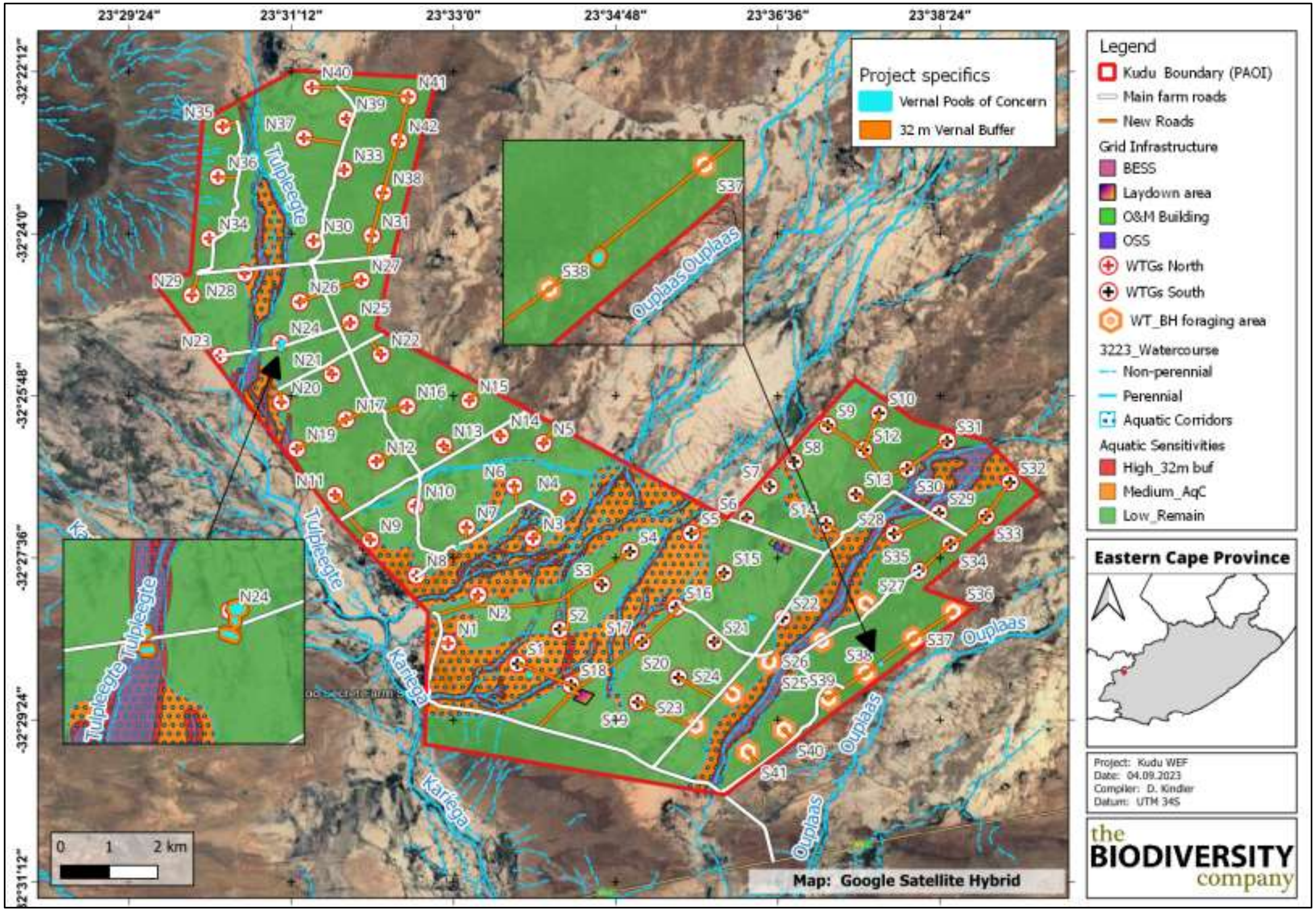

Figure 9.3: The delineated watercourses inclusive of the respective buffers together the applied sensitivity rating applied to wind turbine towers, buildings, substation and BESS

9.4. Avifauna and Associated Sensitivity

The wind turbines of the FE Kudu Wind Energy Facility will pose a potential collision risk to several priority species that could occur regularly at the site. Species exposed to this risk are large terrestrial species i.e., mostly bustards such as Karoo Korhaan, Southern Black Korhaan, Ludwig's Bustard, Kori Bustard, and Blue Crane, although bustards and cranes generally seem to be not as vulnerable to turbine collisions as was originally anticipated (Ralston-Paton & Camagu 2019). Soaring priority species, i.e., species such as Martial Eagle, Pale Chanting Goshawk, Lanner Falcon, Booted Eagle, Verreaux's Eagle, Greater Kestrel, and Lesser Kestrel are most at risk of all the priority species that are likely to occur at the project site. In summary, the following priority species could be at risk of collisions with the turbines: African Harrier-Hawk, Amur Falcon, Black Harrier, Black Stork, Black-winged Kite, Blue Crane, Booted Eagle, Brown Snake Eagle, Burchell's Courser, Common Buzzard, Double-banded Courser, Greater Kestrel, Grey-winged Francolin, Jackal Buzzard, Karoo Korhaan, Kori Bustard, Lanner Falcon, Lesser Kestrel, Ludwig's Bustard, Martial Eagle, Pale Chanting Goshawk, Sclater's Lark, Secretarybird, Southern Black Korhaan, Spotted Eagle-Owl, Verreaux's Eagle, and White Stork.

The following high sensitivities were identified on site (refer to **Figure 9.5**):
- A 200m turbine (including rotor-swept area) exclusion zone should be implemented around boreholes and dams,
- A 100m turbine (including rotor-swept area) exclusion zone on either side of drainage lines. The exclusion zone should also exclude the rotor swept area of the turbines.

The high avifauna sensitivity areas represent turbine exclusion zones.

9.4.1 Sensitivity Analysis against the development footprint

The current 80-turbine layout assessed in this report avoids all the recommended avifaunal turbine exclusion zones (including rotor-swept areas). It is the specialist opinion that the current facility layout is acceptable. Turbine N20 has been micro-sited to avoid the recommended avifaunal sensitivity buffer. The development is supported, provided the mitigation measures are strictly applied.

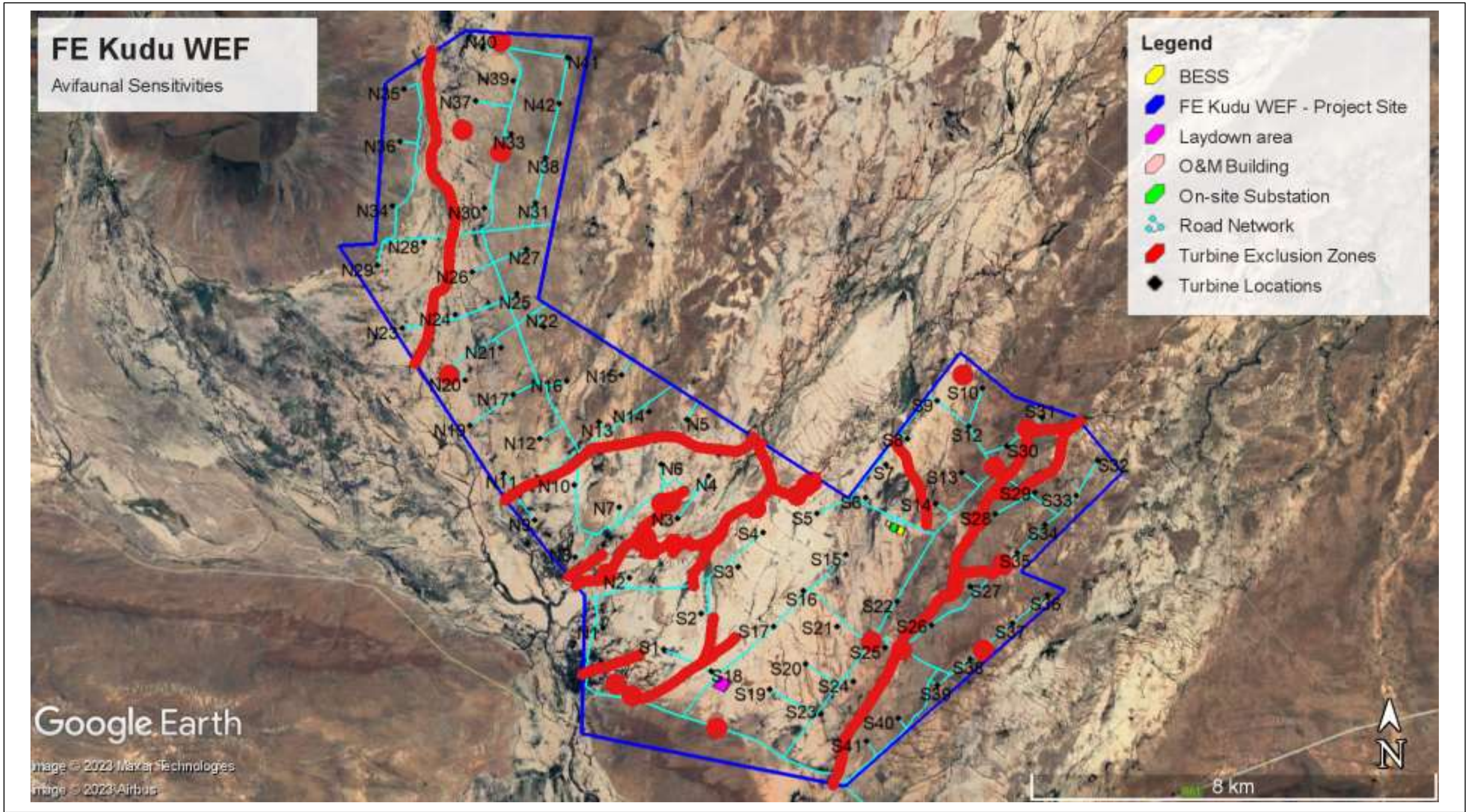

Figure 9.5: Areas of avifaunal sensitivity identified within the FE Kudu Wind Energy Facility project site overlain with the development layout

9.5. Bats and Associated Sensitivity

Key habitat features have been identified for bats within the development area. These habitat features present specific uses and opportunities for bats including roosts, foraging resources and commuting resources. Resources within the development area that are important for foraging bats include:

» Natural and artificial permanent, seasonal, and ephemeral surface water resources,
» Mountainous areas in the north east of the project site,
» Existing building infrastructures, and
» Riparian and other woody vegetation and tree clumps.

Buffers have been placed around important habitat for bats and include (**Figure 9.6**):

» High sensitivity features and areas (inclusive of full blade length):
  - Important habitats such as perennial watercourses, rivers, rocky outcrops, buildings, trees, water features, wetlands, cultivated lands, and orchards/vineyards have been buffered by 200m.
  - Smaller non-perennial drainage lines have been buffered by 100m.

The high bat sensitivity areas represent turbine exclusion zones (including the full blade length) to minimise potential impacts on the local bat population.

9.5.1 Sensitivity Analysis against the development footprint

Considering the bat sensitivity, there is no encroachment into any high sensitivity (exclusion or no-go) areas by any turbines, or the battery energy storage system, operation and maintenance buildings, or laydown areas.

The development footprint is considered as acceptable in terms of bat sensitivity.

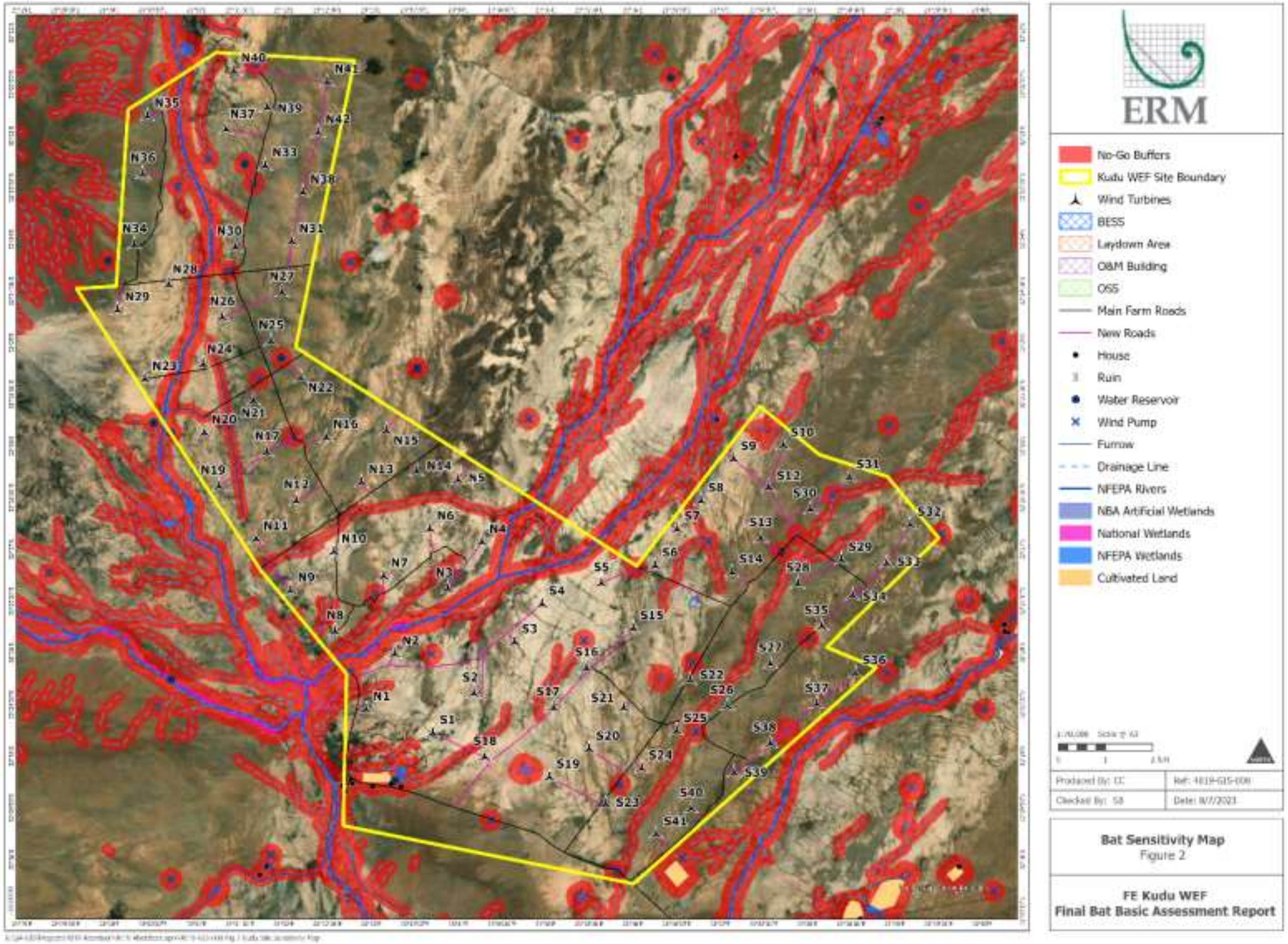

Figure 9.6: Bat sensitivity map showing all turbine exclusion buffers which needs to be considered for the placement of wind turbines

9.6. Soils and Agriculture and Associated Sensitivity

The project development area includes areas of medium and low sensitivity (refer to **Figure 9.7**). The sensitivity rating considers the land capability and agricultural potential as well as the soil erodibility. The majority of the facility infrastructure components are located well within areas with Medium Sensitivity. Medium agricultural sensitivity is mainly due to the high land capability of Low-Moderate (Class 07) areas and the depth of the soil which ranged between 0.6 and 1.5m. Low agricultural sensitivity is due to the Low (Class 05) land capability and the absence of any field crop boundaries. Areas shown as having field crops did not show any signs of cultivation during the site visit. The Low Sensitivity areas have shallow effective soil depth, and the arid climate reduces the land capability of the area significantly.

The facility layout is considered to be acceptable in terms of soils and agricultural resources.

9.6.1 Sensitivity Analysis against the development footprint

For the placement of the wind turbines, it is confirmed that the majority of the turbines are located within the Medium sensitivity areas, with 29 turbines located within the low sensitivity areas. Although most of the area is allocated a Medium sensitivity, the area is only used for livestock grazing as was observed during the site visit. In addition, no field crops were present within the development area. The turbine positions are considered to be acceptable with no adjustments to the development footprint required.

The facility substation, BESS, O&M hub footprints are within areas of medium sensitivity. The placement of the infrastructure is considered to be acceptable.

Several sections of the access roads (and cable routes) traverse through moderate sensitivity soil resources. The placement of the infrastructure is considered to be acceptable.

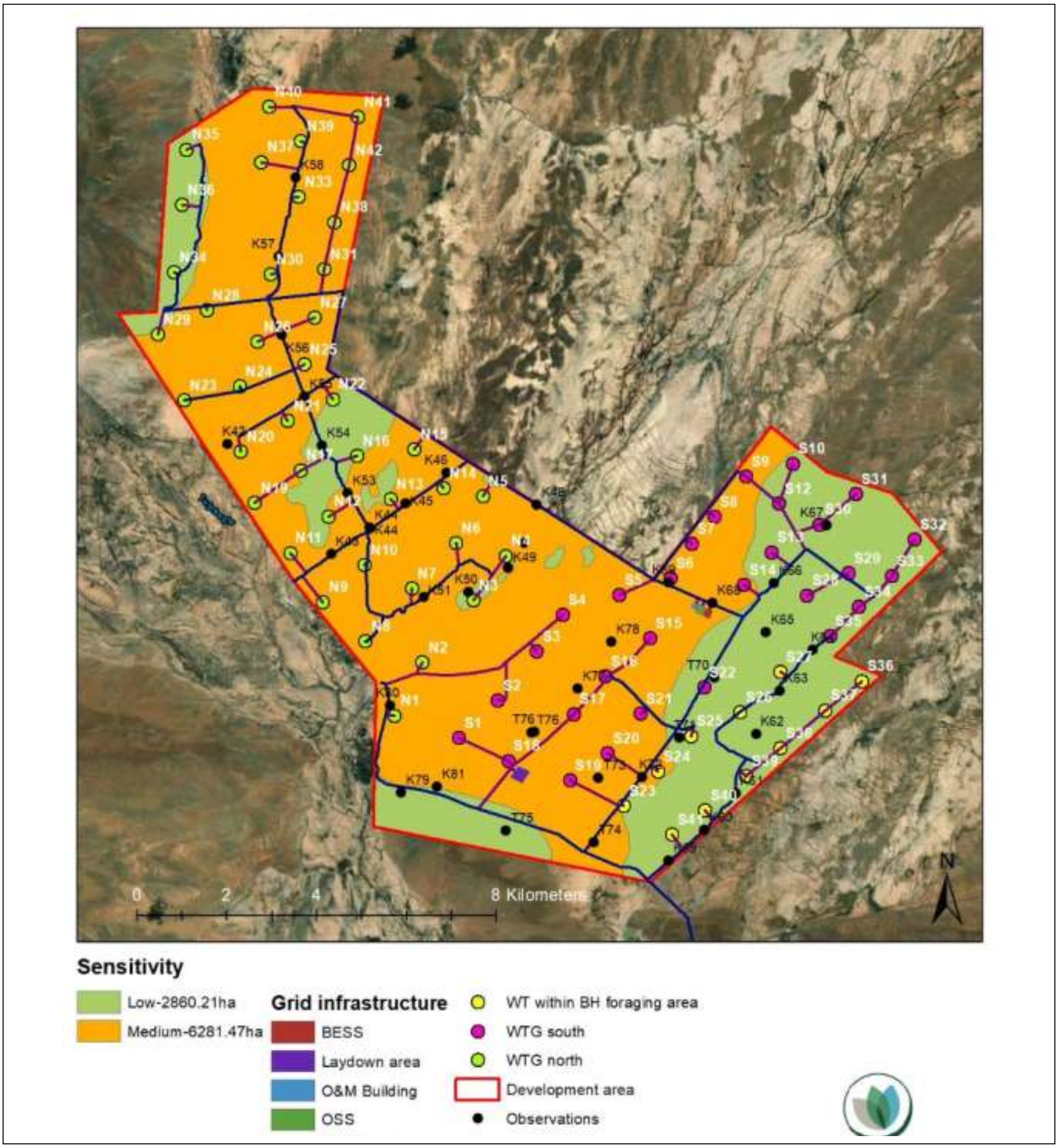

Figure 9.7: Soils and agricultural sensitive areas associated with the FE Kudu Wind Energy Facility

9.7. Heritage Resources and Associated Sensitivity

Archaeology

The majority of the lithic material identified is of low significance (not conservation-worthy), and even though the resources may be destroyed during construction. The findings of the completed assessments conclude that, despite the high number of observations of artefacts, these resources are common and representative of similar scatters across widespread areas of the Karoo. Despite the very high numbers of observations made, the archaeological material is ubiquitous across the entire area and in general, the results of this assessment indicate that the archaeological sensitivity of the development area is low. All of the resources identified by Booth and Sanker (2013) as well as CTS Heritage (2022, 2023) have been mapped relative to the proposed development.

These resources are common and representative of similar scatters across widespread areas of the Karoo. Despite the very high numbers of observations made, the archaeological material is ubiquitous across the entire area and in general, the results of this assessment indicate that the archaeological sensitivity of the development area is low.

Cultural

The development site lies between the R61 and N9, both of which are considered to have scenic qualities with dramatic views towards the Camdeboo mountain backdrop to the north. A development setback of by at least 1km on either side of the R61 and N9 has been recommended by the specialist. The Wolwekop peak, situated just north of the R61 and is considered a distinctive landmark feature. It is recommended that the nearest turbine be located more than 2.5km from this peak.

As the site possesses a number of landscape elements contributing to a composite cultural landscape including topographical features, open plains, water features, historic scenic routes and farmsteads, the area proposed for development is considered to be of very high cultural sensitivity.

Palaeontology

At a regional scale, the project is located to the south of the Great Escarpment, to the west of the distinctive Camdeboo Plains and at considerable distance from the cluster of Nature Reserves around Graaff Reinet.

At the local scale, the project is generally located away from major scenic topographical features and beyond 16km from the town of Aberdeen and beyond 10km from the Fonteinbos Nature Reserve. At a local and site scales, the following sensitive heritage receptors have been identified:

- Historical farmsteads (Grade IIIB and IIIC)
- The scenic qualities of the R61
- The Murraysburg Road and east-west historical access route
- Wolwekop as a distinctive topographical feature adjacent to the R61

The current layout considered, observes these restrictions.

No structures or cultural landscape elements of significance are located within the area proposed for development.

In terms of the heritage resources identified in the heritage field assessment, Sites 001 and 062 are graded IIIC. Sites 001 and 062 are located well away from the proposed development footprint and no impact is anticipated.

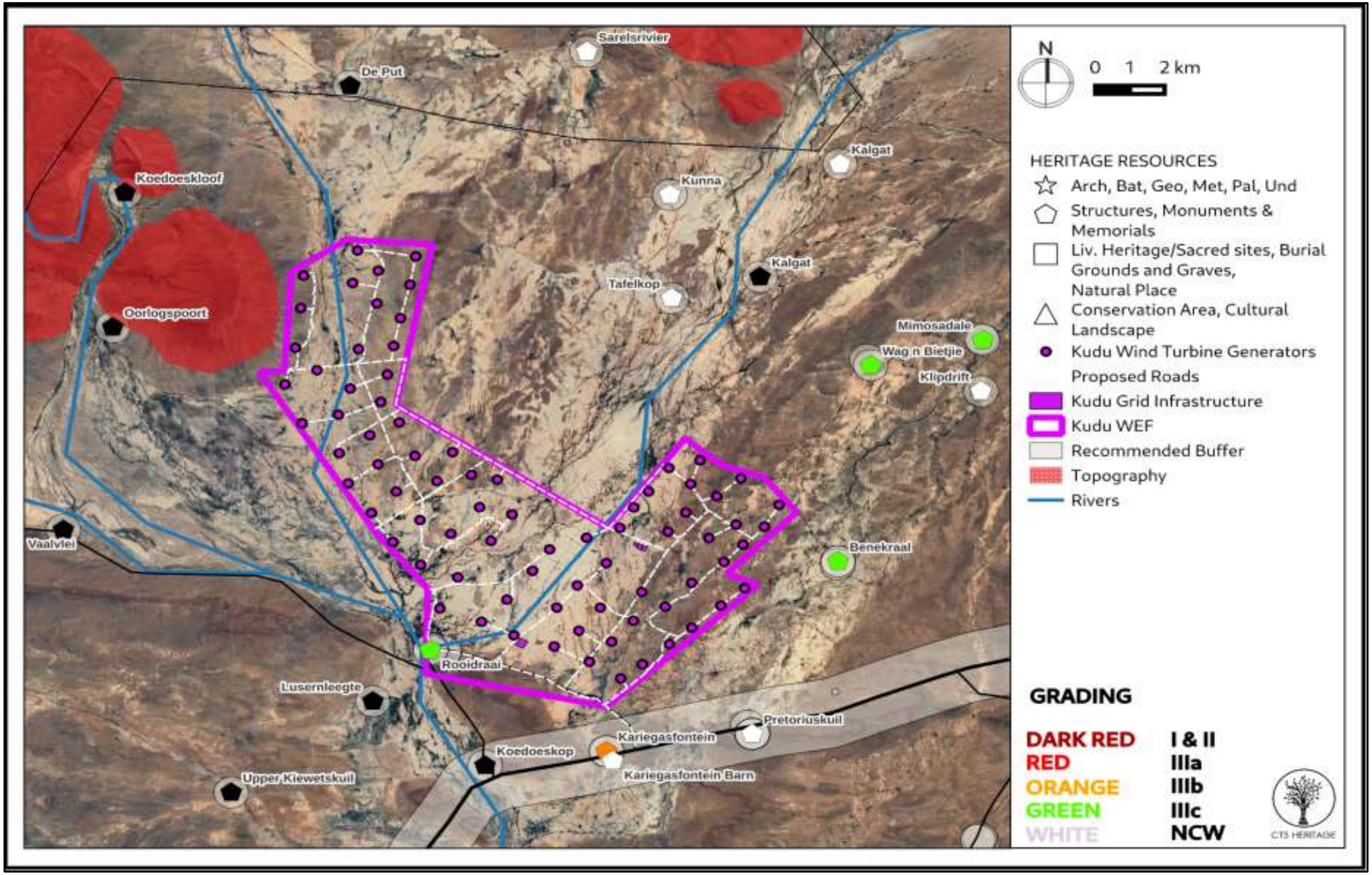

Figure 9.8: Location of heritage resources within and surrounding the FE Kudu Wind Energy Facility development area

9.7.1 *Sensitivity Analysis against the development footprint*

For the placement of the wind turbines, it is confirmed that all of the turbines are located within the Low sensitivity areas. No turbines in the layout fall within any of the no-go buffers. The placement of the turbines as proposed is considered to be acceptable with no adjustments to the development footprint required.

For the placement of the Facility substation, BESS, O&M hub it is confirmed that the footprint of the infrastructure will be placed within areas of low sensitivity. Therefore, the placement of the infrastructure is considered to be acceptable.

In terms of linear infrastructure proposed, most of the roads have been planned to run through low sensitivity areas. The roads planned within the no-go buffers on the map are not considered high sensitivity as there are already existing roads present and only a very small area is otherwise encroached on. The placement of the infrastructure is considered to be acceptable.

9.8. Visual and Associated Sensitivity

A visibility analysis was undertaken from each of the wind turbine positions (80 in total) at an offset of 250m (approximate tip-height) above ground level.

The viewshed analysis does not include the effect of vegetation cover or existing structures on the exposure of the proposed WEF, therefore signifying a worst-case scenario.

The result of the viewshed analysis displays the potential areas of visual exposure, as well as the potential frequency of exposure. The frequency of exposure indicates the number of turbines that may be exposed i.e., more turbines may be visible in the darker orange areas than in the yellow areas. Land that is more elevated is typically more exposed to the proposed WEF, whilst lower lying areas such as valleys and areas located behind areas of higher elevation (i.e., hill /mountains) are shielded, or not as exposed.

The core, uninterrupted area of visual exposure of the wind turbines is likely to be experienced by sensitive receptors located to the east of the Oorlogspoortberge Mountains within a 0 - 10km radius of the structures. This is due to the generally flat nature of the topography extending from the foot of the mountains. The frequency of visual exposure (number of turbines visible) is expected to be slightly reduced where the plains are interrupted by lower lying drainage lines located to the south of the proposed site, as well as beyond the ridge line of the Oorlogspoortberge Mountains to the north west. It is expected that the wind turbine structures will be highly visible from homesteads within this zone, as well as, from the R61 arterial road and secondary road traversing west of the project site.

Additional visual exposure on the plains between 10 – 20km of the turbine structures is slightly more scattered with visually screened areas located to the north west and north east and less so in the south primarily as a result of screening effect of the Oorlogspoortberge Mountains and the lower lying drainage areas. The frequency of visual exposure (number of turbines visible) has become marginally reduced and it is expected that some wind turbines may only be partially visible i.e., mainly the blades. This is as a result of the ridges and mountains to the north west and north east of the proposed site, thereby largely restricting the visual exposure to the plains beyond these topographical features.

The frequency of visual exposure beyond 20km from the turbine structures is once again expected to subside, as well as, the sections of wind turbines that may be exposed. Visibility of the turbine structures will be scattered throughout this area with visually screened areas lying beyond the Oorlogspoortberge to the north west, and Camdeboo Mountains to the north east.

9.8.1 Sensitivity Analysis against the development footprint

The DFFE screening tool generated for FE Kudu Wind Facility indicated that the site has a very high sensitivity for landscape owing to the fact that the site is located on a slope of between 1:4 and 1:10 and on top of mountains/high ridges. From the assessment, it can be concluded that the landscape visual sensitivity is high due to:

» The avoidance of placement of turbines on any mountain tops or ridges
» Possible placement of turbines on slopes of between 1:4 and 1:10
» Low occurrence of homesteads within 5km
» Low VAC of the receiving environment
» The placement of the development within the Beaufort REDZ
» Scenic R61 arterial road located more than 3km from the site
» Limited existing built infrastructure within the study area

A 1km buffer along the edge of the outer most turbines were identified as the zone within which there is a risk of shadow flicker occurring.

This study found that six (6) turbines labelled N1, S41, S23, S19, S18 and S1 (shaded in light grey) are likely to have a shadow flicker impact on motorists using the secondary road. It is, however, expected that the number of motorists travelling on these roads will be limited and the level of exposure will be brief, thereby, not constituting a shadow flicker visual impact of concern for these receptors.

One (1) turbine labelled N1 (shaded in red), may have a shadow flicker impact on Rooidraai which is known as the Karoo Secret Farm Stay. However this homestead is located within the farm portions earmarked for the proposed WEF development.

No homesteads are loacted within a potential shadow flicker zone thereby, not constituting a shadow flicker visual impact of concern for the FE Kudu Wind Energy Facility.

9.9. Noise and Associated Sensitivity

There is no residential area close to the proposed development. The closest community is the town of Aberdeen, located more than 40km east of the project site, which is too far from the project site for sound to be of any concern. The area surrounding the development area consists of dispersed residences. Four potential noise sensitive receptors (NSRs) were identified within the development area. These include areas used for residential purposes. **Figure 9.9** illustrates the NSRs identified and the potential sensitivity in terms of noise that may be experienced at the locations.

9.9.1 Sensitivity Analysis against the development footprint

Based on the results of the Noise Impact Assessment no adjustments to the development footprint are required.

All wind turbines are located more than 1km from the NSRs identified. For the layout evaluated, considering a WTG with a SPL of 109.2 dBA (re 1 pW) the proposed layout is acceptable.

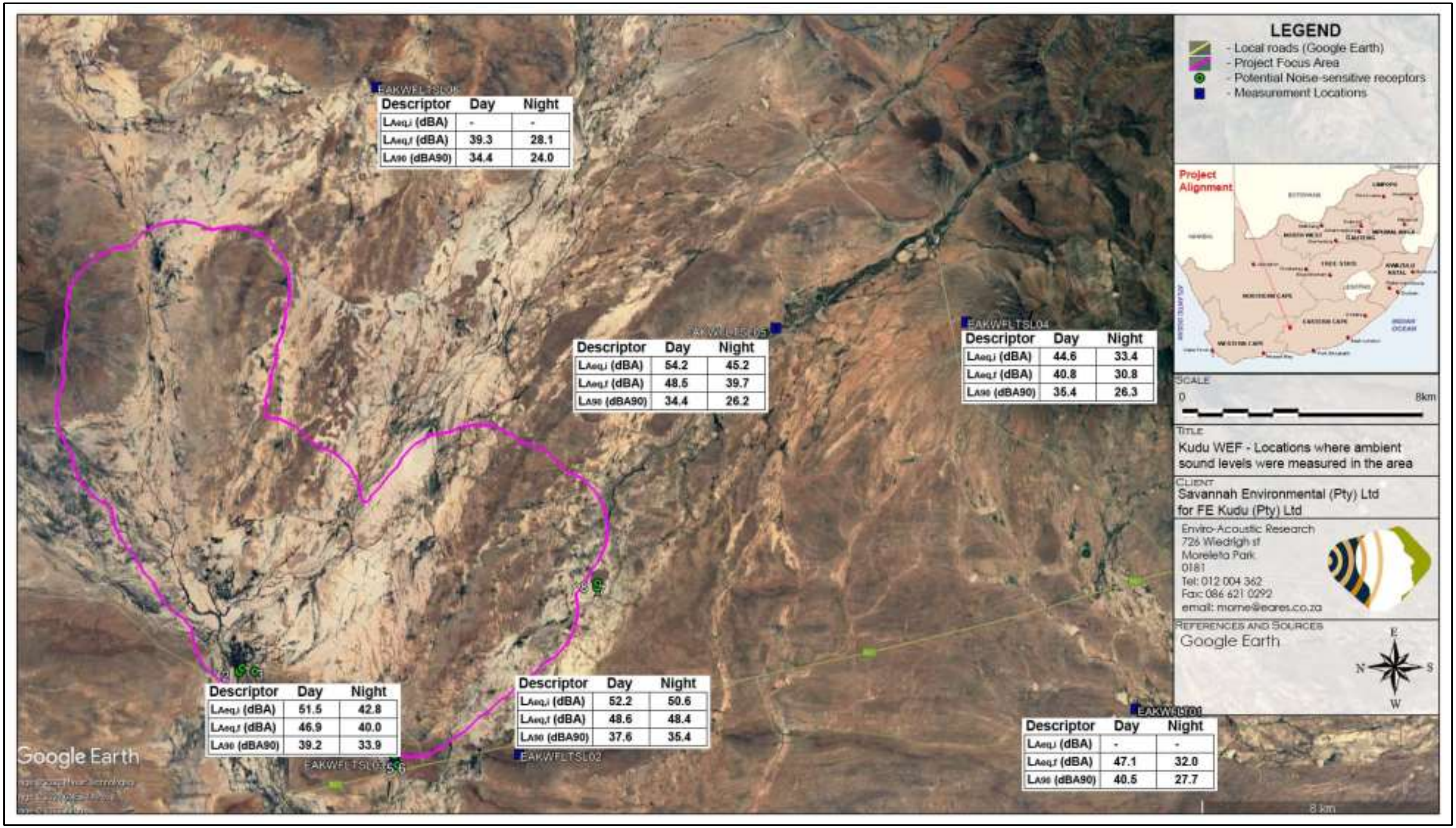

Figure 9.9: Noise site sensitivity and closest identified noise sensitive developments in relation to the FE Kudu Wind Energy Facility

9.10. Overall Sensitivity Measured Against the Development Footprint

The features and areas of sensitivity identified in the project site have been considered and measured against the development footprint – which includes the facility infrastructure such as turbine positions, access roads, on-site facility substation, switching station, BESS and O&M locations, and laydown areas. The turbines have been located outside of sensitive environments including elevated terrain, larger freshwater resources including the buffers for the Tulpleegte and Kariega rivers and tributaries. The turbines have also been places outside of identified bird and bat high activity areas, and away from homesteads and heritage features. The majority of the open plain habitat of the site represent the Transitional vegetation type and considered to be medium sensitivity, and offer sufficient areas for the positioning of the wind turbines and other associated infrastructure.

Figure 9.10 provides a combined environmental sensitivity map for the development area, and indicates those environmental sensitivities of turbine exclusion zones, high, or medium sensitivity.

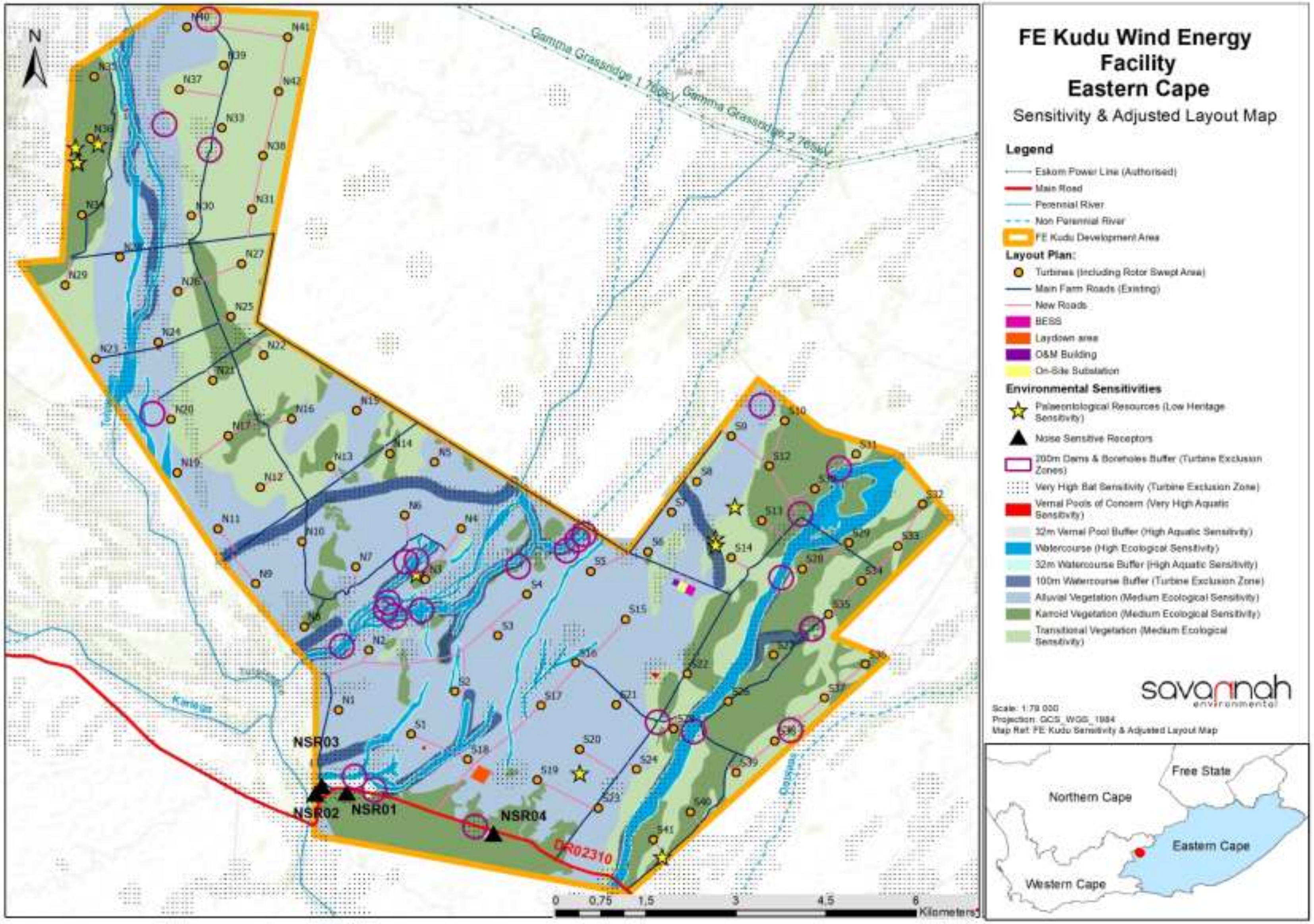

Figure 9.10: Combined environmental sensitivity and layout map for the FE Kudu Wind Energy Facility development area.

CHAPTER 10: ASSESSMENT OF IMPACTS

This chapter serves to assess the significance of the positive and negative environmental impacts (direct and indirect) expected to be associated with the development of the FE Kudu Wind Energy Facility and associated infrastructure. This assessment has considered the construction of a wind energy facility with a contracted capacity of up to 600MW, within a project site[1] consisting of a single affected property of up to 9 170ha. The FE Kudu Wind Energy Facility project site is proposed to accommodate the following infrastructure:

» Up to 80 wind turbines, turbine foundations and turbine hardstands
» An on-site substation hub incorporating:
  - A132kV on-site facility substation
  - Switchyard with collector infrastructure
  - Battery Energy Storage System (BESS)
  - Operation and Maintenance buildings
» A balance of plant area incorporating:
  - Temporary laydown areas
  - A construction camp laydown and temporary concrete batching plant
» Power lines internal to the wind farm, trenched and located adjacent to internal access roads, where feasible[2].
» Access roads to the site and between project components with a width up to 8m for primary access routes.

The full extent of the project site was considered through the BA process. On-site sensitivities were identified through the screening of existing information, desk-top evaluations and field surveys. The development footprint assessed within this BA Report was designed by the project developer in order to respond to and avoid the sensitive environmental and social features located within the development area. This approach ensured that where specialists identified and confirmed specific areas and features of sensitivity that need to be avoided in terms of the placement of turbines, that the application of the mitigation hierarchy (i.e., avoid, minimise, mitigate and offset) was applied. The application of the mitigation hierarchy aimed at avoidance as the first level of mitigation, and this was taking into account through the micro-siting of the turbines within the development area. The specialist assessments undertaken as part of this BA process have considered the entire development area and the proposed development footprint (refer to **Figure 10.1**) which was provided by the developer.

[1] The project site is that identified area within which the development area and development footprint are located. It is the broader geographic area assessed as part of the Basic Assessment process, within which indirect and direct effects of the project may occur. The project site is ~9 170ha in extent. The project site is the entire extent of Portion 2 of Farm Oorlogspoort 85.
[2] The intention is for internal project cabling to follow the internal roads.

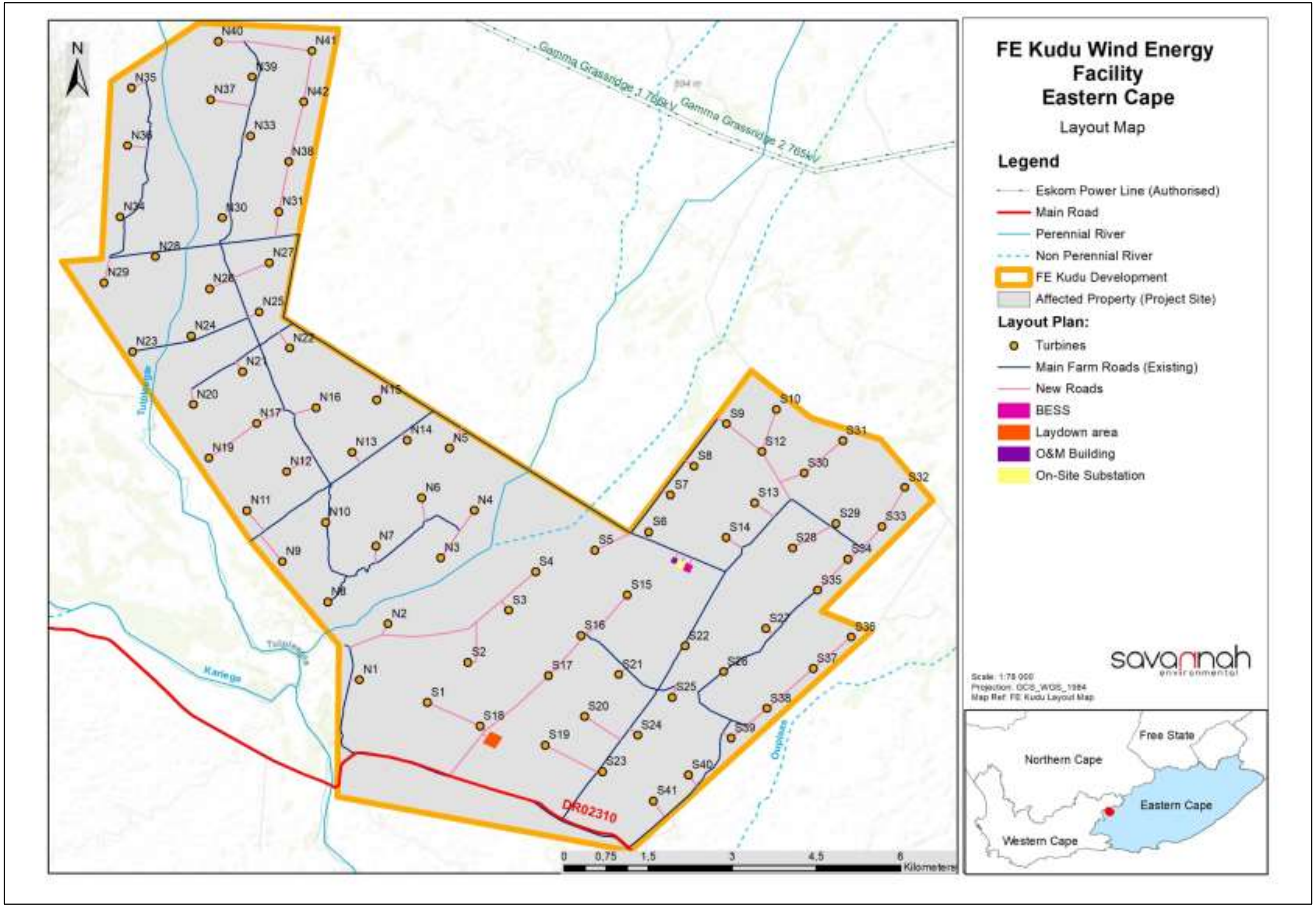

Figure 10.1: Map showing the development footprint for the FE Kudu Wind Energy Facility and associated infrastructure placed within the project site and assessed as part of this BA process

The sections which follow provide a summary of the specialist assessment for each field of study in terms of the impacts which are expected to occur relative to the facility layout, the significance of the impacts, the opportunity for mitigation of high sensitivity impacts to an acceptable level, as well as the appropriate mitigation measures recommended for the further reduction of the impact significance. Note that impacts associated with decommissioning are expected to be similar to those associated with construction activities, however where specific decommissioning impacts have been identified these are covered and assessed. This section of the report must be read together with the detailed specialist studies contained in **Appendix D** to **M.**

Where specific features or areas of sensitivity have been identified which need to be considered for the placement of infrastructure, these features are analysed and detailed in Chapter 9, which provides a sensitivity analysis of the project site and development footprint. The site sensitivity verification was undertaken by all the specialists after which the facility layout was optimised based on the sensitivities identified. The optimised layout was assessed and formed the basis of the impact assessment. The impact assessment provided below is based on the sensitivity analysis and the outcomes thereof.

The development of the FE Kudu Wind Energy Facility will comprise the following phases:

» *Pre-Construction and Construction* – will include pre-construction surveys; site preparation; establishment of access roads, construction camps, batching plant, laydown areas, and facility infrastructure; construction of foundations involving excavations and cement pouring; the transportation of components/construction equipment to site, manoeuvring and operating cranes for unloading and installation of equipment; laying cabling; and commissioning of new equipment and site rehabilitation. The construction phase for the FE Kudu Wind Energy Facility is dependent on the number of turbines to be erected but is estimated to be between 24 and 30 months.
» *Operation* – will include the operation of the wind energy facility and the generation of electricity, which will be fed into the national grid. The operation phase of the FE Kudu Wind Energy Facility is expected to be approximately 20-to-25 years (with maintenance).
» *Decommissioning* – depending on the economic viability of the wind energy facility, the length of the operation phase may be extended beyond a 20-to-25-year period. At the end of the project's life, decommissioning will include site preparation, disassembling of the components of the wind energy facility, clearance of the relevant infrastructure at the site and rehabilitation.

10.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the BA report includes the following information required in terms of the EIA Regulations, 2014 - Appendix 1: Content of basic assessment reports:

Requirement	Relevant Section
3(h)(v) the impacts and risks identified 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.	The impacts and risk associated with the development of the FE Kudu Wind Energy Facility, including the nature, significance, consequence, extent, duration and probability of the impacts and the degree to which the impact can be reversed and cause an irreplaceable loss of resources are included in sections 10.3.2, 10.4.2, 10.5.2, 10.6.2, 10.7.2, 10.8.2, 10.9.2, 10.10.2, 10.11.2 and 10.12.2.

Requirement	Relevant Section
3(h)(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	The positive and negative impacts associated with the development of the FE Kudu Wind Energy Facility are included in sections 10.3.2, 10.4.2, 10.5.2, 10.6.2, 10.7.2, 10.8.2, 10.9.2, 10.10.2, 10.11.2 and 10.12.
3(h)(viii) the possible mitigation measures that could be applied and the level of residual risk.	The mitigation measures that can be applied to the impacts associated with the FE Kudu Wind Energy Facility are included in sections 10.3.2, 10.4.2, 10.5.2, 10.6.2, 10.7.2, 10.8.2, 10.9.2, 10.10.2, 10.11.2 and 10.12.
3(i) a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures,.	A description of all environmental impacts identified for the FE Kudu Wind Energy Facility during the BA process, and the extent to which the impact significance can be reduced through the implementation of the recommended mitigation measures provided by the specialists are included in sections 10.3.2, 10.4.2, 10.5.2, 10.6.2, 10.7.2, 10.8.2, 10.9.2, 10.10.2, 10.11.2 and 10.12.
3(j) an assessment of each identified potentially significant impact and risk, including (i) cumulative impacts, (ii) the nature, significance and consequences of the impact and risk, (iii) the extent and duration of the impact and risk, (iv) the probability of the impact and risk occurring, (v) the degree to which the impact and risk can be reversed, (vi) the degree to which the impact and risk may cause irreplaceable loss of resources and, (vii) the degree to which the impact and risk can be avoided, managed or mitigated.	An assessment of each impact associated with the development of the FE Kudu Wind Energy Facility, including the nature and significance, the extent and duration, the probability, the reversibility, and the potential loss of irreplaceable resources, as well as the degree to which the significance of the impacts can be mitigated are included in sections 10.3.2, 10.4.2, 10.5.2, 10.6.2, 10.7.2, 10.8.2, 10.9.2, 10.10.2, 10.11.2 and 10.12.
3(m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMPr.	Mitigation measures recommended by the various specialists for the reduction of the impact significance are included in sections 10.3.2, 10.4.2, 10.5.2, 10.6.2, 10.7.2, 10.8.2, 10.9.2, 10.10.2, 10.11.2 and 10.12.

10.2. Quantification of Areas of Disturbance on the Site

Site-specific impacts associated with the construction and operation of the FE Kudu Wind Energy Facility relate to the direct loss of habitat, species, or biophysical, landscape or social features. A wind energy facility is, however, dissimilar to most other power generation facilities in that it does not result in whole-scale disturbance or loss to a site (from a biophysical perspective). In order to assess the impacts associated with FE Kudu Wind Energy Facility, it is necessary to understand the extent of the affected area.

The development footprint (**Figure 10.1**) includes all affected/impacted areas, and comprises:

» Up to 80 wind turbines with a maximum hub height of up to 164m. The tip height of the turbines will be up to 250m.
» Concrete turbine foundations (~ 1000m^2 per turbine) and turbine hardstands (~up to 7500m^2)

- An internal road network between project components inclusive of stormwater infrastructure. A 13.5m wide road corridor may be temporarily impacted during construction and rehabilitated to 8m wide after construction (up to 55ha).
- Upgrade to a main access road to the site and between project components with a width up to 8m and a servitude of 13.5m.
- Medium-voltage (MV) power lines internal to the wind farm trenched and located adjacent to internal access roads, where feasible.
- Substation, BESS and O&M buildings
  - On-site facility substation (132kV) up to 2ha in extent.
  - Battery Energy Storage System (BESS) with a footprint of up to 5ha.
  - Operation and Maintenance buildings of up to 1ha.
- Warehouse, laydown area and site camp hub in an 8ha area that will include:
  - Temporary laydown areas (6ha)
  - Temporary warehouse (1ha)
  - Temporary site camp establishment and concrete batching plants (1ha)

Access to the facility will be via an existing (unnamed) gravel road originating off the DR02310 which turns off from the R61 between Beaufort West and Aberdeen. A main access road up to 8m in width will provide access to the facility. It is likely sections of this road will require upgrading and widening to 8m to accommodate the movement of heavy vehicles. This existing road traverses the Remaining Extent of Farm Pretorius Kuil 89 and Portion 2 of Farm Oorlogspoort 85.

Based on the above, it can be concluded that considering the 80-turbine facility layout, up to 185ha of the development area will be transformed and/or disturbed for the development footprint of the FE Kudu Wind Energy Facility.

10.3. Potential Impacts on Terrestrial Ecology (Ecology, Flora and Fauna)

The development of the FE Kudu Wind Energy Facility is likely to result in a variety of impacts, associated largely with the disturbance, loss and transformation of intact vegetation and faunal habitat to hard infrastructure such as turbine foundations and service areas, roads, operations buildings etc. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix D** for more details). Four turbines (S1, S5, N1 and N8) are within the aquatic corridors, but these are unlikely to significantly compromise any ecological functioning since the remainder of the corridors are not affected and are therefore assessed as being acceptable. No turbines are situated within the watercourse buffers and the mitigation strategy has eliminated several crossings from watercourses and buffers. Only necessary access road crossings, mostly along existing farm tracks remain, which are deemed acceptable.

10.3.1 Description of Terrestrial Ecological Impacts

In terms of the impact assessment hierarchy (Avoid, Minimise, Rectify Reduce, Offset), the project development area was subject to an initial site sensitivity verification in order to inform the layout. After completion of this site sensitivity verification, a sensitivity map was provided to the developer and the layout was refined in order to avoid and minimise sensitivities as far as technically possible. The optimised layout being assessed includes measures to rectify and/or reduce the remaining or residual impacts as far as possible. The optimised layout has largely accommodated the sensitivities and avoided exclusion areas for turbines. Some residual crossings (road to turbine S18) and four turbines (S1, S5, N1 and N8) are within the aquatic corridor, but these are unlikely to significantly compromise any ecological functioning since the remainder of the corridors are not affected and are thus deemed acceptable. No turbines are situated within the watercourse buffers and the optimised layout has avoided several crossings from watercourses and buffers. Only necessary access road crossings, mostly along existing farm tracks remain, which are deemed acceptable. Impacts on the ecology of the project site are expected to occur during the construction and operation phases of the FE Kudu Wind Energy Facility. As per the proposed development footprint, the following impacts are identified and assessed for the project.

» Permanent or temporary loss of indigenous vegetation cover because of site clearing. Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint.
» Loss of flora species of special concern during pre-construction site clearing activities.
» Susceptibility of post construction disturbed areas to invasion by exotic and alien invasive species and removal of exotic and alien invasive species during construction. Post construction disturbed areas having no vegetation cover are often susceptible to invasion by weedy and alien species, which can not only become invasive but also prevent natural flora from becoming established.
» Susceptibility of some areas to erosion because of construction related disturbances. Removal of vegetation cover and soil disturbance may result in some areas being susceptible to soil erosion after completion of the activity.
» Disturbances to ecological processes: Activity may result in disturbances to ecological processes.
» Aquatic and Riparian processes: Aquatic habitat is present and could be affected.
» Loss of Faunal Habitat: Activity will result in the loss of habitat for faunal species.
» Impacts to faunal processes because of the activity.
» Loss of faunal SSC due to construction activities: Activities associated with bush clearing, killing of perceived dangerous fauna, may lead to increased mortalities among faunal species.

Since the project is not within any critical or sensitive habitat that is under imminent threat, offsets are not anticipated nor included as any recommendations. The significance before mitigation was assessed based on an optimised layout that has already undergone a refining process to avoid most sensitive habitats pertaining to terrestrial biodiversity.

10.3.2 Impact tables summarising the significance of impacts on ecology during construction, operation and decommissioning (with and without mitigation)

Nature: *Permanent or temporary loss of indigenous vegetation cover as a result of the activity.* Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (0)	Low (0)
Probability	Definite(5)	Definite(5)
Significance	**Low (25)**	**Low (25)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	To some degree, but the habitat loss associated with the project is largely unavoidable.	
Mitigation: » Blanket clearing of vegetation must be limited to the site. No clearing outside of footprint to take place.		

» Topsoil must be striped and stockpiled separately during site preparation and replaced on completion where revegetation will take place. » Any site camps and laydown areas requiring clearing must be located within already disturbed areas away from watercourses.
Residual Impacts: Residual risks include possible clearing of natural or near natural vegetation outside of the proposed footprint.

Nature: *Loss of flora species of conservation concern during pre-construction site clearing activities.* Species of conservation concern are present within the affected area, which could be destroyed during site clearing. All species are widespread species and removal will not result in any significant impact to any flora species or population.		
	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (0)	Low (0)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (10)**	**Low (10)**
Status	Negative	Negative
Reversibility	Moderate	Moderate
Can impacts be mitigated?	To some degree, but the flora loss associated with the project is largely unavoidable.	
Mitigation: » A search and rescue would be recommended before construction commences. Any flora search and rescue will likely include a few individuals of widespread, cosmopolitan or common but protected species. » Respective permits to be obtained prior to construction commencing.		
Residual Impacts: Residual risks include possible clearing of areas outside of the proposed footprint, or not relocating any species, but are likely to be negligible.		

Nature: *Loss of fauna species of conservation concern and potential loss of faunal habitat.* Faunal species of conservation concern are present within the affected area, which could be destroyed during site clearing. All species are widespread species and removal will not result in any significant impact to any flora species or population. Species may include transient fauna species. Activities associated with site preparation and killing of perceived dangerous fauna, may lead to increased mortalities among faunal species.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (0)	Low (0)
Probability	Probable (3)	Probable (3)
Significance	**Low (15)**	**Low (15)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	To some degree, but the habitat loss associated with the project is largely unavoidable.	
Mitigation: » Blanket clearing of vegetation must be limited to the footprint.		

- » The habitats and microhabitats present on the project site are not unique and are widespread in the general area, hence the local impact associated with the footprint would be of low significance if mitigation measures are adhered to.
- » Small mammals within the habitat on and around the affected area are generally mobile and likely to be transient to the area. They will most likely vacate the area once construction commences. As with all construction sites there is a latent risk that there will be some accidental mortalities. Specific measures are made to reduce this risk. The risk of species of Conservation Concern is low, and it is unlikely that there will be any impact to populations of such species because of the activity.
- » Reptiles such as lizards are less mobile compared to mammals, and some mortalities could arise. It is recommended that a faunal search and rescue be conducted before construction commences, although experience has shown that there could still be some mortalities as these species are mobile and may thus move onto site once construction is underway. A retile handler should be on call for such circumstances.
- » Should any amphibian migrations occur between wetland areas during construction, appropriate measures (including temporarily suspending works in the affected area) should be implemented.
- » A pre-commencement faunal search and rescue is recommended, but not necessarily required. Respective permits to be obtained beforehand.
- » No animals are to be harmed or killed during the course of operations including use of snares.

Residual Impacts:

Residual risks include possible clearing of areas outside of the proposed footprint, killing of perceived harmful fauna during construction or not relocating any species, but are likely to be negligible.

Nature: *Invasion by exotic and alien invasive species could occur as a result of construction*

Exotic (weed) and alien invasive species may proliferate during and after construction in disturbed areas. Areas disturbed during construction, having no vegetation cover, including temporary stockpile areas, are often susceptible to invasion by weedy and alien invasive species, which can not only become invasive but also prevent natural flora from becoming established.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (2)	Low (0)
Probability	Probable (3)	Probable (3)
Significance	**Low (21)**	**Low (15)**
Status	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Yes	

Mitigation:

- » Alien species (including alien invasive trees) and weeds must be removed from the site as per CARA/NEMBA requirements.
- » A suitable weed management strategy to be implemented during construction and operation phases as outlined in the EMPr section of this report. It is imperative that any actions are implemented timeously as once alien and weed species generate seeds, the problem is exacerbated.
- » After clearing and construction is completed, an appropriate cover may be required, should natural re-establishment of grasses not take place in a timely manner along road verges. This will also minimise dust.

Residual Impacts:

Residual risks are primarily related to inadequate initial and ongoing implementation of the weed management plan.

Nature: *Disturbances to ecological processes may occur as a result of the activity.*

Activity may result in disturbances to ecological processes.

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium (33)**	**Low (27)**
Status	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources	Moderate	Low
Can impacts be mitigated?	Yes	

Mitigation:

» Blanket clearing of vegetation must be limited to the development footprint, and the area to be cleared must be demarcated before any clearing commences.

» Rehabilitation or revegetation should be implemented on completion of construction.

Residual Impacts:

Residual risks include possible clearing of natural or near natural vegetation outside of the proposed footprint

Nature: <u>*Aquatic and Riparian processes and may be affected by the activity and erosion risk may be elevated.*</u>
Diversion and increased velocity of surface water flows during construction and operation could alter the hydrological regime and result in changes to water quality as well as loss of riparian vegetation / aquatic habitat. Removal of vegetation cover and soil disturbance during construction may result in some areas being susceptible to soil erosion, in particular during unexpected heavy rainfall.

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium (33)**	**Low (27)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	To some degree, but the habitat loss associated with the project is largely unavoidable.	

Mitigation:

» Stormwater discharge into watercourses to be protected against erosion.

» Suitable measures must be implemented in areas that may be susceptible to erosion (such as slopes) and all Any excavations or excavated areas must be protected from erosion.

» Topsoil must be stripped and stockpiled separately and protected from erosion and replaced on completion.

» If natural vegetation re-establishment does not occur natural (bushveld typically regenerates well with minimal intervention), a suitable local grass seed mix must be applied.

Residual Impacts:

Residual risks include inadequate protection from flooding or erosion (including stockpiles topsoil) as a result of unexpected heavy rainfall, mostly during construction and early after construction is completed (until vegetation cover is established).

10.3.3 Implications for Project Implementation

With the implementation of mitigation measures, the significance of impacts of the FE Kudu Wind Energy Facility will be low. On-site mitigation is viewed as the most practical and appropriate action, and viable options for reducing the overall impact of the development on these areas is detailed below:

» No turbines to be developed in areas mapped as terrestrial ecology high sensitivity.
» Avoid the high sensitivity riverine areas (and buffers) for any footprints other than for access road crossings.
» Crossings over riverine corridors should be minimised and restricted to one crossing per watercourse unless no other options are feasible.
» Prioritise crossing watercourses where riverine thicket is absent rather than removing riverine or riparian thicket vegetation.

10.3.4 Overall Result

The Ecological Impact Assessment has identified all impacts to be of low significance after mitigation. There are no impacts associated with the development of the FE Kudu Wind Energy Facility on terrestrial biodiversity that cannot be mitigated to an acceptable level. As such, should all the proposed mitigation measures be implemented, the development is deemed acceptable from a terrestrial ecological impact perspective. No impacts of a high significance or fatal flaws are expected to occur after implementation of the recommended mitigation measures.

10.4. Potential Impacts on Aquatic Resources

The development of the FE Kudu Wind Energy Facility is likely to result in a variety of impacts, associated largely with the direct disturbance or impacts to freshwater features. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix E** for more details). The impacts on aquatics have been assessed on the optimised facility layout which largely avoids associated aquatic features with some watercourse crossings proposed and these are deemed acceptable and appropriately placed. There is however the exception of portions of the roads that are within the 32m vernal pool buffer. Provided the mitigation and recommendations are implemented responsibly the project will present low rated residual impacts to the watercourses.

10.4.1 Description of Impacts on Aquatics

» A detailed assessment of the development footprint confirms that there are no turbines located within the High aquatic sensitivity areas. There are however some watercourse crossings proposed and these are deemed acceptable and appropriately placed. Several artificial and natural vernal pools are located in close proximity to some of the roads. Road infrastructure (specifically the roads between turbines N23 and N24, and turbines S37 and S38) should be re-aligned to avoid the 32m vernal pool buffers while catering for natural surface runoff (box culverts) to continue to feed into these aquatic features to sustain the functioning of these systems and their likely vernal biota.
»

Considering the current anthropogenic activities and influences within the landscape, various impacts to aquatic biodiversity were identified within the study area. These include:

» Historic land modification from reference conditions;
» Farm roads and main roads (and associated altered surface hydrology and wash of hydrocarbons into watercourses. Both formal and informal river crossing structures have altered instream flow characteristics);
» Historical dryland agriculture (and associated altered surface hydrology);
» Grazing and trampling of natural vegetation by livestock in aquatic and riparian areas and adjacent alluvial fan areas;
» Minor encroachment of riparian areas by Alien and/or Invasive Plants (IAP);
» Erosion from steep slopes, river banks and roads (especially roads lacking anti-erosion measures);
» The ephemeral watercourses have numerous anti-erosion berms (instream weirs/ impoundments) across the flat topography, negatively influencing the flow and functioning of the watercourses and their immediate catchment;
» Low to moderate levels of instream sedimentation; and
» Fences and associated maintenance resulting in habitat fragmentation.

10.4.2 Impact tables summarising the significance of impacts on aquatic ecology during construction, operation and decommissioning (with and without mitigation)

Construction Phase Impacts

***Nature**: Disturbance/ displacement/ loss of watercourse habitat (Habitat fragmentation)* Construction phase activities that result in the disturbance, destruction, loss and fragmentation of freshwater habitats, ecosystems and biotic community responses to the alteration of the catchment for development footprint (laydown yards, turbine platforms, grid infrastructure, cabling and road network - with associated watercourse crossings). This involves activities directly within watercourses (direct), and activities adjacent to watercourses (indirect).		
	Without mitigation	**With mitigation**
Extent	Local Area (3)	Site Specific (1)
Duration	Permanent (5)	Short-term (2)
Magnitude	Medium (6)	Low (4)
Probability	Definite (5)	Probable (3)
Significance	**High (70)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources	Yes	No
Can impacts be mitigated	Yes, however not entirely. The optimised layout has lowered the number of interceptions with watercourses, vernal pools and associated buffers.[1]	
Mitigation[2]: » A Buffer of 32m is allocated to the watercourse delineations. Adherence to the buffer areas outside of the areas earmarked for the proposed project infrastructure. These should be visibly demarcated in areas where construction will verge the buffers to avoid encroachment into these areas; » Buffer zones not earmarked for critical crossings as per the optimised facility layout must be treated as no-go areas and maintained as conservation areas; » Prevent the unnecessary destruction, and fragmentation of the watercourses (including the riparian areas and vernal pools where applicable) through avoidance strategies. » Minimise the number of watercourse crossings, and ensure that existing crossings are used as far as possible.		

[1] The impact assessment without mitigation, does not consider the opimised layout.
[2] Additional mitigation measures are detailed in Section 6.2.6 of the Aquatic Ecology Impact Assessment attached as Appendix E.

Residual impacts: The loss of currently intact vegetation is an unavoidable consequence of the project and cannot be entirely mitigated. Avoidance mitigation for freshwater features, with minimal watercourse crossings. The residual impact would however be low for the construction phase with focus on limiting both erosion and inundation required.

***Nature**: <u>Pollution of water resources from construction activities</u>* Pollution (cement and hydrocarbons) stemming from construction activities that enters the natural environment and downslope watercourses, with associated impacts to soils, habitat integrity and ecological function. In turn, these impacts reduce the aquatic and terrestrial biodiversity dependent on the affected freshwater ecosystems, notably in times of surface water availability.		
	Without mitigation	**With mitigation**
Extent	Local Area (3)	Site Specific (1)
Duration	Moderate term (3)	Very Short-term (1)
Magnitude	Medium (6)	Minor (2)
Probability	Definite (5)	Probable (3)
Significance	**Medium (60)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources	No	No
Can impacts be mitigated	Yes, although this impact cannot be well mitigated as some level of pollution is unavoidable.	
Mitigation[3]: » Buffer zones not earmarked for critical crossings as per the optimised facility layout must be treated as no-go areas and maintained as conservation areas; » Construction activities must take place during the low flow period (as much as possible); » A qualified Hydrologist with experience in arid areas must develop a suitable and adaptive stormwater management plan to ensure no erosion takes place and that clean water reports back to the local watercourses; » Laydown yards, camps and storage areas must be beyond the watercourse and associated buffer areas; » No dumping of construction material on-site may take place; » All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials should be supported; » Make sure all excess consumables and building materials / rubble are removed from site and deposited at an appropriate waste facility.		
Residual impacts: Some level of pollution is inevitable due to the nature of the construction activities and cannot be entirely mitigated. The residual impact would however be low and of short duration for the construction phase provided mitigation is responsibly implemented.		

Nature: - *<u>Alteration of catchment hydrology and associated habitat ecology impacts from construction activities</u>* Construction phase activities that result in the reshaping and change in vegetative cover density for infrastructure with associated alterations of slope, runoff quantities and velocities, infiltration capacity and sediment movement from baseline conditions. This is expected to occur across the catchment, with associated impacts to slope stability, habitat integrity and ecological function. This is especially of concern due to the complex and extensively braided watercourse network compounded by the flat topography between the well-defined drainage features prone to ponding, including vernal pools.		
	Without mitigation	**With mitigation**
Extent	Local Area (3)	Footprint & surrounding areas (2)

[3] Additional mitigation measures are detailed in Section 6.2.6 of the Aquatic Ecology Impact Assessment attached as Appendix E.

Duration	Permanent (5)	Moderate term (5)
Magnitude	Medium (6)	Low (4)
Probability	Definite (5)	Probable (3)
Significance	**High (70)**	**Low (27)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Medium
Irreplaceable loss of resources	Yes	No
Can impacts be mitigated	Yes, although this impact cannot be well mitigated as the hydrology alterations are unavoidable. However, the optimised layout has lowered the number of interceptions with watercourses and associated buffers	

Mitigation[4]:

» A buffer of 32 m is allocated to the watercourse delineations including vernal pools. Adherence to the buffer areas outside of the areas earmarked for the proposed project infrastructure. These should be visibly demarcated in areas where construction will verge the buffers to avoid encroachment into these areas.
» The recommended buffer zones must be strictly adhered to during the construction phase of the project, with exception of the activities and structures required to traverse the watercourse. Any supporting aspects and activities not required to be within the buffer area must adhere to the buffer zone.
» Construction activities must take place during the low flow period (as much as possible). In addition to this, basic stormwater structures such as berms must be designed and implemented prior to and throughout the duration of the construction activities;
» A qualified Hydrologist with experience in arid areas must develop a suitable and adaptive Stormwater management plan to ensure no erosion takes place and that clean water reports back to the local watercourses which includes the vernal pools.
» Stormwater runoff from the infrastructure should enter the drainage systems through diffuse channels fitted with flow attention / energy dissipation structures in the form of green infrastructure;
» The water resources outside of the specific project site area must be avoided;
» Prevent uncontrolled access of vehicles through the watercourse that can cause a significant adverse impact on the hydrology and alluvial soil structure of these areas.

Residual impacts:

Alteration of the catchment hydrology is inevitable due to the nature of the construction activities and cannot be entirely mitigated. The residual impact would however be low and of moderate duration for the construction phase.

Operation Phase Impacts

Nature: - Continued disturbance/ displacement/ loss of watercourse habitat

Disturbance created during the construction phase will leave the project area and watercourses vulnerable to erosion (highly erodible catchment) and encroachment by alien vegetation. The operation phase activities will result in the continued destruction, loss and fragmentation of habitats, ecosystems and biotic community responses. This includes the operation of watercourse crossing structures.

	Without mitigation	**With mitigation**
Extent	Low (2)	Site specific (1)
Duration	Long term (4)	Short term (2)
Magnitude	Medium (6)	Low (4)
Probability	Definite (5)	Probable (3)
Significance	**Medium (60)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources	Yes	No

[4] Additional mitigation measures are detailed in Section 6.2.6 of the Aquatic Ecology Impact Assessment attached as Appendix E.

Can impacts be mitigated	Yes, with proper management and avoidance and appropriate structures implemented at construction, this impact can be mitigated to a low level.

Mitigation[5]:

» Watercourses and buffer zones not earmarked for critical crossings as per the optimised facility layout must be treated as no-go areas and maintained as conservation areas for the life of the project;

Residual impacts:

The area is not pristine with historical modification present. Despite mitigation, erosion is expected across the project footprint, influencing downslope watercourses and habitat, especially where roads intercept with watercourses or lateral drainage. The residual impact following mitigation would however be low.

Nature: *Pollution of water resources from operational activities*

The operation and maintenance of the proposed development will result in minimal pollution impacts from lubricating oils and hydraulic and insulating fluids for turbine maintenance, and hydrocarbons (fuels, oil, etc) from leaking maintenance vehicles which escape into the environment along the road network, entering downslope watercourses during rainfall events, with impacts to water quality and ecological functioning.

	Without mitigation	**With mitigation**
Extent	Local area (3)	Site specific (1)
Duration	Short term (2)	Very short term (1)
Magnitude	Medium (6)	Minor (2)
Probability	Definite (5)	Probable (3)
Significance	**Medium (55)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	High
Irreplaceable loss of resources	No	No
Can impacts be mitigated	Yes, although this impact cannot be well mitigated as some level of pollution is unavoidable, although minimal.	

Mitigation[6]:

» The adaptive stormwater management plan must be routinely implemented to ensure no erosion takes place and that clean water flows back to the local watercourses;

» All waste generated on-site during operation must be adequately managed. Separation and recycling of different waste materials should be supported.

Residual impacts:

Some level of pollution is inevitable due to the nature of the operational activities and cannot be entirely mitigated. The residual impact would be low and of very short duration following the implementation of mitigation.

[5] Additional mitigation measures are detailed in Section 6.2.6 of the Aquatic Ecology Impact Assessment attached as Appendix E.

[6] Additional mitigation measures are detailed in Section 6.2.6 of the Aquatic Ecology Impact Assessment attached as Appendix E.

***Nature**: Alteration of catchment hydrology and associated habitat ecology impacts from operational activities* As a result of the landscaping to new topography and change in vegetative cover type in the project footprint, together with increased hardened surfaces from grid infrastructure, turbine platforms and road network, new functioning regimes pertaining to surface runoff, infiltration and sediment movement patterns will influence the adjacent natural habitat characteristics. This in turn will influence habitat integrity and ecological functioning, notably from localised increases in return flows (surface runoff), erosion and instream sedimentation impacts. This would be applicable to habitat and watercourse features in proximity to the proposed infrastructure, notably the areas downslope of the road network.		
	Without mitigation	**With mitigation**
Extent	Local area (3)	Footprint & surrounding areas (2)
Duration	Long term (4)	Short term (2)
Magnitude	High (8)	Low (4)
Probability	Definite (5)	Probable (3)
Significance	**High (75)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources	No	No
Can impacts be mitigated	Yes, although this impact cannot be well mitigated as the hydrology alterations are unavoidable. However, the operational activities need to avoid direct impacts to watercourses and associated buffers, notably erosion.	
***Mitigation*[7]:** » The adaptive stormwater management plan must be routinely implemented to ensure no erosion takes place and that clean water flows back to the local watercourses; » Stormwater runoff from the infrastructure should enter the drainage systems through diffuse channels fitted with flow attention / energy dissipation structures in the form of green infrastructure; » Prevent uncontrolled access of vehicles through the watercourse that can cause a significant adverse impact on the hydrology and alluvial soil structure of these areas; » The access road and associated road margins, and silt traps must be inspected on a monthly basis for signs of erosion. When erosion is observed, the area should be rehabilitated within 7 days. In addition, inspections following a >50 mm/ 24 hr rainfall event must occur within 7 days of the event.		
***Residual impacts**:* Residual impacts following mitigation are largely related to altered surface runoff and erosion due to altered hydrodynamics and erodibility of the associated catchment.		

10.4.3 Implications for Project Implementation

With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of impacts of the FE Kudu Wind Energy Facility will be low. On-site mitigation is viewed as the most practical and appropriate action, and viable options for reducing the overall impact of the development on these areas is detailed below:

» A 32m no-go buffer around alluvial rivers with or without riparian vegetation for the placement of turbines, hardstands, substation hub and laydown area hub. This 32 m buffer would also apply to vernal pools.
» No buffers are applicable for linear infrastructure (i.e., road network) as this is considered to be medium sensitivity.

[7] Additional mitigation measures are detailed in Section 6.2.6 of the Aquatic Ecology Impact Assessment attached as Appendix E.

» The optimised road alignments have been designed to largely avoid most watercourses and their 32m buffer areas. Multiple crossings across the same watercourse section are not advised, and must be restricted to the minimum number feasible;
» Existing crossing / road or areas should preferentially form part of the facility road network.

10.4.4 Overall Result

The Aquatic Resources Impact Assessment has identified all impacts to be of low significance after mitigation. As a result of the ephemeral and braided nature of the watercourses and susceptibility to erosion and the flat topography likely to be seasonally flooded, the construction and operation phase activities would influence the hydrology, water quality and soil movement within the affected watercourses and vernal pools, notably where the proposed infrastructure traverse these aquatic features and/or their associated 32m buffer. This 32 m buffer also applies to vernal pools. The optimised facility layout has largely avoided the ESAs and associated aquatic features, with limited watercourse crossings proposed which are considered to be acceptable and appropriately placed. There is however the exception of portions of the roads that come in close proximity to the vernal pools and fall within their buffers.

There are no impacts associated with the development of the FE Kudu Wind Energy Facility on freshwater ecology that cannot be mitigated to an acceptable level. As such, should all the proposed mitigation measures be implemented, the development is deemed acceptable from an aquatic resources impact perspective. No impacts of a high significance or fatal flaws are expected to occur after implementation of the recommended mitigation measures. With the responsible implementation of mitigation measures, the project will present low residual impacts to the watercourses.

10.5. Potential Impacts on Avifauna

Various impacts have been identified to be associated with the development of the FE Kudu Wind Energy Facility from an avifaunal perspective. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix F** for more details). The avifaunal impacts associated with the development have been assessed on the facility layout which avoids recommended avifauna turbine exclusion zones (<u>including rotor-swept areas</u>) and is therefore deemed acceptable.

10.5.1 Description of Avifaunal Impacts

The effects of a wind energy facility on birds are highly variable and depend 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, density of the prey and types of bird. 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. The proposed FE Kudu Wind Energy Facility will have several potential impacts on priority avifauna. The impacts are the following:

» Mortality due to collisions with the wind turbines
» Displacement due to disturbance during construction and operation of the wind farm
» Displacement due to habitat change and loss at the wind farm
» Mortality due to electrocution on electrical infrastructure
» Collisions with the 33kV overhead lines

It is important to note that the assessment is made on the *status quo* as it is currently on site. The possible change in land use in the broader development site is not taken into account because the extent and nature of future developments (not only wind energy development) are unknown at this stage.

10.5.2 *Impact tables summarising the significance of impacts on avifauna during construction, operation and decommissioning (with and without mitigation)*

Construction Phase Impacts

Nature of Impact: *Displacement of priority species due to disturbance associated with the construction of the wind turbines and associated infrastructure*. Generally negative due to displacement of priority species due to disturbance associated with the construction of the wind turbines and associated infrastructure. No direct fatalities of birds expected during this phase. Generally short term (approx. 24 months).		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Very short (1)	Very short (1)
Magnitude	High (8)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	**Medium (50)**	**Medium (40)**
Status	Negative	Negative
Reversibility	High	High
Irreplaceable loss of species?	No	No
Can impacts be mitigated?	To some extent	
Mitigation: » Construction activity should be restricted to the immediate footprint of the infrastructure as far as possible, and in particular to the proposed road network. Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of priority species. » Removal of vegetation must be restricted to a minimum and must be rehabilitated to its former state where possible after construction. » Construction of new roads should only be considered if existing roads cannot be upgraded. » Vehicle and pedestrian access to the site should be controlled and restricted as much as possible to prevent unnecessary disturbance of priority species.		
Residual impacts: Due to the nature of the construction activities, it is inevitable that temporary displacement of priority species will happen as a result. While this can be mitigated to some extent, the significance of the residual impacts will remain at a medium level.		

Operation Phase Impacts

Nature of Impact: *Displacement and collisions with turbines associated with the operation phase.* Generally negative due to potential for collision and displacement of Red Data species through the operation of the turbines and activity on site.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium (33)**	**Low (27)**

Status	Negative	Negative
Reversibility	High	High
Irreplaceable loss of species?	No	No
Can impacts be mitigated?	To some extent	

Mitigation:

» Once operational, vehicle and pedestrian access to the site should be controlled and restricted to prevent unnecessary destruction of vegetation.
» Formal live-bird monitoring should resume once the turbines have been constructed, as per the most recent edition of the Best Practice Guidelines (Jenkins et al. 2015). The purpose of this would be to establish whether displacement of priority species has occurred and to what extent. The exact time when operational monitoring should commence, will depend on the construction schedule, and should commence when the first turbines start operating. The Best Practice Guidelines require that, as an absolute minimum, operational monitoring should be undertaken for the first two (preferably three) years of operation, and then repeated again in year 5, and again every five years thereafter for the operational lifetime of the facility.
» Excavated rocks should be removed, or all infilling for road construction should be compacted and all lose rock piles at the base or periphery of such infilling should be covered and packed down to eliminate all potential crevices and shelter for small mammals such as Rock Hyraxes (the primary food source for Verreaux's Eagles).

Residual impacts:
Due to the nature of the infrastructure, it is highly likely that long term partial displacement of priority species will happen, particularly because of the habitat fragmentation caused by the associated road network. The habitat transformation can be limited to some extent through mitigation measures, to keep the significance of the residual impacts at a low level.

Nature of Impact: _Mortality of priority species due to collisions with the turbines in the operation phase_
The proposed FE Kudu Wind Energy Facility will pose a collision risk to several priority species which could occur regularly at the site. Species exposed to this risk are large terrestrial species i.e., mostly bustards such as Karoo Korhaan, Southern Black Korhaan, Ludwig's Bustard, Kori Bustard, and Blue Crane, although bustards and cranes appear to be less vulnerable to turbine collisions as was originally anticipated.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance (E+	**Medium (44)**	**Low (27)**
Status (+ve or –ve)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of species?	Yes	Yes
Can impacts be mitigated?	Yes	

Mitigation:

» A 200m turbine exclusion zone (including the rotor-swept area) should be implemented around boreholes and dams and a 100m turbine exclusion zone (including the rotor-swept area) should be maintained on either side of drainage lines.
» Carcass searches must commence to establish mortality rates, as per the most recent edition of the Best Practice Guidelines (Jenkins et al. 2015). The exact time when operational monitoring should commence will depend on the construction schedule and should commence when the first turbines start operating. The Best Practice Guidelines require that, as an absolute minimum, operational monitoring should be undertaken for

the first two (preferably three) years of operation, and then repeated again in year 5, and again every five years thereafter for the operational lifetime of the facility. » If annual estimated collision rates of other species of conservation concern indicate unsustainable mortality levels of priority species, i.e., if natural background mortality together with the estimated mortality caused by turbine collisions exceeds a critical mortality threshold as determined by the avifaunal specialist in consultation with other experts e.g., BLSA, additional measures will have to be implemented which could include shutdown on demand. This must be undertaken in consultation with a qualified avifaunal specialist.
Residual impacts: It is not possible to completely eliminate the risk of turbine collisions, but through mitigation measures, it could be reduced to a low level.

Nature of Impact: *Mortality of priority species due to electrocutions on the overhead MV network (where applicable) and in the substation yard.*

While the intention is to place the medium voltage reticulation network underground where possible, there are areas where the lines might have to run above ground, for technical reasons. In these instances, the poles could potentially pose an electrocution risk to raptors.

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	High (8)
Probability	Highly probable (4)	Improbable (1)
Significance (E+	**Medium (52)**	**Low (13)**
Status (+ve or –ve)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of species?	Yes	Yes
Can impacts be mitigated?	Yes	

Mitigation:

» Overhead lines should be restricted to an absolute minimum and should only be allowed if underground cabling is unfeasible due to technical constraints.
» The final pole designs must be signed off by the bird specialist to ensure that a bird-friendly design is used.
» Bi-monthly inspections of the overhead sections of the MV network must be conducted to look for carcasses under the poles.
» With regard to the infrastructure within the substation yard, the hardware is too complex to warrant any mitigation for electrocution at this stage. It is rather recommended that if any impacts are recorded once operational, site-specific mitigation be applied reactively and in consultation with a qualified avifauna specialist.

Residual impacts:

It is possible to largely eliminate the risk of electrocutions with the use of bird-friendly designs, although all structures carry some risk of electrocution.

Nature of Impact: *Mortality of priority species due to collisions with 33kV OHL* While the intention is to place the majority of the medium voltage reticulation network underground at the wind farm, there are areas where the lines will run above ground. Priority species which are most at risk of collisions with the medium voltage powerlines are the following: Black Stork, Blue Crane, Karoo Korhaan, Kori Bustard, Ludwig's Bustard, Secretary bird, Southern Black Korhaan, Spotted Eagle-Owl, Verreaux's Eagle, White Stork. In particular, where the reticulation network occurs near large dams and agricultural fields are high-risk areas.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Probable (3)
Significance (E+	**Medium (52)**	**Medium (33)**
Status (+ve or –ve)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of species?	Yes	Yes
Can impacts be mitigated?	To a limited extent	
Mitigation: » Overhead lines should be restricted to an absolute minimum and should only be allowed if underground cabling is unfeasible due to technical constraints. » Bird flight diverters should be installed on all 33kV overhead lines on the full span length on the earthwire (according to Eskom guidelines - five metres apart). Light and dark colour devices must be alternated to provide contrast against both dark and light backgrounds respectively		
Residual impacts: There will be an ongoing residual risk of collisions with the OHL, but mitigation should reduce the risk by some extent.		

Decommissioning Phase Impacts

Nature of Impact: *Displacement of priority species due to disturbance during the decommissioning phase* It is inevitable that a measure of displacement will take place for all priority species during the construction phase, resulting from disturbance associated with the construction activities. This is likely to affect ground nesting species the most, as this could temporarily disrupt their reproductive cycle.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Very short (1)	Very short (1)
Magnitude	High (8)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance (E+	**Medium (50)**	**Medium (40)**
Status (+ve or –ve)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of species?	No	No
Can impacts be mitigated?	To some extent	
Mitigation measures:		

» Decommissioning activity should be restricted to the immediate footprint of the infrastructure as far as possible, and in particular to the proposed road network. Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of priority species. » Construction of new roads should only be considered if existing roads cannot be utilised / upgraded. » Vehicle and pedestrian access to the site should be controlled and restricted as much as possible to prevent unnecessary disturbance of priority species.
Residual impacts: Due to the nature of the decommissioning activities, it is inevitable that temporary displacement of priority species will happen as a result. While this can be mitigated to some extent, the significance of the residual impacts will remain at a medium level.

10.5.3 Implications for Project Implementation

With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of impacts of the FE Kudu Wind Energy Facility will be medium. On-site mitigation is viewed as the most practical and appropriate action, and viable options for reducing the overall impact of the development on avifaunal species is detailed below:

The following high sensitivities were identified on site:

- A 200m turbine (including rotor-swept area) exclusion zone should be implemented around boreholes and dams,
- A 100m turbine (including rotor-swept area) exclusion zone on either side of drainage lines. The exclusion zone should also exclude the rotor swept area of the turbines.

The high avifauna sensitivity areas represent turbine exclusion zones. All of the high avifauna sensitivity areas have been avoided by the adjusted facility layout (refer to **Figure 9.10**).

10.5.4 Overall Result

The Avifauna Impact Assessment identified that all impacts associated with the development of the FE Kudu Wind Energy Facility development footprint will be of a medium significance before mitigation and can be mitigated to an acceptable level of impact with medium (lower impact score) and low sensitivity. No impacts of a high significance or fatal flaws are expected to occur with the implementation of the recommended mitigation measures. The current 80 turbine layout assessed in this report avoids all the recommended avifaunal turbine exclusion zones (including rotor-swept areas) and is therefore deemed acceptable. Turbine N20 has been micro-sited to avoid the recommended avifaunal sensitivity buffer. The development is supported, provided the mitigation measures listed in this report are strictly applied.

10.6. Potential Impacts on Bats

Various impacts have been identified for bats with the development of the FE Kudu Wind Energy Facility. The potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix G** for more details). The impacts on bats have been assessed based on the optimised facility layout, which avoids all high sensitivity areas and is therefore considered acceptable (the only exception being road crossings, which is an acceptable impact).

10.6.1 Description of Bat Impacts

At the FE Kudu Wind Energy Facility, direct impacts pose the greatest risk to bats, with collisions being most relevant. However, habitat modification and disturbance/displacement also raise potential risks, especially if bats are disturbed during peak foraging or commuting hours or if potential roosting habitats are disturbed or destroyed. There is a possibility that bats may be reluctant to leave their roosts when subjected to disturbance, which may further exacerbate the impact.

Wind energy facilities have the potential to impact bats directly through collisions (with spinning turbine blades) and barotrauma resulting in mortality, and indirectly through the modification of habitats. Similarly, their associated grid connection may also impact bats directly through collisions, and indirectly through habitat modification. Modification of habitat includes roost destruction, roost disturbance, and displacement from foraging areas and/or commuting routes. Direct impacts pose the greatest risk to bats and, in the context of the project, habitat modification impacts should not pose a significant risk because the project footprint (i.e., turbines, roads and other associated infrastructure) is small and because of limited roosting spaces at the site.

Direct impacts to bats posed by the turbines at the FE Kudu Wind Energy Facility will be limited to species that make use of the airspace in the rotor-swept zone of the wind turbines. Six of the bat species that were recorded on the project site exhibit behaviour that may bring them into contact with wind turbine blades. They are therefore potentially at risk of negative impacts if not properly mitigated. This includes high risk species (Egyptian free-tailed bat, Long-tailed serotine, Natal long-fingered bat, Zulu Serotine, Lesser Long-fingered Bat and Cape Serotine). The Egyptian free-tailed bat, Natal long-fingered bat and Cape serotine have all suffered mortality at operational wind energy facilities in South Africa.

During the monitoring campaign at the FE Kudu Wind Energy Facility site, no confirmed roosts have been identified based on evaluations of existing spatial data and specialist on-site observations. Nevertheless, it is essential to consider cumulative impacts, as similar effects on the local, regional, or national bat population could lead to irreparable losses for the affected bat community over time. Adequate mitigation measures are crucial to minimise the impact of the FE Kudu Wind Energy Facility on bats and their habitats.

10.6.2 Impact tables summarising the significance of impacts on bats during the construction, operation and decommissioning phases (with and without mitigation)

Construction Phase Impacts

Nature: <u>*Modification of habitats*</u> Bats can be impacted indirectly through the modification or removal of habitats when erecting wind turbines and associated infrastructures. The removal of vegetation during the construction phase can impact bats by removing vegetation cover and linear features that some bats use for foraging and commuting. This modification could subsequently also create favourable conditions for insects upon which bats feed which could in turn attract bats to the proposed wind energy facility.		
	Without mitigation	**With mitigation**
Extent	Low (1)	Low (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly Probable (4)	Probable (3)
Significance	**Medium (36)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Medium

Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation: » The removal of vegetation and man-made buildings should be avoided in all high sensitive areas, as far as possible, and reduced across the project site in all other areas. » Associated infrastructures are permissible in sensitive areas, but should aim to avoid them, as far as possible.		
Residual Impacts: Residual impacts (as a result of habitat modification) are possible to occur on site, after all recommended mitigation measures have been implemented. The significance thereof, however, is expected to be low for this particular impact, and is not likely to lead to an irreplaceable loss of resources.		

Nature: *Disturbance/ displacement of species* Wind Energy Facilities have the potential to impact bats indirectly during the construction phase through the disturbance of roosts or when conducting activities during hours of important bat foraging activities. Relevant activities include the construction of roads, O&M buildings, sub-station(s), internal transmission lines and the installation of wind turbines. Excessive noise and dust during the construction phase could result in bats abandoning their roosts, depending on the proximity of construction activities to roosts.		
	Without mitigation	**With mitigation**
Extent	Low (1)	Low (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly Probable (4)	Probable (3)
Significance	**Medium (36)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: » Limit all construction activities to daylight hours only, within 200m of any confirmed roosts. » Avoid all construction activities within potential roosting habitats, if identified at the time when construction activities (for wind turbines and associated infrastructures) take place. No confirmed roosts have been identified on site to date, although it is recommended for a final specialist site walk-through to take place prior to construction to confirm this, and to provide further construction and roost management recommendations, if required (i.e., if roosts are found).		
Residual Impacts: Residual impacts (as a result of disturbance/displacement effects) are possible to occur on site, after all recommended mitigation measures have been implemented. The significance thereof, however, is expected to be low for this particular impact, and is not likely to lead to an irreplaceable loss of resources, and no confirmed roosts have been located on site throughout the duration of the monitoring campaign.		

Operational Phase Impacts

Nature: *Mortality due to wind turbine collision and/ or barotrauma* Bats can be impacted during the operational phase by means of collision with wind turbines and/ or barotrauma. These impacts will be limited to species that make use of the airspace within the rotor swept zone of the wind turbines, during foraging, commuting and/ or migration activities. Such impacts would also be further exacerbated with potential light pollution that would be present during operational activities. Certain bat species actively forage around artificial lights due to the higher numbers of insects which are attracted to these lights. This would bring these species into the vicinity of the operating turbines and increase the risk of collision/barotrauma for these species.		
	Without mitigation	**With mitigation**

Extent	High (4)	High (3)
Duration	Long-term (4)	Long-term (4)
Magnitude	High (8)	Moderate (6)
Probability	Definite (5)	Probable (3)
Significance	**High (80)**	**Medium (39)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Medium
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Partially	

Mitigation:

» Implement an operational phase bat monitoring programme, in accordance with the most recent version of the operational phase bat monitoring guidelines.
» Implement blade feathering (up to the manufacturers cut-in speed) as soon as operation begins, to prevent free-wheeling.
» The placement of all turbines, as well as their full blade length, should remain outside of high sensitivity areas, to be considered from the outset of the design phase.
» If residual impacts reach the threshold limit (at any wind turbine), then appropriate minimisation measures should be implemented (turbine curtailment and/or acoustic deterrence mechanisms).
» Lighting at the project should be kept to a minimum at all associated infrastructures. Appropriate types of lighting are to be used to avoid attracting insects, and hence, bats. This includes downward facing low-pressure sodium and warm white LED lights. To be considered from the outset of the design phase.

Residual Impacts:

Impacts can be mitigated, although residual impacts are likely to occur. These can however be further minimised through appropriate minimisation techniques, in the event that fatality thresholds are reached. Careful consideration needs to be placed on proposed mitigation measures in order to reduce the magnitude of residual impacts, as far as possible.

Nature: *Disturbance/ displacement of species*

Wind Energy Facilities have the potential to impact bats indirectly during the operational phase through the disturbance of roosts or when conducting O&M activities during hours of important bat foraging activities. Excessive noise and dust during the operational phase could also result in bats abandoning their roosts, depending on the proximity of operational activities to roosts.

	Without mitigation	**With mitigation**
Extent	Low (2)	Low (2)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium (33)**	**Low (27)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

» Limit O&M activities to daylight hours.
» Avoid all O&M activities for wind turbines and associated infrastructures within potential bat roosting habitats, as far as possible. No confirmed bat roosts have been identified on site to date, although it is recommended that a suitably qualified bat specialist (appointed to conduct the operational phase bat monitoring programme) is to further advise on refining recommendations pertaining to O&M activities as new roosting information becomes available, during the project's operational phase (if relevant).

Residual Impacts:

Residual impacts (as a result of disturbance/displacement effects) are possible to occur on site, after all recommended mitigation measures have been implemented. The significance thereof, however, is expected to be low for this particular impact, and is not likely to lead to an irreplaceable loss of resources, and no confirmed roosts have been located on site throughout the duration of the monitoring campaign.

Decommissioning Phase Impacts

Nature: *Disturbance/ displacement of species* Wind Energy Facilities have the potential to impact bats indirectly during the decommissioning phase through the disturbance of roosts or when conducting decommissioning activities during hours of important bat foraging activities. Excessive noise and dust during the decommissioning phase, as a result of decommissioning wind turbines and associated infrastructures, could also result in bats abandoning their roosts, depending on the proximity of decommissioning activities to roosts.		
	Without mitigation	**With mitigation**
Extent	Low (2)	Low (2)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium (30)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: » Limit decommissioning activities to daylight hours only. » Avoid all decommissioning activities within potential roosting habitats (without consulting with an appointed bat specialist), if identified during the projects' operational phase bat monitoring campaign, when decommissioning wind turbines and associated infrastructures. Consult with the appointed bat specialist on further management measures, should this be required.		
Residual Impacts: Residual impacts (as a result of disturbance/displacement effects) are possible to occur on site, after all recommended mitigation measures have been implemented. The significance thereof, however, is expected to be low for this particular impact, and is not likely to lead to an irreplaceable loss of resources, and no confirmed roosts have been located on site throughout the duration of the monitoring campaign.		

10.6.3 Implications for Project Implementation

With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of impacts of the FE Kudu Wind Energy Facility will be medium to low. On-site mitigation is viewed as the most practical and appropriate action, and viable options for reducing the overall impact of the development on these areas is detailed below:

» A 200m no development buffer around important habitats such as perennial watercourses, rivers, rocky outcrops, buildings, trees, water features, wetlands, and cultivated lands.
» A 100m no development buffer around smaller non-perennial drainage lines.
» No confirmed roosts have been identified on site to date, although it is recommended for a final specialist site walk-through to take place prior to construction to confirm this, and to provide further construction and roost management recommendations, if required (i.e., if roosts are found).

10.6.4 Overall Result

Based on the bat activity recorded at the FE Kudu Wind Energy Facility project site the significance ratings for the majority of the impacts to bats posed by the development are predicted to be medium or high before mitigation, depending on the impact being considered. After mitigation, all impacts are predicted to be of a medium to low significance. Based on the opportunity for reduction of the impacts through appropriate mitigation measures from a high or medium significance to a medium acceptable significance, no fatal flaws are expected to occur.

10.7. Assessment of Impacts on Agriculture

Various impacts have been identified with the development of the FE Kudu Wind Energy Facility from an agricultural perspective. The potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix L** for more details). The impacts on soil and agricultural potential associated with the development have been assessed on the facility layout and no high sensitivity areas have been identified.

10.7.1 Description of the Impacts on Agriculture

It is anticipated that the most significant change to the soil profiles of the project site will occur during the construction phase when the main and internal access roads as well as the areas where infrastructure will be erected will be cleared of vegetation. The following impacts are relevant to the construction phase:

» <u>Reduction of land with natural vegetation for livestock grazing</u> - Earth-moving equipment will be used to clear the vegetation from the access road areas as well as all the areas where structures will be erected. In areas where obstacles such as rock outcrops are present, earth-moving equipment will be used to remove these rocks and lithic material and level the surface.

» <u>Soil erosion</u> - All areas where vegetation is removed from the soil surface will result in exposed soil surfaces that will be prone to erosion. Both wind and water erosion are a risk and even though the project area is in an arid climate, the intensity of a single rainstorm may result in soil particles being transported away. Once the soil particles are removed, vegetation will have difficulty establishing itself on the rock, lithic and hard carbonate material in the area.

» <u>Soil pollution</u> - During the construction phase, construction workers will traverse through the area with vehicles and construction equipment. Both potential spills and leaks from construction vehicles and equipment as well as waste generation on site, can result in soil pollution.

» <u>Soil compaction</u> - The weight of vehicles and equipment traversing in the construction areas as well as deliberate compaction in areas where buildings will be constructed, will reduce the pore space between soil particles and reduce the water infiltration rate of soil. The reduced water infiltration will increase the risk of soil erosion during rainfall events.

During the operation phase, maintenance vehicles and equipment will travel on the main and internal access roads between the turbines and the offices and workshop. It is foreseen that these soil surfaces will remain bare and will be exposed to soil erosion by wind and water movement. The following impacts are relevant to the operation phase:

» Soil erosion - The areas where vegetation was cleared during construction, will remain at risk of soil erosion, especially during a rainfall event when runoff from the cleared surfaces will increase the risk of soil erosion in the areas directly surrounding the wind turbines and buildings.

» Soil pollution - During the operation phase, engineers and maintenance workers will travel between the wind turbines, substations, offices and workshop to ensure that the project is maintained and repairs are done. During the operation phase, potential spills and leaks from maintenance vehicles and equipment as well as waste generation on site, can result in soil pollution.

The decommissioning phase will have similar impacts to that of the construction phase as special cranes and other equipment will be used to remove the wind turbine materials. Soil in the areas where the turbine structures are removed will be exposed to soil erosion and soil pollution with materials as well fuel and lubricants from the construction vehicles, are impacts associated with this phase.

10.7.2 Impact tables summarising the significance of impacts on agriculture during the construction, operation and decommissioning phases (with and without mitigation)

Construction phase

***Nature**: Reduction of land with natural vegetation for livestock grazing.*
The availability of grazing land that can be used for small stock farming will be reduced during the construction phase. It is anticipated that the impact will remain as long the infrastructure is present, and the impact will only cease once all surface infrastructure has been decommissioned and vegetation has re-established in these areas.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short duration - 2-5 years (2)	Very short duration - 0-1 years (1)
Magnitude	Low (4)	Minor (2)
Probability	Definite (4)	Probable (3)
Significance	**Low (28)**	**Low (12)**
Status (positive or negative)	Negative	Positive
Reversibility	High	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	N/A

Mitigation:
» Vegetation clearance must be restricted to infrastructure and access road areas.
» Materials and equipment must only be stored in the pre-determined laydown areas.
» Removal of obstacles to allow for access of construction vehicles must be kept to only were essential.
» Prior arrangements must be made with the landowner and neighbouring landowners to ensure that farm and game animals are moved to areas where they cannot be injured by vehicles traversing the area.
» No boundary fence must be opened without the landowner or neighbouring landowners' permission.
» No open fires made by the construction teams are allowable during the construction phase.
» The supporting infrastructure must be constructed as closely as possible together to avoid fragmentation of the entire project site.
» The project developer must communicate with the landowner on access restriction around the infrastructure to ensure the landowner is not expecting to return sheep farming to areas of the farm where it will no longer be possible.

Residual Impacts:
The residual impact from the construction of the project is considered low.

<table>
<tr><td colspan="3">Nature: <u>The clearing and levelling of a limited area of land within the proposed project site will increase the risk of soil erosion in the area</u>.
The existing gravel roads are already at risk of soil erosion and vehicle access on unsurfaced access roads will increase the risk of soil erosion. It is anticipated that the risk will naturally reduce as grass and lower shrubs re-establishes in the area once the construction has been completed and the operation phase commences.</td></tr>
<tr><td></td><td>Without mitigation</td><td>With mitigation</td></tr>
<tr><td>Extent</td><td>Local (1)</td><td>Local (1)</td></tr>
<tr><td>Duration</td><td>Medium-term (3)</td><td>Medium-term (3)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Low (4)</td></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Improbable (2)</td></tr>
<tr><td>Significance</td><td>Medium (30)</td><td>Low (16)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
<tr><td>Reversibility</td><td>Low</td><td>Low</td></tr>
<tr><td>Irreplaceable loss of resources?</td><td>Yes</td><td>No</td></tr>
<tr><td>Can impacts be mitigated?</td><td>Yes</td><td>N/A</td></tr>
<tr><td colspan="3">Mitigation:
» Land clearance must only be undertaken immediately prior to construction activities and only within the development footprint/servitude.
» Unnecessary land clearance must be avoided.
» Prioritise the stabilisation and surfacing of existing access roads to prevent soil erosion during the rainy season.
» Evaluate access roads weekly during the rainy season to detect early onset of erosion and rehabilitate any eroded areas immediately.
» Implement a Stormwater Management Plan (SWMP) that includes stormwater drainage structures on access roads as well as around any other hardened surfaces such as the turbine hardstands and the O&M buildings.
» Level any remaining soil removed from excavation pits that remained on the surface instead of allowing small stockpiles of soil to remain on the surface.
» Regularly monitor the site to check for areas where signs of soil erosion may start to appear.
» Should any soil erosion be detected, it must be addressed immediately through rehabilitation and surface stabilisation techniques.</td></tr>
<tr><td colspan="3">Residual Impacts:
The residual impact from the construction of the FE Kudu Wind Energy Facility on the susceptibility to erosion is considered low.</td></tr>
</table>

<table>
<tr><td colspan="3">Nature: <u>Soil pollution</u>
The following construction activities can result in the chemical pollution of the soil:
1. Petroleum hydrocarbon (present in oil and diesel) spills by machinery and vehicles during earthworks and the removal of vegetation as part of site preparation.
2. Spills from vehicles transporting workers, equipment, and construction material to and from the construction site.
3. The accidental spills from temporary chemical toilets used by construction workers.
4. The generation of domestic waste by construction workers.
5. Spills from fuel storage tanks during construction.
6. Pollution from concrete mixing.
7. Any construction material remaining within the construction area once construction is completed.</td></tr>
<tr><td></td><td>Without mitigation</td><td>With mitigation</td></tr>
<tr><td>Extent</td><td>Local (1)</td><td>Local (1)</td></tr>
<tr><td>Duration</td><td>Short-term (2)</td><td>Short-term (2)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Low (4)</td></tr>
<tr><td>Probability</td><td>Low (4)</td><td>Improbable (2)</td></tr>
</table>

Significance	**Medium (36)**	**Low (14)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	N/A
Mitigation: » Maintenance must be undertaken regularly on all vehicles and construction/maintenance machinery to prevent hydrocarbon spills; » Any waste generated during construction, must be stored in designated containers and removed from the site by the construction teams; and » Any left-over construction materials must be removed from site.		
Residual Impacts: The residual impact from the construction of the proposed project will be low to negligible.		

Nature: Soil compaction The clearing and levelling of land for the wind turbines and supporting infrastructure as well as the access roads, will result in soil compaction. In the area where the access road will be constructed, topsoil will be removed, and the remaining soil material will be deliberately compacted to ensure a stable road surface. While the Glenrosa soils (present in the largest part of the development area) are less prone to soil compaction, the rest of the soil forms in the development area are susceptible to soil erosion as a result of the higher silt and clay content.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (30)**	**Low (16)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	N/A
Mitigation: » Vehicles and equipment must travel within demarcated areas and not outside of the construction footprint; » Unnecessary land clearance must be avoided; » Where possible, conduct the construction activities outside of the rainy season; and » Vehicles and equipment must park in designated parking areas.		
Residual Impacts: The residual impact from the construction of the proposed project on soil compaction is considered low.		

Operation phase

Nature: Soil erosion The areas where vegetation was cleared, will remain at risk of soil erosion, especially during a rainfall event when runoff from the cleared surfaces will increase the risk of soil erosion in the areas directly surrounding the wind turbines and buildings.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)

Significance	**Medium (30)**	**Low (16)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	N/A
Mitigation: » Evaluate access roads weekly during the rainy season to detect early onset of erosion and rehabilitate any eroded areas immediately. » Implement a Stormwater Management Plan (SWMP) that includes stormwater drainage structures on access roads as well as around any other hardened surfaces such as the turbine hardstands and the O&M buildings. » The rest of the development area must regularly be monitored to detect early signs of soil erosion on-set. » If soil erosion is detected, the area must be stabilised by the use of geo-textiles and facilitated re-vegetation		
Residual Impacts: The residual impact from the operation of the proposed FE Kudu Wind Energy Facility the susceptibility to erosion is considered low.		

Nature: Soil pollution During the operation phase of the project, the following activities can result in the chemical pollution of the soil: » Petroleum hydrocarbon (present in oil and diesel) spills by maintenance machinery and vehicles. » The generation of domestic waste by maintenance staff.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Low (4)	Improbable (2)
Significance	**Medium (36)**	**Low (14)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	N/A
Mitigation: » Maintenance must be undertaken regularly on all vehicles and maintenance machinery to prevent hydrocarbon spills. » No domestic and other waste must be left at the site and must be transported with the maintenance vehicles to an authorised waste dumping area.		
Residual Impacts: The residual impact from the operation of the proposed project will be low to negligible.		

Decommissioning phase

The decommissioning phase will have the same impacts as the construction phase i.e., soil erosion and soil pollution. Even though roads will then exist, areas where infrastructure is removed will present bare surfaces at risk of soil erosion through wind and rainfall. It is anticipated that especially the risk of soil erosion will remain until the vegetation growth has re-established in the area where the infrastructure of the FE Kudu Wind Energy Facility was decommissioned.

10.7.3 Implications for Project Implementation

Following the data analysis and impact assessment above, the FE Kudu Wind Energy Facility is considered acceptable within the development area that was assessed. The development area consists mainly of the Glenrosa (low (Class 05) land capability) and Swartland soil forms (Low-Moderate (Class 07) land capability). The area is dominated by Medium agricultural sensitive areas with only 29 turbines out of 80 falling on Low agricultural sensitivity. Although most of the area is allocated a Medium sensitivity, the area is only used for livestock grazing as was observed during the site visit. Additionally, no field crops were present within the development area.
No highly sensitive agricultural areas were identified by the specialist that require avoidance from the proposed facility layout.

10.7.4 Overall Result

Majority of the impacts of the FE Kudu Wind Energy Facility from an agricultural perspective will be medium or low prior to the implementation of mitigation. With the implementation of the recommended mitigation measures, all impacts can be reduced to a low acceptable level. No impacts of a high significance are expected to occur, and no fatal flaws are associated with the development from an agricultural perspective. Given the avoidance of sensitive features at the site by the facility layout no high impacts are likely to occur as a result of the development.

It is the specialist’s opinion that the application be considered favourably, permitting that the mitigation measures are successfully implemented. The project infrastructure should also remain within the development area boundaries and in the positions indicated in the layout map.

10.8. Assessment of Impacts on Heritage Resources

Negative impacts on heritage resources have been identified based on the resources identified and discovered during the site survey. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix H**). The impacts on heritage resources associated with the development have been assessed on the facility layout which avoids all high sensitivity areas.

10.8.1 Description of the Heritage Impacts

Various Landscape Elements of Cultural Value have been identified within the area proposed for development:

Topographical Features

- Wolwekop peak situated just north of the R61 near the Murraysburg secondary road. This is a distinctive landmark feature. It is recommended that the nearest turbine be located more than 2.5km from this peak.
- Camdeboo Mountains and the “Sleeping Giant” formation framing the long views northwards.

Watercourses and infrastructure

- The route of the periodical Kraai River crossing a portion of the site and informing a pattern of settlement.
- Dams, wind pumps and water furrows.

Planting Patterns

- » Clumps of trees typically founds around homesteads as shelter from the sun/wind and as place-making elements.

Scenic and historic routes

- » The R61 as a regional linkage route of some scenic value with dramatic views towards the mountain backdrop to the north.
- » The combination of the intersection of the R61 and the Murraysberg Road, change in topography and the landmark qualities of the Wolwekop providing a threshold condition.
- » The east-west historic route running parallel to the R61 and through the site, which has structured a historical pattern of settlement.

Settlements

- » Aberdeen town of suggested Grade IIIA heritage value and situated approximately 40km east of the wind farm site.
- » A number of farmsteads and stone kraals situated within or adjacent to the development area of mostly Grade IIIC heritage value and in some instances of suggested Grade IIIB heritage value.

In terms of the heritage resources identified in the heritage field assessment, Sites 001 and 062 are graded IIIC. These sites are located well away from the proposed development footprint and no impact is anticipated.

10.8.2 Impact tables summarising the significance of impacts on heritage during construction (with and without mitigation)

Nature: *Impacts on heritage resources (cultural landscape)* The broader context of the area proposed for development has cultural significance that may be impacted by the proposed development.		
	Without mitigation	**With mitigation**
Extent	Regional (5)	Regional (5)
Duration	Short-term (4)	Short-term (4)
Magnitude	High (8)	High (8)
Probability	Small (2)	Small (2)
Significance	**Medium (34)**	**Medium (34)**
Status (positive or negative)	Neutral	Neutral
Reversibility	Any impacts to heritage resources that do occur are reversible once the infrastructure is removed	Any impacts to heritage resources that do occur are reversible once the infrastructure is removed
Irreplaceable loss of resources?	Low/Unlikely	Low/Unlikely
Can impacts be mitigated?	N/A	N/A
Mitigation: » Setback from the R61 by at least 1km on either side. » Avoid steep or elevated topography, ridgelines or koppies, with a no development buffer of at least 2.5km from Wolwekop » Setback from graded resources and farmstead settlements IIIB and IIIC, by 500m. » Setback from farmsteads forming part of the settlement pattern by at least 500m		
Residual Impacts:		

NA

Nature: *Impacts on heritage resources (archaeological resources)* The area proposed for development is known to conserve heritage resources of archaeological significance that may be impacted by the proposed development.		
	Without mitigation	**With mitigation**
Extent	Site only (1)	Site only (1)
Duration	Short-term (5)	Short-term (5)
Magnitude	Moderate (5)	Moderate (5)
Probability	Small (2)	Small (1)
Significance	**Low (22)**	**Low (11)**
Status (positive or negative)	Neutral	Neutral
Reversibility	Any impacts to heritage resources that do occur are irreversible	Any impacts to heritage resources that do occur are irreversible
Irreplaceable loss of resources?	Low/Unlikely	Low/Unlikely
Can impacts be mitigated?	Yes	
Mitigation: » Should any significant archaeological resources be uncovered during the course of the construction phase, work must cease in the area of the find and ECPHRA must be contacted regarding an appropriate way forward.		
Residual Impacts: Should any significant archaeological resources be impacted (however unlikely) residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources		

Nature: *Impacts on heritage resources (palaeontological resources)* The area proposed for development is known to conserve heritage resources of palaeontological significance that may be impacted by the proposed development.		
	Without mitigation	**With mitigation**
Extent	Site -only (1)	Site only (1)
Duration	Short-term (5)	Short-term (5)
Magnitude	High (8)	High (8)
Probability	Permanent (5)	Small (1)
Significance	**High (70)**	**Low (14)**
Status (positive or negative)	Neutral	Neutral
Reversibility	Any impacts to heritage resources that do occur are irreversible	Any impacts to heritage resources that do occur are irreversible
Irreplaceable loss of resources?	High/Likely	Low/Unlikely
Can impacts be mitigated?	Yes	
Mitigation: » The Chance Fossil Finds Procedure must be implemented for the duration of construction activities		
Residual Impacts: Should any significant palaeontological resources be impacted (however unlikely) residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources		

The main impacts expected to occur on the heritage resources associated with the development of the FE Kudu Wind Energy Facility will be during the construction phase, with the operation and decommissioning phases unlikely to involve further impacts.

10.8.3 Implications for Project Implementation

With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of impacts of the FE Kudu Wind Energy Facility will be medium. On-site mitigation is viewed as the most practical and appropriate action, and viable options for reducing the overall impact of the development on these areas is detailed below:

» Setback from the R61 by at least 1km on either side.
» Avoid steep or elevated topography, ridgelines or koppies, with a no development buffer of at least 2.5km from Wolwekop
» Setback from graded resources and farmstead settlements IIIB and IIIC, by 500m
» Setback from farmsteads forming part of the settlement pattern by at least 500m
» The attached Chance Fossil Finds Procedure must be implemented for the duration of construction activities
» Although all possible care has been taken to identify sites of cultural importance during the investigation of the study area, it is always possible that hidden or subsurface sites could be overlooked during the assessment. If any evidence of archaeological sites or remains (e.g., remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils, burials or other categories of heritage resources are found during the proposed development, work must cease in the vicinity of the find and ECPHRA must be alerted immediately to determine an appropriate way forward.

10.8.4 Overall Result

The site forms part of an intact cultural landscape representative of the Central Plateau of the Great Karoo possessing heritage value for historical, aesthetic, architectural, social and scientific reasons. Based on the site suvey and assessment of potential heritage resources and receptors, a wind farm at the proposed location is acceptable from a cultural landscape perspective. There are no red flags, which identify the project to be a fatal flaw from a cultural landscape perspective. No structures or cultural landscape elements of significance are located within the area proposed for development and the optimised layout observes the recommended buffer areas and mitigation measures.

All impacts identified on the heritage resources (including archaeology, palaeontology and cultural landscape) are of a medium to high significance prior to the implementation of mitigation measures. With the implementation of the mitigation measures the impact significance will be reduced to impacts of a medium to low significance. With the opportunities presented for the reduction of impact through the implementation of the recommended mitigation measures, no unacceptable impacts of a high significance are expected to occur. No fatal flaws are therefore associated with the FE Kudu Wind Energy Facility a heritage perspective.

10.9. Assessment of Noise Impacts

Wind turbines produce sound, primarily due to mechanical operations and aerodynamic effects of the blades. Modern wind turbine manufacturers have virtually eliminated the noise impact caused by mechanical sources and instituted measures to reduce the aerodynamic effects. As with many other activities, the wind turbines emit sound power levels at a level that can impact on areas at some distance away. When potentially sensitive receptors are nearby, care must be taken to ensure that the operations at the wind energy facility do not cause undue annoyance or otherwise interfere with the quality of life of the receptors. Potential noise impacts and the relative significance of the impacts are summarised below (refer to **Appendix J**). The noise impacts associated with the development have been assessed on the facility layout which avoids all high sensitivity areas.

10.9.1 Description of Noise Impacts

During the construction phase, the undertaking of specific activities will result in noise impacts. The activities include:

» Site survey and preparation;
» Establishment of site entrance, internal access roads, contractors' compound and passing places;
» Civil works to sections of the public roads to facilitate turbine delivery;
» Construction of foundations;
» Transport of components and equipment to site;
» Establishment of laydown and hard standing areas;
» Erection of the turbines;
» Construction of the substation;
» Establishment of ancillary infrastructure; and
» Site rehabilitation.

The significance of the noise impact is medium for access road construction activities. This partially relates to the strict EIA criteria used as well as the high noise levels associated with the upgrading of access roads close to NSR03 and NSR04. While the noise impact would be temporary, the following measures will reduce the significance of the noise impact.

10.9.2 Impact tables summarising the significance of impacts on Noise during construction, operation and decommissioning (with and without mitigation)

Construction Phase Impacts

Nature: <u>Construction of access roads</u> Daytime ambient sound levels could range from less than 20 dBA to 73 dBA, averaging at 45.2 dBA. Daytime ambient sound levels are thus typical of a rural noise district most of the times, though it is expected that introduced noises will be audible over large distances during quiet periods (during low wind conditions). Road construction activities will increase ambient sound levels due to air-borne noise. The projected noise levels, the change in ambient sound levels as well as the potential noise impact is defined per NSR.		
	Without mitigation	**With mitigation**
Magnitude	Very High (10)	High (8)
Extent	Local (2)	Local (2)
Duration	Temporary (1)	Temporary (1)
Probability	Definite (5)	Probable (2)
Significance	**High (65)**	**Low (22)**
Status	Negative	Negative
Reversibility	High	High

Loss of resources?	No	No
Can impacts be mitigated?	Yes, but not required	Yes, but not required
Mitigation: » The applicant can relocate the access road further than 60m from NSR03 and NSR04; » The applicant could construct a wall or acoustic barrier between the road the NSR03 and NSR04; and » The applicant should notify the NSR when construction activities will take place.		
Residual Risks: There is no risk of any residual noises.		

Nature: <u>Construction traffic noises</u> Daytime ambient sound levels could range from less than 20 dBA to 73 dBA, averaging at 45.2 dBA. Daytime ambient sound levels are thus typical of a rural noise district most of the times, though it is expected that introduced noises will be audible over large distances during quiet periods (during low wind conditions). Road construction activities will increase ambient sound levels due to air-borne noise. The projected noise levels, the change in ambient sound levels as well as the potential noise impact is defined per NSR in and summarized in this table.		
	Without mitigation	**With mitigation**
Magnitude	Moderate (6)	Moderate (6)
Extent	Local (2)	Local (2)
Duration	Short-term (2)	Short-term (2)
Probability	Improbable (1)	Improbable (1)
Significance	**Low (10)**	**Low (10)**
Status	Negative	Negative
Reversibility	High	High
Loss of resources?	No	No
Can impacts be mitigated?	No mitigation required	No mitigation required
Mitigation: » The significance of noise impacts due to construction traffic is low no additional mitigation is required or recommended.		
Residual Risks: There is no risk of any residual noises.		

Nature: <u>Daytime WTG construction activities</u> Daytime ambient sound levels could range from less than 20 dBA to 73 dBA, averaging at 45.2 dBA. Daytime ambient sound levels are thus typical of a rural noise district most of the times, though it is expected that introduced noises will be audible over large distances during quiet periods (during low wind conditions). Various construction activities (development of laydown areas and the hard standing areas, excavation of foundations, concreting of foundations and the assembly of the wind turbines tower and components, as well as construction of other infrastructure) taking place simultaneously during the day will increase ambient sound levels due to air-borne noise.		
	Without mitigation	**With mitigation**
Magnitude	Minor (2)	Moderate (6)
Extent	Local (2)	Local (2)
Duration	Short-term (2)	Short-term (2)
Probability	Improbable (1)	Improbable (1)
Significance	**Low (6)**	**Low (6)**
Status	Negative	Negative

Reversibility	High	High
Loss of resources?	No	No
Can impacts be mitigated?	No mitigation required	No mitigation required
Mitigation: » The significance of the noise impact is low for daytime construction activities and no additional mitigation is required or recommended.		
Residual Risks: There is no risk of any residual noises.		

Nature: *Night time WTG construction activities* Night-time ambient sound levels could range from less than 20 dBA to more than 60 dBA, averaging at 36.5 dBA. Ambient sound levels are expected to be low during period of low winds, and it is expected that introduced noises will be audible over large distances during quiet periods (during low wind conditions). Various construction activities (likely limited to the pouring of concrete as well as erection of WTG components) taking place simultaneously at night will increase ambient sound levels due to air-borne noise.		
	Without mitigation	**With mitigation**
Magnitude	Moderate (6)	Moderate (6)
Extent	Regional (3)	Regional (3)
Duration	Short-term (2)	Short-term (2)
Probability	Possible (2)	Possible (2)
Significance	**Low (22)**	**Low (22)**
Status	Negative	Negative
Reversibility	High	High
Loss of resources?	No	No
Can impacts be mitigated?	No mitigation required	No mitigation required
Mitigation: » While night-time construction activities are unlikely to take place, the potential significance was estimated. It was determined that the significance of night-time construction activities will be low and no additional mitigation is required or recommended.		
Residual Risks: There is no risk of any residual noises.		

Operation phase

Nature: *Daytime operation of WTG considering the worst-case SPL* WTG will only operate during period with increased winds, when ambient sound levels are higher than periods with no or low winds. Numerous WTG of the FE Kudu Wind Energy Facility operating simultaneously during the day will increase ambient sound levels due to air-borne noise from the WTG. The projected noise levels and the change in ambient sound levels is defined for the identified NSR		
	Without mitigation	**With mitigation**
Magnitude	Low (4)	Low (4)
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (4)
Probability	Improbable (1)	Improbable (1)
Significance	**Low (10)**	**Low (10)**

Status	Negative	Negative
Reversibility	High	High
Loss of resources?	No	No
Can impacts be mitigated?	No mitigation required	No mitigation required
Mitigation: » The significance of the noise impact is low and no additional mitigation is recommended.		
Residual Risks: There is no risk of any residual noises.		

Nature: *Night-time operation of WTG considering the worst-case SPL* WTG will only operate during period with increased winds, when ambient sound levels are higher than periods with no or low winds. Ambient sound levels will likely be higher with this assessment assuming an ambient sound level of 41.5 dBA. Numerous WTG of the FE Kudu Wind Energy Facility operating simultaneously at night will increase ambient sound levels due to air-borne noise from the WTG. The projected noise levels, the change in ambient sound levels as well as the potential noise impact is defined per NSR and summarized in this table.		
	Without mitigation	**With mitigation**
Magnitude	Low (4)	Low (4)
Extent	Regional (3)	Regional (3)
Duration	Long-term (4)	Long-term (4)
Probability	Possible (2)	Possible (2)
Significance	**Low (22)**	**Low (22)**
Status	Negative	Negative
Reversibility	High	High
Loss of resources?	No	No
Can impacts be mitigated?	No mitigation required	No mitigation required
Mitigation: » The significance of the noise impact is low and no additional mitigation is recommended or required.		
Residual Risks: There is no risk of any residual noises.		

Decommissioning phase

Final decommissioning activities will have a noise impact lower than either the construction or operation phases. This is because decommissioning and closure activities normally take place during the day using minimal equipment (due to the decreased urgency of the project). While there may be various activities, there is a very small risk for a noise impact. The significance of any noise impact would be low and similar to the construction noise impact.

10.9.3 Implications for Project Implementation

With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of impacts of the FE Kudu Wind Energy Facility will be low. On-site mitigation is viewed as the most practical and appropriate action, and viable options for reducing the overall impact of the development on these areas.

10.9.4 Overall Result

From the noise impacts assessed there will be a low significance for daytime construction activities, a medium significance for night-time construction activities (with mitigation proposed to reduce the significance to low), and a low significance for night-time facility operation activities and an impact to ambient sound levels at noise-sensitive receptors due to air-borne noise from the wind turbines. No impacts of a high significance after the implementation of mitigated measures, or fatal flaws were identified.

It was determined that the potential noise impacts, without mitigation, would be:

- of a high significance for the construction of access roads, although mitigation measures are available and recommended that would reduce the significance of the noise impact to low;
- of a low significance relating to noises from construction traffic;
- of a low significance for the daytime construction activities (hard standing areas, excavation and concreting of foundations and the assembly of the WTG and other infrastructure);
- of a potential low significance for the night-time construction activities (the pouring of concrete, erection of WTG);
- of a low significance for daytime operational activities (noises from wind turbines) when considering the worst-case SPL; and
- of a low significance for night-time operational activities (noises from wind turbines) when considering the worst-case SPL.

Mitigation measures are available and were included in this report, that should reduce the significance of the noise impact to low:

- of a low significance for daytime operational activities (noises from wind turbines) when considering the worst-case SPL; and
- of a low significance for night-time operational activities (noises from wind turbines) when considering the worst-case SPL.

No impacts of a high significance after the implementation of mitigation measures, or fatal flaws were identified.

10.10. Assessment of Visual Impacts

Negative impacts on sensitive visual receptors will occur during the undertaking of construction activities and the operation of the FE Kudu Wind Energy Facility. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix I**). The Visual impacts associated with the development have been assessed on the current proposed layout which avoids all high sensitivity areas.

10.10.1 Visual Assessment

During the construction phase of the FE Kudu Wind Energy Facility a noticeable increase in heavy vehicles utilising the roads to the project site may occur. This will result in a visual nuisance to other road users and landowners within the surrounding area. Construction activities may potentially result in a high temporary visual impact, that may be mitigated to moderate.

The operation of the FE Kudu Wind Energy Facility will have a high visual impact on observers within a 5km radius of the proposed wind turbine structures. The following homesteads are provisionally included, due the presence of already authorised, in progress or proposed wind energy facilities on their properties and their assumed support for wind energy facility developments. The homesteads include:

» Kariegasfontein (in process Kariega Wind Facility Cluster)
» Pretoriuskuil (in process Kariega Wind Facility Cluster)
» Rooidraai- Karoo Secret Farm Stay (FE Kudu Wind Energy Facility)
» Benekraal (in process Kariega Wind Facility Cluster)

No mitigation of this impact is possible (i.e., the structures will be visible regardless), but general mitigation and management measures are recommended as best practice.

The operation of the FE Kudu Wind Energy Facility is expected to have a moderate visual impact on observers traveling along the roads within a 5km radius of the wind turbines. This includes observers travelling along the secondary road located to the east of the proposed wind energy facility. Since observers traveling along these roads will only be exposed to the visual intrusion for a short period of time and the road in question is only a secondary gravel road expected to carry limited traffic, it is expected that this will reduce the probability of this impact occurring. No mitigation of this impact is possible (i.e., the structures will be visible regardless), but general mitigation and management measures are recommended as best practice.

The FE Kudu Wind Energy Facility could have a moderate visual impact on residents of (or visitors to) homesteads within a 5 - 10km radius of the wind turbine structures. These include residents of/visitors to Kiewietskuil, Lower Kiewietskuil, Upper Kiewietskuil, Vaalvlei, Klipdrift and Oorlogspoort, as well as observers travelling along the R61 arterial road and various secondary roads. No mitigation of this impact is possible (i.e., the structures will be visible regardless), but general mitigation and management measures are recommended as best practice.

The following homesteads are also potentially impacted due to their location on a proposed development property and their assumed support for wind energy facility developments within the region.

» Maraiskraal (authorised Eskom Aberdeen Wind Farm)
» Mimosadale (in process Kariega Wind Facility Cluster)
» Waaikraal (in process Kariega Wind Facility Cluster)
» Tafelkop (in process Kariega Wind Facility Cluster)
» Kunna (in process Kariega Wind Facility Cluster)
» Sarelsrivier (in process Kariega Wind Facility Cluster)

The FE Kudu Wind Energy Facility could have a moderate visual impact on residents of (or visitors to) homesteads within a 10-20km radius of the wind turbines. Residents of/visitors to:

» Graafwater
» Bakoond
» Gannaleegte
» Springbokvlakte
» Klipkoppies
» Teerputs
» Rooidam
» Vlakfontein
» Omdraai
» Dowefontein

» The Ranges
» Ouplaas
» Vriespoort (2)
» Windmere
» Glencliff
» Kykrug
» Harmonie
» Langrug
» Goedehoop
» Stellenboschvlei
» Bokvlei
» Karreepoort
» De Puts

The following properties are provisionally included, due the presence of an already authorised wind energy facilities on their properties and their assumed support for wind energy facility developments within the region:

» Kraanvoëlkuil (Aberdeen 1, 2 & 3 Wind Farms)
» Windermere (Aberdeen 1, 2 & 3 Wind Farms)
» Perseverance (Aberdeen 1, 2 & 3 Wind Farms)
» De Kroon (authorised Eskom Aberdeen Wind Farm)
» Klipstawel (in process Kariega Wind Facility Cluster)
» Kalkgat (in process Kariega Wind Facility Cluster)
» Sarelsrivier (in process Kariega Wind Facility Cluster)

No mitigation of this impact is possible (i.e., the structures will be visible regardless), but general mitigation and management measures are recommended as best practice.

Shadow flicker is an impact relevant to the operation of the turbines. Shadow flicker only occurs when the sky is clear, and when the turbine rotor blades are between the sun and the receptor (i.e., when the sun is low). Most shadow impact is associated with 3-4 times the height of the object. Based on this research, a 1km buffer along the edge of the outer most turbines were identified as the zone within which there is a risk of shadow flicker occurring.

This study found that six (6) turbines labelled N1, S41, S23, S19, S18 and S1 are likely to have a shadow flicker impact on motorists using the DR02103 secondary road. It is, however, expected that the number of motorists travelling on these roads will be limited and the level of exposure will be brief, thereby, not constituting a shadow flicker visual impact of concern for these receptors.

One (1) turbine labelled N1 may have a shadow flicker impact on Rooidraai which is known as the Karoo Secret Farm Stay. However, this homestead is located within the farm portions earmarked for the proposed wind farm development. The significance of shadow flicker is therefore anticipated to be moderate.

The area immediately surrounding the proposed facility has a relatively low incidence of receptors and light sources, so light trespass and glare from the security and after-hours operational lighting for the facility will have some significance for visual receptors in the study area, especially those located in closer proximity to the wind turbine structures especially within 0-5km and potentially up to 10km.

Another source of glare light, albeit not as intense as flood lighting, is the aircraft warning lights mounted on top of the hub of the wind turbines. These lights are less aggravating due to the toned-down red colour, but have the potential to be visible from a great distance. This is especially true due to the strobing effect of the lights, a function specifically designed to attract the observer's attention. The Civil Aviation Authority (CAA) prescribes these warning lights and the potential to mitigate their visual impacts have traditionally been very low other than to restrict the number of lights to turbines that delineate the outer perimeter of the facility.

Some ground-breaking new technology in the development of strobing lights that only activate when an aircraft is detected nearby may aid in restricting light pollution at night and should be investigated and implemented by the project proponent, if available and permissible by the CAA. This new technology is referred to as *needs-based night lights,* which deactivates the wind turbine's night lights when there is no flying object within the airspace of the Wind Energy Facility. The system relies on the active detection of aircraft by radar sensors, which relays a switch-on signal to the central wind farm control to activate the obstacle lights.

Further lighting impacts have the potential for sky glow. Sky glow is the condition where the night sky is illuminated when light reflects off particles in the atmosphere such as moisture, dust or smog. The sky glow intensifies with the increase in the number of light sources. Each new light source, especially upwardly directed lighting, contribute to the increase in sky glow.

This anticipated lighting impact during operation is likely to be of moderate significance, and may be mitigated to moderate especially within 0-5km and potentially up to 10km radius of the wind turbine structures.

In terms of ancillary infrastructure, the range of visual exposure will fall within that of the turbines. The anticipated visual impact resulting from this infrastructure is likely to be of low significance both before and after mitigation.

An impact on the sense of place for the area is also identified from a visual perspective. Sense of place refers to a unique experience of an environment by a user, based on his or her cognitive experience of the place. An impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light. The greater environment has a rural, undeveloped character and a natural appearance. These generally undeveloped landscapes are considered to have a high visual quality. The significance of the visual impacts on the sense of place within the region (i.e., beyond a 20km radius of the development and within the greater region) is expected to be of medium significance. However, in the future should all the intended development be constructed, it is expected that the significance of the visual impacts on the sense of place could be reduced to moderate significance (lower rating). No mitigation of this impact is possible (i.e., the structures will be visible regardless), but general mitigation and management measures are recommended as best practice.

10.10.2 Impact table summarising the significance of visual impacts during construction, operation and decommissioning (with and without mitigation)

Construction Phase Impacts

Nature: *Visual impact of construction activities on sensitive visual receptors* Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed wind energy facility.		
	Without mitigation	***With mitigation***
Extent	Very Short distance (4)	Very Short distance (4)
Duration	Short term (2)	Short term (2)
Magnitude	Very high (10)	High (8)
Probability	Highly Probable (4)	Probable (3)
Significance	**High (64)**	**Moderate (42)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: Planning: » Retain and maintain natural vegetation in all areas outside of the development footprint, but within the project site. Construction: » Ensure that vegetation is not unnecessarily removed during the construction period. » Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e., in already disturbed areas) where possible. » Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. » Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at licensed waste facilities. » Reduce and control construction dust using approved dust suppression techniques as and when required (i.e., whenever dust becomes apparent). » Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts. » Rehabilitate all disturbed areas immediately after the completion of construction works.		
Residual impacts: None, provided that rehabilitation works are carried out as required.		

Operation Phase Impacts

Nature: *Visual impact on sensitive visual receptors (residents and visitors) located within a 5km radius of the wind turbine structures* Visual impact on observers (residents at homesteads and visitors/tourists) in close proximity (i.e., within 5km) to the wind turbine structures.		
	Without mitigation	***With mitigation***
Extent	Very Short distance (4)	Very Short distance (4)
Duration	Long term (4)	Long term (4)
Magnitude	Very high (10)	Very high (10)
Probability	Probable (3)	Probable (3)
Significance	**Medium (54)**	**Medium (54)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No, only best practice management measures can be implemented.	

Generic best practise mitigation/management measures: Planning: » Retain/re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude, but within the project site. Operations: » Maintain the general appearance of the facility as a whole. Decommissioning: » Remove infrastructure not required for the post-decommissioning use. » Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications.
Residual impacts: The visual impact will be removed after decommissioning, provided the wind energy facility infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain.

Nature: *Potential visual impact on sensitive visual receptors (observers travelling along roads) located within a 5km radius of the wind turbine structures* Visual impact on observers travelling along the secondary roads in close proximity (i.e., within 5km) to the wind turbine structures		
	Without mitigation	***With mitigation***
Extent	Very Short distance (4)	Very Short distance (4)
Duration	Long term (4)	Long term (4)
Magnitude	Very high (10)	Very high (10)
Probability	Probable (3)	Probable (3)
Significance	**Medium (54)**	**Medium (54)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No, only best practice management measures can be implemented.	
Generic best practise mitigation/management measures: Planning: » Retain/re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude, but within the project site. Operations: » Maintain the general appearance of the facility as a whole. Decommissioning: » Remove infrastructure not required for the post-decommissioning use. » Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications.		
Residual impacts: The visual impact will be removed after decommissioning, provided the wind energy facility infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain.		

Nature: *Potential visual impact on sensitive visual receptors within the region (5 – 10km radius)* Visual impact on observers travelling along the roads and residents at homesteads within a 5 – 10km radius of the wind turbine structures.		
	Without mitigation	***With mitigation***
Extent	Short distance (3)	Short distance (3)

Duration	Long term (4)	Long term (4)
Magnitude	High (8)	High (8)
Probability	Highly probable (4)	Highly probable (4)
Significance	**Medium (60)**	**Medium (60)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No, only best practise measures can be implemented	

Generic best practise mitigation/management measures:

Planning:
» Retain/re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude, but within the project site.

Operations:
» Maintain the general appearance of the facility as a whole.

Decommissioning:
» Remove infrastructure not required for the post-decommissioning use.
» Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications.

Residual impacts:

The visual impact will be removed after decommissioning, provided the wind energy facility infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain.

Nature: *Potential visual impact on sensitive visual receptors within the region (10 – 20km radius)*

Visual impact on observers travelling along the roads and residents at homesteads within a 10 – 20km radius of the wind turbine structures

	Without mitigation	***With mitigation***
Extent	Medium distance (2)	Medium distance (2)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)
Significance	**Medium (48)**	**Medium (48)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No, only best practise measures can be implemented	

Generic best practise mitigation/management measures:

Planning:
» Retain/re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude, but within the project site.

Operations:
» Maintain the general appearance of the facility as a whole.

Decommissioning:
» Remove infrastructure not required for the post-decommissioning use.
» Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications.

Residual impacts:

The visual impact will be removed after decommissioning, provided the wind energy facility infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain.

Nature: Shadow Flicker Visual impact of shadow flicker on sensitive visual receptors in close proximity to the wind energy facility.		
	Without mitigation	***With mitigation***
Extent	Very Short distance (4)	Very Short distance (4)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	**Medium (42)**	**Medium (42)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	N.A. due to the low probability of occurrence	
Generic best practise mitigation/management measures: N.A.		
Residual impacts: N.A.		

Nature: Visual impact of operational, safety and security lighting of the facility at night. Visual impact of lighting at night on sensitive visual receptors		
	No mitigation	***Mitigation considered***
Extent	Short/Medium (3)	Short/Medium (3)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	High (8)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium (60)**	**Medium (45)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: Planning & operation: » Implement needs-based night lighting if considered acceptable by the SACAA. » Limit aircraft warning lights to the turbines on the perimeter according to SACAA requirements, thereby reducing the overall impact. » Shield the sources of light by physical barriers (walls, vegetation, or the structure itself). » Limit mounting heights of lighting fixtures, or alternatively use foot-lights or bollard level lights. » Make use of minimum lumen or wattage in fixtures. » Make use of down-lighters, or shielded fixtures. » Make use of Low-Pressure Sodium lighting or other types of low impact lighting. » Make use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.		
Residual impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain.		

Nature: <u>*Visual impact of ancillary infrastructure*</u> Visual impact of the ancillary infrastructure on observers in close proximity to the structures.		
	Without mitigation	***With mitigation***
Extent	Very Short distance (4)	Very Short distance (4)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (24)**	**Low (24)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No, only best practise measures can be implemented	

Generic best practise mitigation/management measures:

<u>Planning:</u>

» Retain/re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude, but within the project site.

<u>Operations:</u>

» Maintain the general appearance of the infrastructure.

<u>Decommissioning:</u>

» Remove infrastructure not required for the post-decommissioning use.
» Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications.

Residual impacts:

The visual impact will be removed after decommissioning, provided the ancillary infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain.

Nature: <u>*Visual impact on the sense of place*</u> The potential impact on the sense of place of the region. The significance of the visual impacts on the sense of place within the region (i.e., beyond a 20km radius of the development and within the greater region) is expected to be of low significance.		
	Current scenario	***Future scenario***
Extent	Long distance (1)	Long distance (1)
Duration	Long term (4)	Long term (4)
Magnitude	Very High (10)	Moderate (6)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium (60)**	**Medium (33)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No, only best practise measures can be implemented	

Generic best practise mitigation/management measures:

<u>Planning:</u>

» Retain/re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude, but within the project site.

<u>Operations:</u>

» Maintain the general appearance of the facility as a whole.

<u>Decommissioning:</u>

» Remove infrastructure not required for the post-decommissioning use. » Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications.
Residual impacts: The visual impact will be removed after decommissioning, provided the wind energy facility infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain.

Decommissioning Phase Impacts

The visual impact will be removed after decommissioning, provided the wind energy facility infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain.

10.10.3 Implications for Project Implementation

With the implementation of mitigation measures by the developer, contractors, and operational staff, the significance of impacts of the FE Kudu Wind Energy Facility will be medium. On-site mitigation is viewed as the most practical and appropriate action, and viable options for reducing the overall impact of the development on these areas is detailed below:

» Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e., in already disturbed areas) where possible.

10.10.4 Overall Result

The primary visual impact, namely the appearance of the wind energy facility (the wind turbines) is not possible to mitigate. The functional design of the turbines cannot be changed in order to reduce visual impacts. Alternative colour schemes (i.e., painting the turbines sky-blue, grey or darker shades of white) are currently not permissible as the SACAA's Marking of Obstacles expressly states, "Wind turbines shall be painted bright white to provide the maximum daytime conspicuousness". Failure to adhere to the prescribed colour specifications will result in the fitting of supplementary daytime lighting to the wind turbines, once again aggravating the visual impact. Night-time lighting impacts can be mitigated through the implementation of needs-based night lighting, if this is considered acceptable by the SACAA and ICASA.

Overall, the significance of the visual impacts associated with the proposed FE Kudu Wind Energy Facility is expected to be high as a result of the generally undeveloped character of the landscape. The facility would be visible within an area that contains certain sensitive visual receptors who could consider visual exposure to this type of infrastructure to be intrusive. Such visual receptors include people travelling along the national, arterial and secondary roads, as well as, residents of rural homesteads or travellers/ tourists passing through the region.

Conventional mitigation (e.g., such as screening of the structures) of the potential visual impacts is highly unlikely to succeed due to the nature of the development and the receiving environment. The overall potential for mitigation is therefore generally low.

Even though it is possible that the potential visual impacts may exceed acceptable levels within the context of the receiving environment, the proposed development is not considered to be fatally flawed.

10.11. Assessment of Social Impact Assessment

Potential social and social impact assessment impacts and the relative significance of the impacts associated with the development of the FE Kudu Wind Energy Facility are summarised below (refer to **Appendix K**).

10.11.1 Description of Social Impacts

Impacts are expected to occur with the development of the FE Kudu Wind Energy Facility during the construction, operation and decommissioning phases. Both positive and negative impacts are identified and assessed.

Positive impacts during construction includes:
» Creation of employment and business opportunities, and
» The opportunity for skills development and on-site training.

Negative impacts during construction includes:
» Impacts associated with the presence of construction workers on local communities.
» Impacts related to the potential influx of jobseekers.
» 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.
» Nuisance impacts, such as noise, dust, and safety, associated with construction related activities and vehicles.
» Impact on productive farmland.

Positive impacts during operation includes:
» The establishment of infrastructure to improve energy security and support renewable sector.
» Creation of employment opportunities.
» Benefits for local landowners.
» Benefits associated with socio-economic contributions to community development.

Negative impacts during operation includes:
» Visual impacts and associated impacts on sense of place.
» Impact on property values.
» Impact on tourism.

10.11.2 Impact tables summarising the significance of socio-economic impacts during construction, operation and decommissioning (with and without mitigation measures)

Construction Phase Impacts

Nature: Creation of employment and business opportunities during the construction phase The creation of jobs in the area which will allow for the earning of an income and skills development.		
	Without Mitigation	**With Enhancement**
Extent	Local – Regional (2)	Local – Regional (3)
Duration	Short term (2)	Short term (2)

Magnitude	Moderate (6)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)
Significance	**Medium (40)**	**Medium (44)**
Status	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	N/A	N/A
Can impact be enhanced?	Yes	

Enhancement:

Employment

» Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase.
» Where reasonable and practical, the proponent should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. However, due to the low skills levels in the area, the majority of skilled posts are likely to be filled by people from outside the area.
» Where feasible, efforts should be made to employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria.
» Before the construction phase commences the proponent should meet with representatives from the DM to establish the existence of a skills database for the area. If such as database exists, it should be made available to the contractors appointed for the construction phase.
» The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that the proponent intends following for the construction phase of the project.
» Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the construction phase.
» The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.

Business

» The proponent should liaise with the DBNLM with regards the establishment of a database of local companies, specifically BBBEE companies, which qualify as potential service providers (e.g., construction companies, catering companies, waste collection companies, security companies etc.) prior to the commencement of the tender process for construction service providers. These companies should be notified of the tender process and invited to bid for project-related work.

Residual impacts: Improved pool of skills and experience in the local area.

Nature: <u>Potential impacts on family structures and social networks associated with the presence of construction workers</u>

The disruption of existing family structures and social networks and risks linked to potentially risky behaviour such as:

» An increase in alcohol and drug use.
» An increase in crime levels.
» The loss of girlfriends and/or wives to construction workers.
» An increase in teenage and unwanted pregnancies.
» An increase in prostitution.
» An increase in sexually transmitted diseases (STDs), including HIV

	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (1)

Duration	Short term for community as a whole (2)	Short term for community as a whole (2)
Magnitude	Moderate for the community as a whole (6)	Low for community as a whole (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium for the community as a whole (30)**	**Low for the community as a whole (21)**
Status	Negative	Negative
Reversibility	No in case of HIV and AIDS	No in case of HIV and AIDS
Irreplaceable loss of resources?	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods	
Can impact be mitigated?	Yes, to some degree. However, the risk cannot be eliminated	

Mitigation:

» Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase.
» Preparation and implementation of a Community Health, Safety and Security Plan (CHSSP) prior to and during the construction phase.
» The SEP and CHSSP should include a Grievance Mechanism that enables stakeholders to report resolve incidents.
» Where possible, the proponent should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically for semi and low-skilled job categories.
» The proponent should consider the option of establishing a Monitoring Committee (MC) for the construction phase that representatives from local landowners, farming associations, and the local municipality. This MC should be established prior to commencement of the construction phase and form part of the SEP.
» The proponent and contractor should develop a Code of Conduct (CoC) for construction workers. The code should identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code should be subject to appropriate disciplinary action and/or dismissed. All dismissals must comply with the South African labour legislation. The CoC should be signed by the proponent and the contractors before the contractors move onto site. The CoC should form part of the CHSSP.
» The proponent and the contractor should implement an HIV/AIDS, COVID-19 and Tuberculosis (TB) awareness programme for all construction workers at the outset of the construction phase. The programmes should form part of the CHSSP.
» The contractor should provide transport for workers to and from the site on a daily basis. This will enable the contactor to effectively manage and monitor the movement of construction workers on and off the site.
» The contractor must ensure that all construction workers from outside the area are transported back to their place of residence within 2 days for their contract coming to an end.
» No construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.

***Residual impacts*:** Impacts on family and community relations that may, in some cases, persist for a long period of time. Also, in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.

***Nature*:** <u>*Potential impacts on family structures, social networks and community services associated with the influx of job seekers*</u>

The main areas of concern associated with the influx of job seekers include:

» Impacts on existing social networks and community structures.
» Competition for housing, specifically low-cost housing.
» Competition for scarce jobs.
» Increase in incidences of crime.

	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (1)
Duration	Short term (2)	Short term (2)
Magnitude	Low (2)	Low (2)
Probability	Probable (3)	Probable (3)
Significance	**Low (18)**	**Low (15)**
Status	Negative	Negative
Reversibility	No in case of HIV and AIDS	No in case of HIV and AIDS
Irreplaceable loss of resources?	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods	
Can impact be mitigated?	Yes, to some degree. However, the risk cannot be eliminated	

Mitigation:

It is impossible to stop people from coming to the area in search of employment. However, the proponent should ensure that the employment criteria favour residents from the area. In addition:

» Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase.
» Preparation and implementation of a Community Health, Safety and Security Plan (CHSSP) prior to and during the construction phase.
» The proponent, in consultation with the DM, should investigate the option of establishing a MC to monitor and identify potential problems that may arise due to the influx of job seekers to the area.
» The proponent should implement a "locals first" policy, specifically with regard to unskilled and low skilled opportunities.
» The proponent should implement a policy that no employment will be available at the gate.
» The contractor must ensure that all construction workers from outside the area are transported back to their place of residence within 2 days for their contract coming to an end.
» No construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.

***Residual impacts*:** Impacts on family and community relations that may, in some cases, persist for a long period of time. Also, in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.

***Nature*:** *Potential risk to safety of farmers and farm workers, livestock and damage to farm infrastructure associated with the presence of construction workers on site*

The presence on and movement of construction workers on and off the site poses a potential safety threat to local famers and farm workers in the vicinity of the site. In addition, farm infrastructure, such as fences and gates, may be damaged and stock losses may also result from gates being left open and/or fences being damaged, or stock theft linked either directly or indirectly to the presence of farm workers on the site.

	Without Mitigation	**With Mitigation**
Extent	Local (3)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	Medium (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium (33)**	**Low (24)**
Status	Negative	Negative

Reversibility	Yes, compensation paid for stock losses and damage to farm infrastructure etc.	Yes, compensation paid for stock losses and damage to farm infrastructure etc.
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	Yes

Mitigation:

» The proponent should enter into an agreement with the local farmers in the area whereby damages to farm property etc. during the construction phase will be compensated for. The agreement should be signed before the construction phase commences.
» All farm gates must be closed after passing through.
» Contractors appointed by the proponent should provide daily transport for low and semi-skilled workers to and from the site.
» The proponent should consider the option of establishing a MF (see above) that includes local farmers and develop a Code of Conduct for construction workers. This committee should be established prior to commencement of the construction phase. The Code of Conduct should be signed by the proponent and the contractors before construction activities commence.
» The proponent should hold contractors liable for compensating farmers and communities in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. This should be contained in the Code of Conduct to be signed between the proponent, the contractors, and neighbouring landowners. The agreement should also cover loses and costs associated with fires caused by construction workers or construction related activities (see below).
» The Environmental Management Plan (EMP) must outline procedures for managing and storing waste on site, specifically plastic waste that poses a threat to livestock if ingested.
» Contractors appointed by the proponent must ensure that all workers are informed at the outset of the construction phase of the conditions contained in the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms.
» Contractors appointed by the proponent must ensure that construction workers who are found guilty of stealing livestock and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation.
» It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.

Residual impacts No, provided losses are compensated for.

Nature: <u>*Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of grass fires*</u>

The presence of construction workers and construction-related activities on the site poses an increased risk of grass fires that could, in turn pose, a threat to livestock, crops, wildlife and farm infrastructure. The potential risk of grass fires will be higher during the dry, windy winter months from May to October.

	Without Mitigation	**With Mitigation**
Extent	Local (4)	Local (2)
Duration	Short term (2)	short term (2)
Magnitude	Moderate due to reliance on agriculture for maintaining livelihoods (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium (36)**	**Low (24)**
Status	Negative	Negative
Reversibility	Yes, compensation paid for stock and crop losses etc.	

Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	

Mitigation:

- » The proponent should enter into an agreement with the local farmers in the area whereby damages to farm property etc. during the construction phase will be compensated for. The agreement should be signed before the construction phase commences.
- » Contractor should ensure that open fires on the site for cooking or heating are not allowed except in designated areas.
- » Smoking on site should be confined to designated areas.
- » Contractor should ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced. Measures to reduce the risk of fires include avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high-risk dry, windy winter months.
- » Contractor should provide adequate fire-fighting equipment on-site, including a fire fighting vehicle.
- » Contractor should provide fire-fighting training to selected construction staff.
- » No construction staff, with the exception of security staff, to be accommodated on site overnight.
- » As per the conditions of the Code of Conduct, in the advent of a fire being caused by construction workers and or construction activities, the appointed contractors must compensate farmers for any damage caused to their farms. The contractor should also compensate the fire-fighting costs borne by farmers and local authorities.

Residual impacts No, provided losses are compensated for.

Nature: _Potential noise, dust and safety impacts associated with construction related activities_

Construction related activities, including the movement of heavy construction vehicles of and on the site, has the potential to create dust, noise and safety impacts and damage roads.

	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (1)
Duration	Short Term (2)	Short Term (2)
Magnitude	Medium (6)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	**Medium (30)**	**Low (15)**
Status	Negative	Negative
Reversibility	Yes	
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	

Mitigation:

The potential impacts associated with heavy vehicles can be effectively mitigated. The mitigation measures include:

- » The movement of construction vehicles on the site should be confined to agreed access road/s.
- » Establishment of a Grievance Mechanism that provides local farmers and other road users with an effective and efficient mechanism to address issues related to construction related impacts, including damage to local gravel farm roads.
- » The movement of heavy vehicles associated with the construction phase should be timed to avoid times and days of the week, such as weekends, when the volume of traffic travelling along the access roads may be higher.
- » Establishment of a Grievance Mechanism that provides local farmers and other road users with an effective and efficient mechanism to address issues related to construction related impacts, including damage to local gravel farm roads.

» Dust suppression measures should be implemented, such as wetting on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. » All vehicles must be road worthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.
Residual impacts If damage to local farm roads is not repaired then this will affect the farming activities in the area and result in higher maintenance costs for vehicles of local farmers and other road users. The costs will be borne by road users who were no responsible for the damage.

Nature: *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 project etc. will damage farmlands and result in a loss of farmlands for grazing.* The activities associated with the construction phase and establishment of the proposed project and associated infrastructure will result in the disturbance and loss of land available for grazing.		
	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Long term-permanent if disturbed areas are not effectively rehabilitated (5)	Short term if damaged areas are rehabilitated (2)
Magnitude	Medium (6)	Minor (2)
Probability	Probable (3)	Highly Probable (4)
Significance	**Medium (36)**	**Low (20)**
Status	Negative	Negative
Reversibility	Yes, disturbed areas can be rehabilitated	Yes, disturbed areas can be rehabilitated
Irreplaceable loss of resources?	Yes, loss of farmland. However, disturbed areas can be rehabilitated	Yes, loss of farmland. However, disturbed areas can be rehabilitated
Can impact be mitigated?	Yes, however, loss of farmland cannot be avoided	Yes, however, loss of farmland cannot be avoided
Mitigation: » An Environmental Control Officer (ECO) should be appointed to monitor the construction phase. » Existing internal roads should be used where possible. In the event that new roads are required, these roads should be rehabilitated on completion of the construction phase. » The footprint associated with the construction related activities (access roads, construction camps, workshop etc.) should be minimised. » All areas disturbed by construction related activities, such as access roads on the site, construction camps etc., should be rehabilitated at the end of the construction phase. » The implementation of a rehabilitation programme should be included in the terms of reference for the contractor/s appointed. The specifications for the rehabilitation programme should be included in the EMPr. » The implementation of the Rehabilitation Programme should be monitored by the ECO.		
Residual impacts**:** Overall loss of farmland could affect the livelihoods of the affected farmers, their families, and the workers on the farms and their families. However, disturbed areas can be rehabilitated.		

Operation Phase Impacts

Nature: *Development of infrastructure to improve energy security and support the renewable sector* The positive benefits associated with energy security and the provision of green energy.		
	Without Enhancement	**With Enhancement**
Extent	Local, Regional and National (4)	Local, Regional and National (5)
Duration	Long term (4)	Long term (4)

Magnitude	High (8)	High (8)
Probability	Highly Probable (4)	Definite (5)
Significance	**High (64)**	**High (85)**
Status	Positive	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	Yes, impact of climate change on ecosystems	Reduced CO_2 emissions and impact on climate change
Can impact be mitigated?	Yes	

Enhancement Measures:

- Implement a skills development and training programme aimed at maximizing the number of employment opportunities for local community members.
- Maximise opportunities for local content, procurement, and community shareholding.

Residual impacts: Overall reduction in CO_2 emission, reduction in water consumption for energy generation, contribution to establishing an economically viable commercial renewables generation sector in the Northern Cape and South Africa.

Nature: *Creation of employment and business opportunities associated with the operational phase*

The proposed development will create in the region of 40-50 full time employment opportunities during the operational phase, of which 55% will be unskilled, 35% semi-skilled, and 15% skilled.

	Without Enhancement	**With Enhancement**
Extent	Local and Regional (1)	Local and Regional (2)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Low (4)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	**Low (28)**	**Medium (40)**
Status	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	

Enhancement:

Employment

- Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase.
- Where reasonable and practical, the proponent should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. However, due to the low skills levels in the area, the majority of skilled posts are likely to be filled by people from outside the area.
- Where feasible, efforts should be made to employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria.
- Before the construction phase commences the proponent should meet with representatives from the DM to establish the existence of a skills database for the area. If such as database exists, it should be made available to the contractors appointed for the construction phase.
- The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that the proponent intends following for the construction phase of the project.
- Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the construction phase.

» The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. **Business** » The proponent should liaise with the DBNLM with regards the establishment of a database of local companies, specifically BBBEE companies, which qualify as potential service providers (e.g., construction companies, catering companies, waste collection companies, security companies etc.) prior to the commencement of the tender process for construction service providers. These companies should be notified of the tender process and invited to bid for project-related work.
***Residual impacts*:** Creation of permanent employment and skills development opportunities for members from the local community and creation of additional business and economic opportunities in the area

Nature: *The generation of additional income represents a significant benefit for the local affected farmer(s) and reduces the risks to their livelihoods posed by droughts and fluctuating market prices for sheep and farming inputs, such as feed etc.* In terms of the rental agreement, the affected landowner will be paid an annual amount dependent upon the number of wind turbines located on the property. The additional income will reduce the risk to their livelihoods posed by droughts and fluctuating market prices for sheep and farming inputs, such as fuel, feed etc.		
	Without Enhancement	**With Enhancement**
Extent	Local (1)	Local (3)
Duration	Long term (4)	Long term (4)
Intensity	Low (4)	Moderate (6)
Likelihood	Probable (3)	Definite (5)
Significance	**Low (27)**	**High (65)**
Status	Positive	Positive
Reversibility	Yes	Yes
Can impact be enhanced?	Yes	
***Enhancement*:** » Implement agreements with affected landowners.		
***Residual impacts*:** Support for local agricultural sector and farming		

Nature: *Benefits associated with support for local community's form SED contributions* The establishment of Community Trusts projects create significant benefits for local rural communities, such as financial security. However, Community Trusts can also be mismanaged. This is an issue that will need to be addressed when setting up the trust.		
	Without Enhancement	**With Enhancement**
Extent	Local and Regional (2)	Local and Regional (3)
Duration	Long term (4)	Long term (4)
Intensity	Low (4)	Moderate (6)
Likelihood	Probable (3)	Definite (5)
Significance	**Medium (30)**	**High (65)**
Status	Positive	Positive
Reversibility	Yes	Yes
Can impact be enhanced?	Yes	
***Enhancement*:** » The proponents should liaise with the DBNLM to identify projects that can be supported by SED contributions.		

» Clear criteria for identifying and funding community projects and initiatives in the area should be identified. The criteria should be aimed at maximising the benefits for the community as a whole and not individuals within the community. » Strict financial management controls, including annual audits, should be instituted to manage the SED contributions.
Residual impacts: Promotion of social and economic development and improvement in the overall well-being of the community

Nature: *Visual impact associated with the proposed facility and associated infrastructure and the potential impact on the area's rural sense of place.* The proposed wind farm has the potential to impact on the areas existing rural sense of place		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	**Medium (36)**	**Medium (36)**
Status	Negative	Negative
Reversibility	Yes, wind farm components and other infrastructure can be removed.	
Irreplaceable loss of resources?	No	
Can impact be mitigated?	Yes	
Mitigation: » The recommendations contained in the VIA should be implemented.		
Residual impacts: Potential impact on current rural sense of place.		

Nature: *Potential impact of the wind farm on property values* The wind farm will impact on the property values of surrounding areas		
	Without Mitigation	**With Enhancement / Mitigation**
Extent	Local (2)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	**Low (24)**	**Low (21)**
Status	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	
Enhancement: » The recommendations contained in the VIA should be implemented		
Residual impacts: Linked to visual impact on sense of place.		

Nature: *Potential impact of the wind farm on local tourism* (including Karroo Secrets Farm Stay) The impact of the facility on tourism in the surrounding area.		
	Without Mitigation	**With Mitigation**

Extent	Local (2)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	**Low (24)**	**Low (21)**
Status	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	
Enhancement: » The recommendations contained in the VIA should be implemented.		
Residual impacts: Linked to visual impact on sense of place.		

Decommissioning Phase Impacts

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 the proposed facility the decommissioning phase is likely to involve the disassembly and replacement of the existing components with more modern technology. This is likely to take place in the 20 - 25 years post commissioning. The decommissioning phase is therefore likely to create additional construction type jobs, as opposed to the jobs losses typically associated with decommissioning.

Given the moderate number of people employed during the operational phase (~ 40-50), the social impacts at a community level associated with decommissioning can be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be Low (negative). Decommissioning will also create temporary employment opportunities, which would represent a positive temporary impact. The significance would be Low (positive) with enhancement due to limited opportunities and short duration.

Nature: *Social impacts associated with retrenchment including loss of jobs, and source of income* Decommissioning will also create temporary employment opportunities, which would represent a positive temporary impact		
	Without Mitigation	**With Mitigation**
Extent	Local (4)	Local (2)
Duration	Short term (2)	short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium (36)**	**Low (24)**
Status	Negative	Negative
Reversibility	N/A	
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	
Enhancement:		

» The proponent should ensure that retrenchment packages are provided for all staff retrenched when the plant is decommissioned. » All structures and infrastructure associated with the proposed facility should be dismantled and transported off-site on decommissioning.
***Residual impacts*:** No, provided effective retrenchment package.

10.11.3 Overall Result

The positive effects and impacts of FE Kudu Wind Energy Facility would outweigh the negative effects. This is largely due to the fact that the project is expected to have a positive net impact on economic development, employment, household earnings, government revenue and skills development in the country and most importantly in the local community that experiences a high unemployment rate as well as a small economic base. The negative impacts that are expected to occur as a result of the project will be far more localised and would affect a significantly smaller number of people and households than in the case of the net benefits that would be derived by the project.

No negative impacts with an unacceptable level of significance following the implementation of mitigation are expected to occur from a social perspective.

10.12. Assessment of Impacts on Traffic

Potential impacts on the traffic components of the affected area and the relative significance of the impacts associated with the development of the FE Kudu Wind Energy Facility are summarised below (refer to **Appendix M**).

10.12.1 Description of Traffic Impacts

The traffic expected to be generated by the development of the FE Kudu Wind Energy Facility can be divided into the three phases of the project, namely:

» *Construction Phase* – The construction phase includes the transportation of people, construction materials and equipment to the project site. This phase also includes the construction of roads, excavation of turbine footings, trenching for electrical cables and other ancillary construction works that will temporarily generate the largest amount of traffic. Potential traffic congestion and delays on the surrounding road network and associated noise and dust pollution are expected to occur. Traffic generated by the construction of the facility will have a medium significant impact on the surrounding road network. The exact number of trips generated during construction will be determined by the contractor and the haulage company transporting the components to site, the staff requirements and where equipment is sourced from.

» *Operation Phase* – During operation, it is expected that staff and security will visit the facility. Approximately 40-50 full-time employees will be stationed on site (subject to change). Based on experience with similar projects, the number of full-time employees is generally low and consequently, the associated trips are negligible. The traffic generated during this phase will be minimal and will have a nominal impact on the surrounding road network.

» *Decommissioning Phase* – The decommissioning phase will generate construction related traffic including the transportation of people, construction materials, water and equipment (i.e. abnormal trucks transporting turbine components). The potential traffic impact will be of medium significance before mitigation measures during the construction and decommissioning phases. However, considering that this is temporary and short term in nature, the impact can be mitigated to an acceptable level of low significance.

10.12.2 Impact tables summarising the significance of impacts on traffic during the construction and operation phases (with and without mitigation)

Construction & Decommissioning Phase Impacts

Nature: *Traffic impacts expected during the construction phase* Traffic congestion due to an increase in traffic caused by the transportation of equipment, material and staff to site		
	Without mitigation	**With mitigation**
Extent	National (4)	National (4)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium (36)**	**Low (30)**
Status (positive or negative)	Negative	Negative
Reversibility	Completely reversible	Completely reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: » Source equipment, machinery and material locally as far as possible. » Stagger deliveries of components to site and scheduled to occur outside of peak traffic periods as much as possible. » Dust suppression of gravel roads close to and on site. » Regular maintenance of gravel roads located within the site boundary, including the access road to the site. » If any damage occurs due to construction vehicles along the road in the vicinity, these damages need to be repaired. » The use of quarries near the site as much as possible. » Staff trips to occur outside of main peak traffic periods as far as possible. » Delivery Management Plan		
Residual Impacts: The proposed mitigation measures for the construction traffic will result in a reduction of the impact on the surrounding road network. Traffic will return to normal levels after construction is completed.		

Operation Phase Impacts

Nature: *Traffic impacts expected during the operational phase* Slight increase in trips on external roads due to transport of staff to and from site and irregular maintenance trips		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (20)**	**Low (20)**
Status (positive or negative)	Negative	Negative

Reversibility	Completely reversible	Completely reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: » None required.		
Residual Impacts: Low residual impact.		

The traffic generated during the operational phase will be minimal and will have not have any impact on the surrounding road network. The decommissioning phase impacts will be the same as the impacts associated with the construction phase which includes traffic congestion. This is based on the fact that similar trips/movements are expected.

10.12.3 Overall Result

The traffic generated during the construction phase, although significant, will be temporary and impacts are considered to be negative and of medium significance before and of low significance after mitigation. The operation phase impacts would be minimal. The decommissioning phase will result in the same impact as the construction phase as similar trips are expected. The potential traffic impact will be of medium significance before mitigation measures during the construction and decommissioning phases. However, considering that this is temporary and short term in nature, the impact can be mitigated to an acceptable level of low significance.

No impacts of high significance were identified, and no fatal flaws are associated with the FE Kudu Wind Energy Facility from a traffic perspective.

10.13. Assessment of the 'Do Nothing' Alternative

The 'do-nothing' alternative (i.e., no-go alternative) is the option of not constructing the FE Kudu Wind Energy Facility Should this alternative be selected, there would be no environmental impacts (biophysical changes due to transformation) on the site due to the construction and operation activities of a wind energy facility.

a) Land use and transformation

The affected property (i.e., project site) is currently used for livestock grazing and for a secondary income through tourism activities. The grazing capacity for most of the study area, is 20 ha/LSU, with 24ha/LSU and 26ha/LSU found in the eastern side. The proposed development footprint of the FE Kudu Wind Energy Facility would allow the on-going grazing to continue on areas of the affected properties that will not house wind energy facility infrastructure. The development footprint is approximately 2% of the total extent of the project site (that is 185ha of 9 170ha). Therefore, the current land-use will be retained, while also generating renewable energy from the wind. The impact on agricultural activities, with appropriate mitigation measures in place, as a result of the project is expected to be low.

The only tourism activities in close proximity to proposed activities and infrastructure is Karoo Secret on the subject property itself. The property is currently used as a working Karoo stock farm, and the facilities are operated by the owner as a secondary enterprise. The operation provides accommodation (total capacity of 13) in two facilities - Karoo Secret and Lark Cottage. Both are located along the Nelspoort gravel road to the east of the Rooidraai farmstead complex on 85/2. The operation caters to overnight visitors (travellers) as well as destination visitors associated with the Karoo farm stay experience, and birding.

The implementation of the 'do-nothing' alternative would leave the land-use restricted to the current livestock grazing and limitations, losing out on the opportunity to generate renewable energy from wind as additive thereto (i.e., current activities would continue). Therefore, from a land-use perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of a viable and compatible land use.

In addition, the landowner would obtain an income from the wind energy facility (as the developer would pay a portion of the revenue generated to the landowner in accordance with the lease agreement for the use of the land). This would contribute towards the financial stability of the landowner which would in turn contribute to the financial viability of the farming practices on the property. The implementation of the 'do nothing' alternative would retain the current land-use, fore-going the opportunity to generate renewable energy from the wind and at the same time continue the current agricultural activities on areas that fall outside of the proposed infrastructure.

The 'do nothing' alternative would result in a lost opportunity for the landowner (in terms of implementing a compatible land use option, while still retaining the current land use, as well as a loss in long-term revenue) and the country (in terms of renewable energy). From this perspective the no-go alternative is not preferred when considering land use and agricultural aspects of the project site. Use of the identified site for the development of the proposed wind energy facility is considered to be a preferred land use as the benefits will outweigh the impacts.

From a visual perspective, however, the implementation of the 'do-nothing' alternative will conserve the landscape as it currently is. Transformation will lead to a change in the sense of place for the area, however no fatal flaws have been identified in this regard.

b) Socio-economic impact

Social: The impacts of pursuing the no-go alternative are both positive and negative as follows:

» The benefits would be that there is no disruption from an influx of jobseekers into the area, nuisance impacts (noise and dust during construction), visual impacts and safety and security impacts. The impact is therefore neutral.
» There would also be an opportunity lost in terms of job creation, skills development and associated economic business opportunities for the local economy, as well as a loss of the opportunity to generate energy from a renewable resource without creating detrimental effects on the environment.

Foregoing the proposed development would not necessarily compromise the development of renewable energy facilities in South Africa. However, the socio-economic benefits for local communities at this location and within the surrounding area would be forfeited. The area has experienced social challenges which has resulted in the need for socio-economic upliftment.

Therefore, from a socio-economic perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of socio-economic benefits, when considering the current socio-economic conditions of the area.

New Business: Some of the positive spin off effects that are to ensue from the project expenditure will be localised in the communities located near the site, such as the towns of Aberdeen. The local services sector and specifically the trade, transportation, catering and accommodation, renting services, personal services and business services are expected to benefit the most from the project activities during the construction phase. New business sales that will be stimulated as a result of the establishment of the wind energy facility, albeit for a temporary period, will be lost with the implementation of the 'do nothing' alternative. Therefore, from a business perspective, the 'do-nothing' alternative is not preferred as there is a loss of new business opportunities. These new business opportunities are already demonstrated through the increase in visitors at the Karoo Secret Guest House, now at pre-feasibility stage.

Employment: The development of the FE Kudu Wind Energy Facility will aid in a reduction of the unemployment rate; however, if the wind energy facility is not developed then the unemployment rate will not be positively influenced by the proposed development. The upliftment and socio-economic benefits for individuals within local communities would be forfeited with the implementation of the 'do nothing' alternative. Therefore, from an employment perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of employment opportunities.

Skills development: The establishment of the FE Kudu Wind Energy Facility will offer numerous opportunities for skills transfer and development. This is relevant for both on-site activities and manufacturing activities. Various wind energy facilities are proposed to be developed in the area and in the Eastern Cape Province, which means that the transfer of skills from foreign experts to the local engineers and construction workers will take place, similar to what has taken place where wind energy facilities have been constructed and operated within the Province. The skills training and transfer benefits for individuals within local communities would be forfeited with the implementation of the 'do nothing' alternative.

Municipal goals: The Dr Beyers Naude Local Municipality Integrated Development Plan indicates that opportunities for renewable energy and electricity are present within the municipal area, which is required for electricity provision to all in need and the upgrading of electricity infrastructure. The no-go alternative will therefore result in the above opportunities not being realised and a subsequent loss of income and opportunities and growth to local people. From this perspective the no-go alternative is not preferred.

c) Impact on electricity supply and targets regarding renewable energy

At a broader scale, the benefits of additional capacity to the electricity grid and those associated with the introduction of renewable energy would not be realised. The Eastern Cape has an ample wind resource. Although the FE Kudu Wind Energy Facility only proposed to contribute a contracted capacity of up to 600MW to the grid capacity. The generation of electricity from renewable energy resources offers a range of potential socio-economic and environmental benefits for South Africa. These benefits include:

» Increased energy security;
» Resource saving (i.e., fossil fuels and water);
» Exploitation of South Africa's significant renewable energy resource;
» Pollution reduction;
» Climate friendly development;
» Support for international agreements;
» Employment creation;
» Acceptability to society; and

» Support to a new industry sector.

At present, South Africa is some way off from fully exploiting the diverse gains from renewable energy and from achieving a considerable market share in the renewable energy industry. South Africa's electricity supply remains heavily dominated by coal-based power generation, with the country's significant renewable energy potential largely untapped to date. Energy supply constraints and the associated load shedding have had a significant impact on the economic development of the South African economy. South Africa is also 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 of carbon emissions.

The Integrated Resource Plan (IRP) (2019) provides for the development of 17 743MW of capacity from large scale wind energy facilities by 2030, with an annual contribution of 1600MW from 2022. The IRP essentially drives the assortment of energy to be implemented for South Africa which is known as the energy mix of the country, considering various generation technologies.

The 'do-nothing' alternative will do little to influence the renewable energy targets set by government. However, as the project site experiences ample wind resource and optimal grid connection opportunities are available, not developing the FE Kudu Wind Energy Facility would see such an opportunity being lost. As current land use activities can continue on the site once the project is operational, the loss of the land to this project during the operation phase (less than 3% of the project site) is not considered significant. In addition, the Eastern Cape Province will not benefit from additional generated power being evacuated directly into the Province's grid. The transition to clean, renewable energy will also not be realised. Therefore, from a regional perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of benefits for the regional area.

d) Conclusion

From the specialist studies undertaken, no environmental fatal flaws were identified to be associated with the FE Kudu Wind Energy Facility. All impacts associated with the project can be mitigated to acceptable levels. If the wind energy facility is not developed the following positive impacts will not be realised:

» Job creation from the construction and operation phases.
» Economic benefit to participating landowners due to the revenue that will be gained from leasing the land to the developer.
» Meeting of energy generation mix in a most economic and rapid manner.
» Provision of clean, renewable energy in an area where it is optimally available.

As detailed above, the 'do-nothing' alternative will result in a number of lost opportunities. The 'do nothing' alternative is therefore not preferred and not proposed to be implemented for the development of the FE Kudu Wind Energy Facility.

CHAPTER 11: ASSESSMENT OF POTENTIAL CUMULATIVE IMPACTS

As identified and assessed in Chapter 10, a wind energy facility development may have effects (positive and negative) on natural resources, the social environment and on the people living in a project area. The preceding impact assessment chapter has reported on the assessment of the impacts associated with the FE Kudu Wind Energy Facility largely in isolation (from other similar developments).

The FE Kudu Wind Energy Facility falls within the Beaufort West REDZs which has been identified by the DFFE as an area highly suitable for wind energy facilities given a range of factors considered. Therefore, DFFE envisages dealing with multiple applications and cumulative issues within a REDZ area. The REDZ are of strategic importance for large scale wind and solar photovoltaic development, in terms of Strategic Integrated Project (SIP) 8. These zones are considered to be areas where significant negative impacts on the environment are limited and socio-economic benefits to the country can be enhanced. Four (4) other renewable energy project within the immediate area surrounding the FE Kudu Wind Energy Facility has been authorised for future development. The FE Kudu Wind Energy Facility will contribute to cumulative impact experienced within the area.

This chapter assesses the potential for the impacts associated with the FE Kudu Wind Energy Facility to become more significant when considered in combination with the other operating or proposed wind energy facilities within the area.

11.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the BA report includes the following information required in terms of the EIA Regulations, 2014 - Appendix 1: Content of basic assessment reports:

Requirement	Relevant Section
3(j)(i) an assessment of each identified potentially significant impact and risk, including cumulative impacts.	The cumulative impacts associated with the development of the FE Kudu Wind Energy Facility are included and assessed within this chapter.

11.2 Approach taken to Assess Cumulative Impacts

The cumulative impacts that have the potential to be compounded through the development of the wind energy facility and its associated infrastructure in proximity to other similar developments include impacts such as those listed below. The role of the cumulative assessment is to confirm if such impacts are relevant to the FE Kudu Wind Energy Facility within the project site being considered for the development. This assessment considers whether the cumulative impact will result in:

- Unacceptable loss of threatened or protected vegetation types or species through clearing, resulting in an impact on the conservation status of such flora or ecological functioning;
- Unacceptable loss to sensitive aquatic features;
- Unacceptable risk to avifauna through collision, avoidance and displacement;
- Unacceptable risk to bats through loss of habitat, infringement on roosting or breeding areas, or risk to collision-prone species;

- Unacceptable loss of high agricultural potential areas presenting a risk to food security and increased soil erosion;
- Complete or whole-scale change in sense of place and character of an area and unacceptable visual intrusion;
- Unacceptable loss of heritage resources;
- Unacceptable negative socio-economic impact;
- Unacceptable increase in ambient noise levels, resulting in an impact on the normal functioning of the occupants of the area;
- Unacceptable risk to the operation of the wind energy facility due to the potential wake loss effect and the social implications from an operational point of view; and
- Unacceptable impact to the traffic network.

Further to the above, positive cumulative impacts are also expected and will be associated with socio-economic aspects and benefits.

Figure 11.1 indicates the location of the FE Kudu Wind Energy Facility in relation to other proposed and authorised wind energy facilities located within the surrounding area of the project site. These projects were identified using the Department of Forestry, Fisheries and the Environment Renewable Energy Database and current knowledge of projects operating and being proposed in the area. No operational wind farms exist in the area. For the assessment of cumulative impacts only developments within a 30km radius from the FE Kudu Wind Energy Facility were considered, which is in line with the Department of Forestry, Fisheries and the Environment requirements.

There are four (4) authorised wind energy facilities (construction has not commenced) located within a 30km radius of the FE Kudu Wind Energy Facility site (refer to **Figure 11.1** and **Table 11.1**). Two other projects considered for the area (FE Tango Wind Energy Facility and the Kariega Wind Facility Cluster) have an application for environmental authorisation in process. The potential for cumulative impacts is summarised in the sections which follow and have been considered within the specialist studies (refer to **Appendices D – M**).

Table 11.1: Wind energy facilities planned within the broader area (within a 30km radius) of the FE Kudu Wind Energy Facility project site

Project Name	Capacity	Location from the FE Kudu Wind Energy Facility project site	Project Status
Eskom Aberdeen Wind Farm	200MW	East of FE Kudu Wind Energy Facility	Authorised No planned construction date
Aberdeen Wind Facility 1	240MW	South east of FE Kudu Wind Energy Facility	Authorised No planned construction date
Aberdeen Wind Facility 2	240MW	South east of FE Kudu Wind Energy Facility	Authorised No planned construction date
Aberdeen Wind Facility 3	240MW	South east of FE Kudu Wind Energy Facility	Authorised No planned construction date

Project Name	Capacity	Location from the FE Kudu Wind Energy Facility project site	Project Status
Kariega Wind Facility Cluster	To be defined	Adjacent to and east of FE Kudu Wind Energy Facility	EA Application currently in process
FE Tango Wind Energy Facility	150MW	East of FE Kudu Wind Energy Facility	EA Application currently in process

Not all the wind energy facilities presently under consideration by various wind energy developers will be authorised and/or built for operation. Not all proposed developments will be granted the relevant permits by the relevant authorities (DFFE, DMRE, NERSA and Eskom) and this is because of the following reasons:

- There may be limitations to the capacity of the existing or future Eskom grid;
- Not all applications will receive a positive environmental authorisation;
- There are stringent requirements to be met by applicants in terms of the REIPPP Programme and a highly competitive process that only selects the most competitive projects;
- Not all proposed wind energy facilities will be able to reduce the associated negative impacts to acceptable levels or be able to mitigate the impacts to acceptable levels (fatally flawed);
- Not all proposed facilities will eventually be granted a generation license by NERSA and sign a Power Purchase Agreement; and
- Not all developers will be successful in securing financial support to advance their projects further.

As there is uncertainty whether the above-mentioned facilities will be implemented, it is also difficult to quantitatively assess the potential cumulative impacts. The cumulative impacts of other known wind energy facilities in the broader area and the FE Kudu Wind Energy Facility are therefore qualitatively assessed in this Chapter.

It is important to explore the potential for cumulative impacts on a qualitative basis as this will lead to a better understanding of these impacts and the potential for mitigation that may be required. The scale at which the cumulative impacts are assessed is important. For example, the significance of the cumulative impact on the regional or national economy will be influenced by wind energy developments throughout South Africa, while the significance of the cumulative impact on visual amenity may only be influenced by developments that are in closer proximity to each other, i.e., up to 30km apart. For practical purposes a sub-regional scale of 30km has been selected for this cumulative impact evaluation.

In the sections below a summary of the potential for cumulative impacts resulting from several wind energy facilities within a 30km radius of the FE Kudu Wind Energy Facility are explored (refer also to the specialist reports contained in **Appendix D** to **M**). Impacts are assessed accordingly in terms of the proposed project in isolation and the impact considering other projects within the area or the cumulative impact with and without mitigation, as was deemed relevant by the specialist. The approach taken by the various specialists in assessing cumulative impacts is informed by the scale at which the impact is likely to occur.

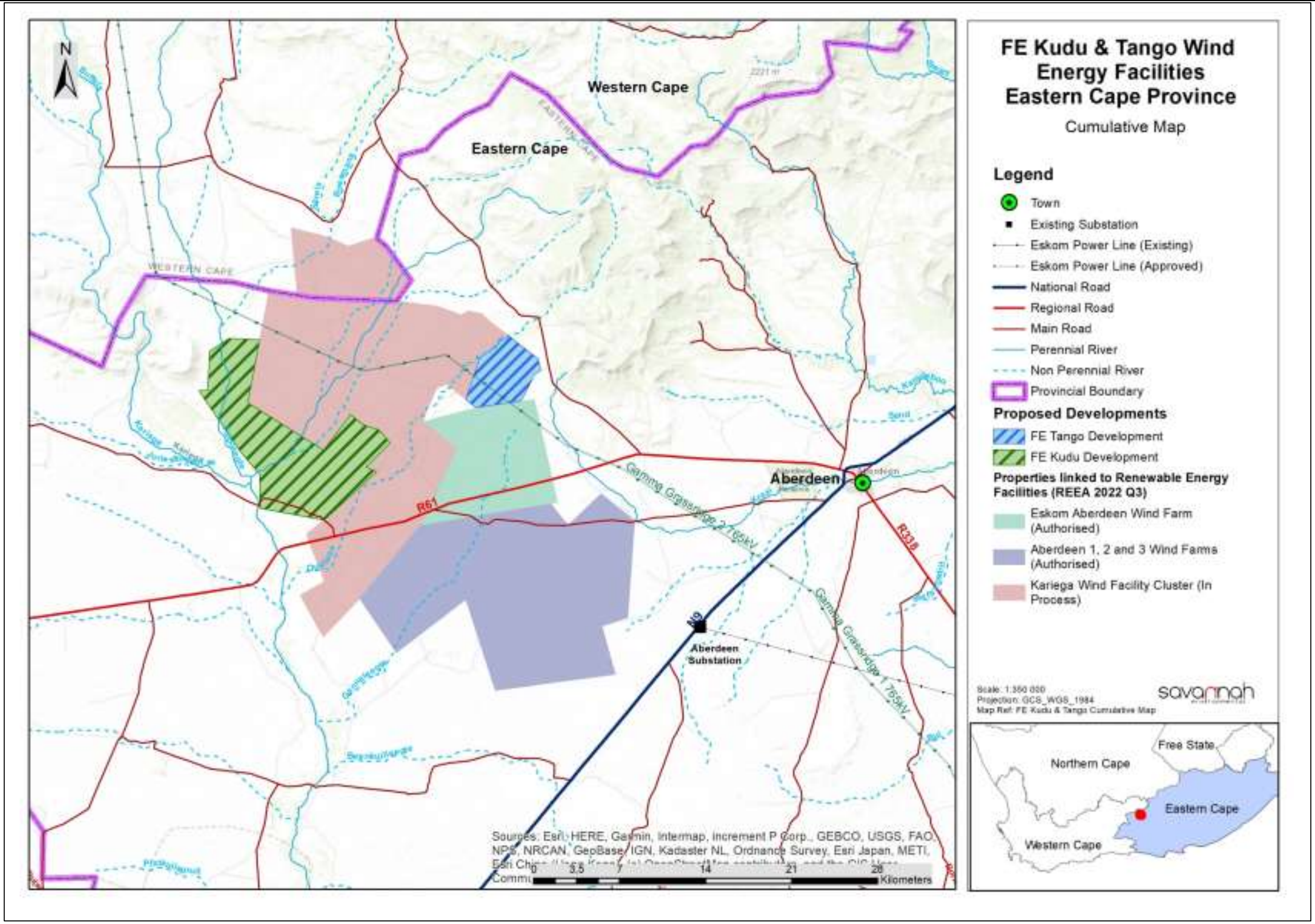

Figure 11.1: Wind farm projects located within the surrounding area of the FE Kudu Wind Energy Facility project site that are considered as part of the cumulative impact assessment

11.3 Cumulative Impacts on Ecological Processes

Current levels of cumulative impact from renewable energy facilities are considered low as there are no constructed facilities within 30km of the FE Kudu Wind Energy Facility.

The development of the facility infrastructure would result in habitat loss and an increase in overall cumulative impacts on fauna and flora in the area. However, as the affected Eastern Lower Karoo vegetation type and the broader area is still largely intact, the extent of habitat loss would not be significant relative to the overall extent of the affected vegetation types. The development of the FE Kudu Wind Energy Facility would not change the overall threat status of any vegetation types or special habitats. As such, the contribution of the FE Kudu Wind Energy Facility to habitat loss and the overall level of cumulative impact in the area is considered to be low and acceptable.

The overall cumulative impact of the proposed project when considered in isolation was rated as low significance. When considered in combination with other projects in the area, the overall cumulative impact of these were also rated as low significance.

Nature: <u>*Cumulative impact on terrestrial ecology.*</u> Development of the FE Kudu Wind Energy Facility may impact on broad-scale ecological processes such as the ability of fauna to disperse. The development would potentially contribute to habitat degradation and the loss of landscape connectivity and ecosystem function within the area, but this is likely to be relatively low as most species are likely to be able to move through the facility as large turbine-free areas are likely to remain available to fauna for movement.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Low (1)	Low (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	**Low (27)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Confidence in findings: *High*		
Mitigation: » Blanket clearing of vegetation must be limited to the site. No clearing outside of footprint to take place. » Any site camps and laydown areas requiring clearing must be located within already disturbed areas away from watercourses. » A search and rescue would be recommended before construction commences. Any flora search and rescue will likely include a few individuals of widespread, cosmopolitan or common but protected species. » A suitable weed management strategy to be implemented during construction and operation phases. It is imperative that any actions are implemented timeously as once alien and weed species generate seeds, the problem is exacerbated. » Ensure that the mitigation hierarchy is applied with a particular emphasis on reducing the development footprint, rehabilitating disturbed areas and minimising degradation around the site. » An open space management plan should be developed for the site, which should include management of biodiversity within the affected areas, as well as that in the adjacent veld		

11.4 Cumulative Impacts on Aquatic Resources

All of the projects have indicated that their intention with regard to mitigation, i.e., selecting the best possible sites to minimise the local and regional impacts, or improving the drainage or hydrological conditions within these rivers, and therefore the cumulative impact could be seen as a net benefit. However, the worst-case scenario has been assessed below, i.e., only the minimum of mitigation be implemented by the other projects such as stormwater management, and that flows within these systems are sporadic.

The overall cumulative impact of the proposed project when considered in isolation was rated with medium significance. When considered in combination with the surrounding renewable energy facilities, the overall cumulative impact of these was rated as medium significance.

Possible cumulative impacts include:

» The cumulative effects from anthropogenic activities that are close enough (such as nearby farming activities within the area) to potentially cause additive effects on the environment or sensitive receivers.
» These include disruption of ecological corridors or habitat such as watercourses, impacts to groundwater and surface water quality, and transport of soils and instream habitat smothering impacts associated with catchment and road reserve erosion.
» Downstream erosion and sedimentation of the downstream systems and farming operations.
» During flood events, the unstable banks (eroded areas) and sediment bars (sedimentation downstream) already deposited downstream will be washed into the mainstem systems, that already have high sediment loads.
» Long-term cumulative impacts due to the proposed electricity generation and transmission footprint, comprising the wind turbines and servitudes in the upper reaches of the watercourses combined with the low density agricultural activities currently present in the upper reaches of the watercourses, has the potential to degrade watercourse habitat across the catchment.

The cumulative impact of the project was rated as medium should the project go ahead and involve the implementation of mitigation.

Nature: Cumulative loss/ disturbance of habitat and ecological functioning of watercourses in the region The development of the proposed infrastructure will contribute to cumulative habitat loss within the local ESAs, watercourses and adjacent habitat together with the potential for increased contaminants and sediment entering the watercourses. The loss/alteration of habitat lowers the buffering capacity of the catchment to water quality impacts, which will have negative impacts on the ecological processes of the associated watercourse in the project area, with no impacts of significance expected in the region.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Footprint & surrounding areas (2)	Local area (3)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low and will cause a slight impact on processes (4)	Moderate and will result in processes continuing but in a modified way (6)
Probability	Probable (3)	Highly probable (4)
Significance	**Medium (30)**	**Medium (52)**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Low
Irreplaceable loss of resources	Yes	Yes

Can impacts be mitigated	Yes, although this impact cannot be well mitigated as some level of hydrological and habitat modification is unavoidable. Avoidance of watercourse areas will be of highest importance to mitigate impacts.
Mitigation: » Prevent the unnecessary destruction, and fragmentation, of the watercourses (including the riparian areas where applicable) through avoidance strategies; » Prevent the loss of the faunal community (aquatic and terrestrial) associated with the watercourse habitat; and » Limiting the construction area to the defined project areas and only impacting those areas where it is unavoidable to do so otherwise, such as at the existing areas of disturbance along the existing road network.	

11.5 Cumulative Impacts on Avifauna

The total affected land parcel area covered by other authorised renewable energy projects within the 30km radius is approximately 145 km². The total land parcel area affected by the FE Kudu Wind Energy Facility equates to approximately 91.7 km². The combined land parcel area affected by authorised renewable energy developments within the 30km radius of similar habitat, inclusive of the FE Kudu Wind Energy Facility, therefore equals approximately 236.7 km². Of this, the FE Kudu project development area constitutes ~39% (91.7 km²). The cumulative impact of the FE Kudu Wind Energy Facility is therefore anticipated to be low to moderate after mitigation.

The total area within the 30km radius around the proposed projects equates to about 2827.4 km² of similar habitat. The total combined size of the land parcels potentially affected by renewable energy projects will equate to ~8.4% of the available untransformed habitat in the 30km radius. However, the actual physical footprint of the renewable energy facilities will be smaller than the land parcel areas themselves. Furthermore, not all projects will proceed to construction. The cumulative impact of all the proposed renewable energy projects is estimated to be moderate.

Nature: <u>*Cumulative impacts on avifauna*</u> Cumulative impacts in terms of: » Displacement of priority species due to disturbance during construction phase » Displacement of priority species due to habitat loss in the operation phase » Mortality of priority species due to collisions with the turbines in the operation phase » Mortality of priority species due to electrocutions on the overhead MV network and in the substation yard. » Mortality of priority species due to collisions with the 33kV medium voltage overhead lines in the operation phase		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Low (1)	High (3)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Medium (6)
Probability	Probable (3)	Probable (3)
Significance	**Low (27)**	**Medium (39)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation: All the mitigation measures which have been listed in the bird impact assessment reports for all the relevant wind energy projects must be applied to the relevant projects. These include the following:		

» Construction activity should be restricted to the immediate footprint of the infrastructure as far as possible. » Burying of internal MV cables. » Rehabilitation of disturbed vegetation. » Using bird-friendly structures for the MV poles. » Marking of overhead lines with Bird Flight Diverters. » Curtailment of turbines if mortality thresholds are exceeded. » Maximum use of existing roads. » Implementation of operational monitoring to assess mortality levels. » Avoidance of no-go buffers around sensitive areas, including raptor nests.

11.6 Cumulative Impacts on Bats

The overall cumulative impact of the proposed project when considered in isolation was rated as medium significance. When considered in combination with the other adjacent Wind Farm projects, the overall cumulative impact of these was rated as high significance.

Cumulative impacts on bats could increase as new facilities are constructed but are difficult to accurately predict or assess without baseline data on bat population size and demographics and these data are lacking for many South African bat species. It is possible that cumulative impacts could be mitigated with the appropriate measures applied to wind farm design and operation.

Cumulative impacts could result in declines in populations of even those species of bats currently listed as Least Concern, if they happen to be more susceptible to mortality from wind turbines (e.g., high-flying open-air foragers such as free-tailed and fruit bats) even if the appropriate mitigation measures are applied.

The cumulative impact on bats considering all planned wind farm projects in this cluster is likely to be high negative, while it is anticipated to be medium negative in isolation (with suitable mitigation measures). All mitigation measures relevant for operational phase bat mortality due to collisions and/or barotrauma should be applied to mitigate cumulative impacts. Furthermore, collaboration with other developments (current and proposed) in the broader project area is essential. The IPPs within this cluster should share lessons learned, align strategies, and agree on coordinated approaches when addressing environmental issues, including the establishment of a data sharing agreement with the other wind farm projects to share operational monitoring data. Sharing data with regulators and interested stakeholders will enable the documentation of cumulative impacts and inform adaptive management processes across projects.

Overall, it is anticipated that without appropriate mitigation, the planned wind farm projects in this cluster could result in unacceptable loss to the regional bat population. However, should all mitigation measures be strictly adhered to (from design phase all the way through to decommissioning), it is anticipated that such losses may be reduced to acceptable levels.

Nature: <u>*Bat fatality impacts on a cumulative scale*</u> Multiple wind farms impacting bats collectively could have the potential to cause significant loss to affected species over a regional or national scale with an inability for the affected species to recover from such loss. This is likely to be most significant through bat mortality as a result of wind turbine collisions and/or barotrauma during the projects' operational phase, particularly during bat foraging/commuting activities.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**

Extent	High (3)	High (5)
Duration	Long-term (4)	Long-term (4)
Magnitude	Medium (6)	High (8)
Probability	Probable (3)	Definite (4)
Significance	**Medium (39)**	**High (85)**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Low
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	

Mitigation:

» Implement an operational phase bat monitoring programme, in accordance with the most recent version of the operational phase bat monitoring guidelines.
» Implement blade feathering (up to the manufacturers cut-in speed) as soon as operation begins, to prevent free-wheeling.
» The placement of all turbines, as well as their full blade length, should remain outside of high sensitivity areas, to be considered from the outset of the design phase.
» If residual impacts reach the threshold limit (at any wind turbine), then appropriate minimisation measures should be implemented (turbine curtailment and/or acoustic deterrence mechanisms).
» The project should collaborate with other developments (current and proposed) in the broader project area. Companies in the area should share lessons learnt, align strategies, and agree to coordinated approaches when responding to environmental issues.
» A data sharing agreement should be setup with other wind farm projects in the region to share operational monitoring data. Data should be shared with regulators and interested stakeholders to allow cumulative impacts to be documented and to inform adaptive management processes across projects.

11.7 Cumulative Impacts on Land Use, Soils and Agriculture

Cumulative impacts have been identified from an agricultural perspective. These include a cumulative impact on areas susceptible to soil erosion, areas with compacted soils and an increased risk of soil pollution. The overall impact of the proposed project when considered in isolation was assessed as low. The cumulative impact of the project and other projects in the area were assessed to be medium.

Nature: Cumulative impact of areas susceptible to soil erosion
Increase in areas susceptible to soil erosion as there will be new areas where there will be clearing and levelling of land for the construction of the infrastructure. Additional traffic on the existing gravel roads (that are already at risk of soil erosion) will further increase the risk of soil erosion.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Regional (2)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Low (4)	Medium (6)
Probability	Improbable (2)	Probable (3)
Significance	**Low (16)**	**Medium (33)**
Status (positive/negative)	Negative	Negative
Reversibility	Low	Low
Loss of resources?	No	Yes
Can impacts be mitigated?	Yes	No

Mitigation:
Each of the projects should adhere to the highest standards for soil erosion prevention and management

Nature: Cumulative impact of areas with compacted soils Increase in areas with compacted soils because any additional access roads, hardstands for turbines and buildings will require deliberate compaction to ensure a stable surface prior to construction. While the Glenrosa soils (present in the largest part of the development area) are less prone to soil compaction, the rest of the soil forms in the development area are susceptible to soil erosion because of the higher silt and clay content.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Regional (2)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Low (4)	Medium (6)
Probability	Improbable (2)	Probable (3)
Significance	**Low (16)**	**Medium (33)**
Status (positive/negative)	Negative	Negative
Reversibility	Low	Low
Loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	No
Mitigation: Each of the projects should adhere to the highest standards for soil erosion prevention and management		

Nature: Cumulative impact of increased risk of soil pollution Increase in areas susceptible to soil pollution, especially during the construction phase. Each of the projects that contribute to cumulative impacts will require construction workers to traverse the area in vehicles and use equipment. The vehicles and equipment pose the risk of leaks that add petroleum hydrocarbons to soil. The construction phase will include cement mixing and the generation of general waste on site, with all unmanaged waste a potential source of soil contaminants.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Regional (2)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (6)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	**Low (27)**	**Medium (30)**
Status (positive/negative)	Negative	Negative
Reversibility	Low	Low
Loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	No
Mitigation: Each of the projects should adhere to the highest standards for soil pollution prevention and management.		

11.8 Cumulative Impacts on Heritage (including archaeology, palaeontology and cultural landscape)

There is the potential for the cumulative impact of proposed renewable energy facilities in the area to negatively impact the cultural landscape due to a change in the landscape character from natural wilderness to semi-industrial. This project falls within a REDZ area, and it is noted that it is preferable to have renewable energy facility development clustered in an area such as a REDZ.

Based on the wind energy facilities within a 30km radius of the proposed FE Kudu Wind Energy Facility, the cumulative visual impact of combined projects will be high. However, this cumulative impact does not represent a fatal flaw from a cultural landscape perspective.

To address concerns about the cumulative impact of renewable energy facilities within the greater Karoo region, a cautious approach is required in terms of assessing the desirability of such development from a cultural landscape perspective. The proposed site is located adjacent to an existing infrastructural corridor associated with the national grid, which suggests a level of suitability of renewable energy facilities which can link in with the grid. Notwithstanding the existing infrastructure, the placement of renewable energy facilities, and wind turbines, must take cognisance of the potential for high visual impact on a relatively intact and representative cultural landscape, and the limited ability to visually screen this infrastructure in the landscape. The cumulative impact on the cultural landscape considering all planned wind farm projects in this cluster is likely to be high, while it is anticipated to be medium in isolation (with suitable mitigation measures).

The cumulative impact of the proposed renewable energy facilities has the potential to negatively impact on the cultural landscape, as well as the distribution and integrity of archaeological and palaeontological resources.

Nature: Cumulative impact to the cultural landscape (sense of place) as well as archaeological and palaeontological resources. The broader context of the area proposed for development has cultural significance that may be impacted by the proposed development		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Regional (5)	Regional (5)
Duration	Where manifest, the impact will be long term - for the duration of the grid infrastructure lifetime (4)	Where manifest, the impact will be long term - for the duration of the grid infrastructure lifetime (4)
Magnitude	The cultural value of the pristine Karoo Landscape is very high and the location of the proposed development will impact this significance (6)	The cultural value of the pristine Karoo Landscape is very high and the location of the proposed development will impact this significance (8)
Probability	It is extremely likely that a significant cultural landscape resources will be impacted (4)	It is extremely likely that a significant cultural landscape resources will be impacted (4)
Significance	**Medium (60)**	**High (68)**
Status (positive or negative)	Negative	Negative
Reversibility	High	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	Yes
Mitigation: » Setback from the N9 and the R61 by at least 1km on either side. » Avoid steep or elevated topography, ridgelines or koppies, with a no development buffer of at least 2.5km from Wolwekop » Setback from graded resources and farmstead settlements IIIB and IIIC, by 500m.		

11.9 Cumulative Noise Impacts

The noise specialist has considered the cumulative noise impact with the development of the FE Kudu Wind Energy Facility on total cumulative noise emissions. There is a very low risk of cumulative noise emissions during the construction phase, because it is unlikely that construction activities will take place simultaneously at the different wind energy facilities. However, a number of WTG are proposed within 5 000m from NSR05, NSR06, NSR07 and NSR08 during the operation phase and there will be a cumulative noise impact at these NSRs.

There is a low significance for a cumulative noise impact to occur during the operations phase.

Nature: Cumulative noise impacts Projected noise levels, the potential change in ambient sound levels as well as the significance of the potential noise impact defined per noise sensitive receptor.		
	Overall impact of the proposed project considered in isolation (post mitigation)	**Cumulative impact of the project and other projects in the area**
Magnitude	Low (4)	Low (4)
Extent	Regional (3)	Regional (3)
Duration	Long-term (4)	Long-term (4)
Probability	Possible (2)	Possible (2)
Significance	**Low (22)**	**Low (22)**
Status	Negative	Negative
Reversibility	High	High
Loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation: » The significance of the potential cumulative noise impact is low and additional mitigation is not required or recommended.		

11.10 Cumulative Visual Impacts

Viewshed analyses were undertaken from all proposed and authorised wind energy facilities within a 30km radius of the proposed FE Kudu Wind Energy Facility, of which the wind turbine layouts were available at the time of drafting this report.

The cumulative visual exposure (and potential cumulative visual impact) is not an unintended consequence of renewable energy facility developments within the region, but rather a concerted effort to concentrate renewable energy facilities within the Beaufort West REDZ. This is an effort to prevent the scattered proliferation of renewable energy generation infrastructure beyond the REDZ and throughout the greater region.

The cumulative visual impact is expected to be high, depending on the observer's sensitivity to wind turbine structures. In spite of this, the cumulative visual impact is still considered to be within acceptable limits, due to the generally remote location of the Beaufort West REDZ and the limited number of affected sensitive visual receptors.

Nature of Impact: *Potential cumulative visual impacts* The potential cumulative visual impact of wind farms on the visual quality of the landscape		
	Overall impact of the proposed project considered in isolation	***Cumulative impact of the project and other projects in the area***
Extent	Medium distance (2)	Medium distance (2)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Very high (10)
Probability	Highly probable (4)	Highly probable (4)
Significance	**Medium (56)**	**High (64)**
Status	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	
Mitigation measures: N.A.		

11.11 Cumulative Social Impacts

From a social impact perspective cumulative impact have been identified for both the construction and operation phases, and within each phase positive and negative impacts have been identified.

The potential cumulative impacts on the area's sense of place will be largely linked to potential visual impacts. In this regard, the Scottish Natural Heritage (2005) describes a range of potential cumulative landscape impacts associated with wind farms on landscapes. These issues are also likely to be relevant to solar facilities and associated infrastructure, including the proposed wind energy facility. The relevant issues identified by Scottish Natural Heritage study 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.

Nature of Impact: *Cumulative impacts on sense of place and the landscape* Visual impacts associated with the establishment of more than one wind farm and the potential impact on the area's rural sense of place and character of the landscape.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Local and regional (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Low (27)**	**Medium (30)**
Status (positive/negative)	Negative	Negative
Reversibility	Yes. WEF components and other infrastructure can be removed.	
Loss of resources?	No	No
Can impacts	Yes	

be mitigated?		
Confidence in findings: High.		
Mitigation: The recommendations of the VIA should be implemented.		

The establishment of the proposed wind energy facility and other facilities in the area does have the potential to place pressure on the local towns in the Dr Beyers Naude Local Municipality and the Beaufort West REDZ, including Aberdeen and Graaff Reinet. The impact will depend on the timing of the construction phase for the different projects. However, the potential impact should also be viewed within the context of the potential positive cumulative impacts for the local economy associated with the establishment of the proposed facility and associated renewable energy projects in the Beaufort West REDZ and the DBNLM. These benefits will create opportunities for investment in the DBNLM, including the opportunity to up-grade and expand existing services and the construction of new houses. Socio-economic development (SED) contributions also represent an important focus of the REIPPPP and is aimed at ensuring that the build programme secures sustainable value for the country and enables local communities to benefit directly from the investments attracted into the area. The proposed wind energy facility is also required to contribute a percentage of projected revenues accrued over the 20-25 year period to SED. This will provide revenue that can be used by the DBNLM to invest in upgrading local services where required. In should also be noted that it is the function of national, provincial, and local government to address the needs created by development and provide the required services. The additional demand for services and accommodation created by the establishment of development renewable energy projects should therefore be addressed in the Integrated Development Planning process undertaken by the Dr Beyers Naude Local Municipality.

Nature of Impact: *Cumulative impacts on local services* The establishment of a number of renewable energy facilities and associated projects, such as the proposed WEF, in the DBNLM has the potential to place pressure on local services, specifically medical, education and accommodation.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Local and regional (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Low (27)**	**Medium (30)**[1]
Status (positive/negative)	Negative	Negative
Reversibility	Yes. wind farm components and other infrastructure can be removed.	
Loss of resources?	No	No
Can impacts be mitigated?	Yes	
Confidence in findings: High.		
Mitigation: The proponent should liaise with the DBNLM to address potential impacts on local services		

In addition to the potential negative impacts, the establishment of renewable energy facilities and associated infrastructure, including the proposed WEF, will also create several socio-economic opportunities for the DBNLM. The positive cumulative opportunities include creation of employment, skills development and training opportunities, and downstream business opportunities.

[1] With effective mitigation and planning, the significance will be Low Negative.

The review of the REIPPPP (December 2021) indicates that to date (across BW1-4) a total contribution of R22.8 billion has been committed to SED initiatives. Assuming an even, annual revenue spread, the average contribution per year would be R1.1 billion. Of the total commitment, R18.5 billion is specifically allocated for local communities where the IPPs operate. With every new IPP on the grid, revenues and the respective SED contributions will increase.

The potential cumulative benefits for the local and regional economy are therefore associated with both the construction and operational phase of renewable energy projects and associated infrastructure and extend over a period of 20-25 years. However, steps must be taken to maximise employment opportunities for members from the local communities in the area and support skills development and training programmes.

Nature of Impact: *Cumulative impacts on local economy* The establishment of renewable energy facilities and associated projects in the DBNLM will create employment, skills development and training opportunities, creation of downstream business opportunities.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Local and regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	High (8)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	**Medium (36)**	**Medium (60)**
Status	Positive	Positive
Reversibility	Yes. Wind energy facility components and other infrastructure can be removed.	
Loss of resources?	No	No
Can impacts be mitigated?	Yes	
Confidence in findings: High.		
Mitigation: The proposed establishment of suitably sited renewable energy facilities and associated projects, such as the proposed FE Kudu project, within the DBNLM should be supported.		

In addition to the potential negative impacts, the establishment of renewable energy facilities and associated infrastructure, including the proposed wind energy facility, will also create several socio-economic opportunities for the Dr Beyers Naude Local Municipality. The positive cumulative opportunities include creation of employment, skills development and training opportunities, and downstream business opportunities.

The potential cumulative benefits for the local and regional economy are therefore associated with both the construction and operational phase of renewable energy projects and associated infrastructure and extend over a period of 20-25 years. However, steps must be taken to maximise employment opportunities for members from the local communities in the area and support skills development and training programmes.

11.12 Cumulative Traffic Impacts

For the assessment of cumulative traffic impacts, it was assumed that all renewable energy projects within 30km currently proposed and authorized, would be constructed at the same time. This is the precautionary approach as in reality; these projects would be subject to a highly competitive bidding process and not all the projects may be successful. Even if all the facilities are constructed and decommissioned at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.

The construction and decommissioning phases of a wind energy facility are the only significant traffic generators. The duration of these phases is short term, i.e., the potential impact of the traffic generated during the construction and decommissioning phases of the facility on the surrounding road network is temporary. When operational, wind farms do not add any significant traffic to the road network. The cumulative impacts (i.e., impacts of all projects under construction at the same time) were assessed to be of medium significance.

Nature: *Cumulative traffic impacts* Traffic generated by the proposed development and the associated noise and dust pollution.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	National (4)	National (4)
Duration	Short term (2)	Short term (2)
Magnitude	Medium (6)	Medium (6)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium (48)**	**Medium (36)**
Status	Negative	Negative
Reversibility	Completely reversible	Completely reversible
Loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation: » Source equipment, machinery and material locally as far as possible. » Stagger deliveries of components to site and scheduled to occur outside of peak traffic periods as much as possible. » Dust suppression of gravel roads close to and on site. » Regular maintenance of gravel roads located within the site boundary, including the access road to the site. » If any damage occurs due to construction vehicles along the road in the vicinity, these damages need to be repaired. » The use of quarries near the site as much as possible. » Staff trips to occur outside of main peak traffic periods as far as possible. » Delivery Management Plan		

11.13 Conclusion regarding Cumulative Impacts

Cumulative impacts are expected to occur with the development of the FE Kudu Wind Energy Facility throughout all phases of the project life cycle and within all areas of study considered as part of this BA report. The main aim for the assessment of cumulative impacts considering the FE Kudu Wind Energy Facility is to test and determine whether the development will be acceptable within the landscape proposed for the development, and whether the loss, from an environmental and social perspective, will be acceptable without whole-scale change.

The following conclusions can be drawn regarding the cumulative impacts associated with the project:

- As sensitive ecological features have been avoided by all projects proposed in the area, cumulative impact on important local biodiversity features would be low. This is also due to the extent of habitat loss not being significant relative to the overall extent of the affected vegetation types. The development of the FE Kudu Wind Energy Facility would not change the overall threat status of any vegetation types or special habitats. The contribution of the FE Kudu Wind Energy Facility to cumulative impacts in the area would also be low. There will therefore be no unacceptable loss or impact on ecological aspects (vegetation types, species and ecological processes) due to the development of the FE Kudu Wind Energy Facility and other wind farms within the surrounding area, provided recommended mitigation measures are implemented. The cumulative impact is therefore acceptable.
- The layouts of the existing and proposed wind energy facilities in the area indicated limited impacts on their aquatic environments as the proposed structures for the most part, have either avoided the delineated watercourses and drainage areas with the exception of unavoidable watercourse crossings by the proposed access roads. There will therefore be no significant loss of sensitive and significant freshwater resources, provided recommended mitigation measures are implemented. The cumulative impact is therefore acceptable.
- The cumulative contribution of the FE Kudu Wind Energy Facility to the total number of turbines in the area, and by implication the impacts associated with the turbines, is moderate. There will be no unacceptable risk to avifauna with the development of the FE Kudu Wind Energy Facility and other wind farms within the surrounding area, provided recommended mitigation measures are implemented. The cumulative impact is therefore acceptable.
- Based on the opportunity for reduction of the impacts through appropriate mitigation measures, there will be no unacceptable risk to bats in terms of mortality with the development of the FE Kudu Wind Energy Facility and other wind farms within the surrounding area. The cumulative impact considering all planned wind farm projects in this cluster is likely to be high, and with suitable mitigation measures implemented is, however, acceptable.
- Due to the limited agricultural potential of soils in the area, it was concluded that there will be no unacceptable loss of agricultural land due to the development of the FE Kudu Wind Energy Facility and other wind farms within the surrounding areas, provided recommended mitigation measures are implemented. The cumulative impact is therefore acceptable.
- The establishment of FE Kudu Wind Energy Facility in conjunction with the establishment of other wind energy facilities, including the Aberdeen Wind Facilities 1-3 and Eskom Aberdeen Wind Energy Facilities has the potential for a high cumulative visual impact, depending on the observer's sensitivity to wind turbine structures. Change to the sense of place and character of the area is therefore expected with the development of wind energy facilities, however, the change is not considered to be a fatal flaw. The cumulative visual impact is still considered to be within acceptable limits due to the generally remote location of the Beaufort West REDZ and the limited number of affected sensitive visual receptors.
- Provided that sensitive heritage sites and landscape features, there will be no unacceptable loss of heritage resources associated with the development of the FE Kudu Wind Energy Facility and other wind farms within the surrounding areas. The cumulative impact is therefore acceptable.
- Both positive and negative cumulative impacts are expected to occur with the establishment of FE Kudu Wind Energy Facility. No unacceptable socio-economic impacts are expected to occur. The cumulative impact is therefore acceptable.

- No unacceptable increase in ambient noise levels is expected to occur with the development of the FE Kudu Wind Energy Facility and other wind farms within the surrounding areas. The cumulative impact is therefore acceptable.
- No unacceptable impacts to the traffic network are expected to occur with the development of the FE Kudu Wind Energy Facility and other wind farms within the surrounding areas. The cumulative impact is therefore acceptable.
- No significant impacts are expected with the development of FE Kudu Wind Energy Facility in terms of wake loss effect impact to planned adjacent facilities. The cumulative impact is therefore acceptable.

Positive cumulative impacts are expected to occur from a socio-economic perspective. These impacts are assessed as having medium significance.

Most cumulative impacts associated with the FE Kudu Wind Energy Facility will be of a medium or low significance, with impacts of a high significance associated with bats and visual cumulative impacts and impacts on heritage. A summary of the cumulative impacts is included in **Table 11.3** below.

Table 11.3: Summary of the cumulative impact significance for the FE Kudu Wind Energy Facility

Specialist assessment	Overall significance of impact of the proposed project considered in isolation	Cumulative significance of impact of the project and other projects in the area
Terrestrial Ecology	Low	Low
Aquatics	Medium	Medium
Avifauna	Low	Medium
Bats	Medium	High
Agriculture	Low	Medium
Heritage (archaeology, palaeontology and cultural landscape)	Medium	High
Noise	Low	Low
Visual	Medium	High
Social Impact Assessment	Low (Negative) Medium (Positive)	Medium (Negative) Medium (Positive)
Traffic	Medium	Medium

The location of the FE Kudu Wind Energy Facility project site and the surrounding wind farms being considered as part of this cumulative impact assessment within a REDZ is considered to assist with the concentration of the negative impacts within an area, as well as the focussing of positive impacts and benefits. The REDZ are considered to be areas within which significant negative impacts on the natural environment are limited and socio-economic benefits are enhanced. Therefore, the development of wind farms within a REDZ reduces the negative impacts in areas located outside of the REDZ and concentrates the positive impacts within the REDZ thereby creating a positive contribution to the communities present. This supports and contributes the need and desirability of the FE Kudu Wind Energy Facility within the project site.

Based on the specialist cumulative assessment and findings, the development of the FE Kudu Wind Energy Facility and its contribution to the overall impact of all wind energy facilities to be developed within a 30km radius, it can be concluded that the cumulative impact considering all planned wind farm projects in this cluster is likely to be high for only bats, visual and heritage, and with suitable mitigation measures implemented would be acceptable. FE Kudu Wind Energy Facility cumulative impacts will largely be of a medium to low significance. Therefore, the development of the FE Kudu Wind Energy Facility will not result in unacceptable, cumulative impacts and will not result in a whole-scale change of the environment.

CHAPTER 12: CONCLUSIONS AND RECOMMENDATIONS

FE Kudu (Pty) Ltd, proposes the development of a wind energy facility and associated infrastructure, on a site located approximately 40km west of the town of Aberdeen in the Eastern Cape Province. The site is located within the Dr Beyers Naude Local Municipality in the greater Sarah Baartman District Municipality. The project site comprises a single affected property, Portion 2 of Farm Oorlogspoort 85.

The project site/development area has an extent of ~9 170ha, which is considered sufficient in extent (allowing sufficient space to avoid any major environmental sensitivities) and suitable from a technical perspective for the development of up to 80 wind turbines with a contracted capacity of up to 600MW. The smaller facility development footprint[1] will be sited within the development area, with an estimated disturbance area of up to 185ha of the development area[2]. The infrastructure associated with the 600MW FE Kudu Wind Energy Facility is indicated in **Figure 12.1**, and will include:

- » Up to 80 wind turbines, turbine foundations and turbine hardstands
- » An on-site substation hub incorporating:
  - A132kV on-site facility substation
  - Switchyard with collector infrastructure
  - Battery Energy Storage System (BESS)
  - Operation and Maintenance buildings
- » A balance of plant area incorporating:
  - Temporary laydown areas
  - A construction camp laydown and temporary concrete batching plant
- » Power lines internal to the wind farm, trenched and located adjacent to internal access roads, where feasible[3].
- » Access roads to the site and between project components with a width up to 8m for primary access routes.

Access to the facility will be via an existing (unnamed) gravel road originating off the DR02310 which turns off from the R61 between Beaufort West and Aberdeen. A main access road up to 8m in width will provide access to the facility. It is likely sections of this road will require upgrading and widening to 8m to accommodate the movement of heavy vehicles. This existing road traverses the Remaining Extent of Farm Pretorius Kuil 89 and Portion 2 of Farm Oorlogspoort 85.

FE Kudu (Pty) Ltd has confirmed that the project site is particularly suitable for wind energy development from a technical perspective due to the strength of the prevailing wind resources, access to the electricity grid, compatibility with the current land use and land availability (refer to Chapter 2 for further details).

[1] The development footprint is the defined area (located within the development area) where the wind farm and other associated infrastructure for the facility is planned to be constructed. This is the actual footprint of the facility, and the area which would be disturbed.

[2] The development footprint takes up 2% of the total development area (9 170ha) which calculates to 185ha.

[3] The intention is for internal project cabling to follow the internal roads.

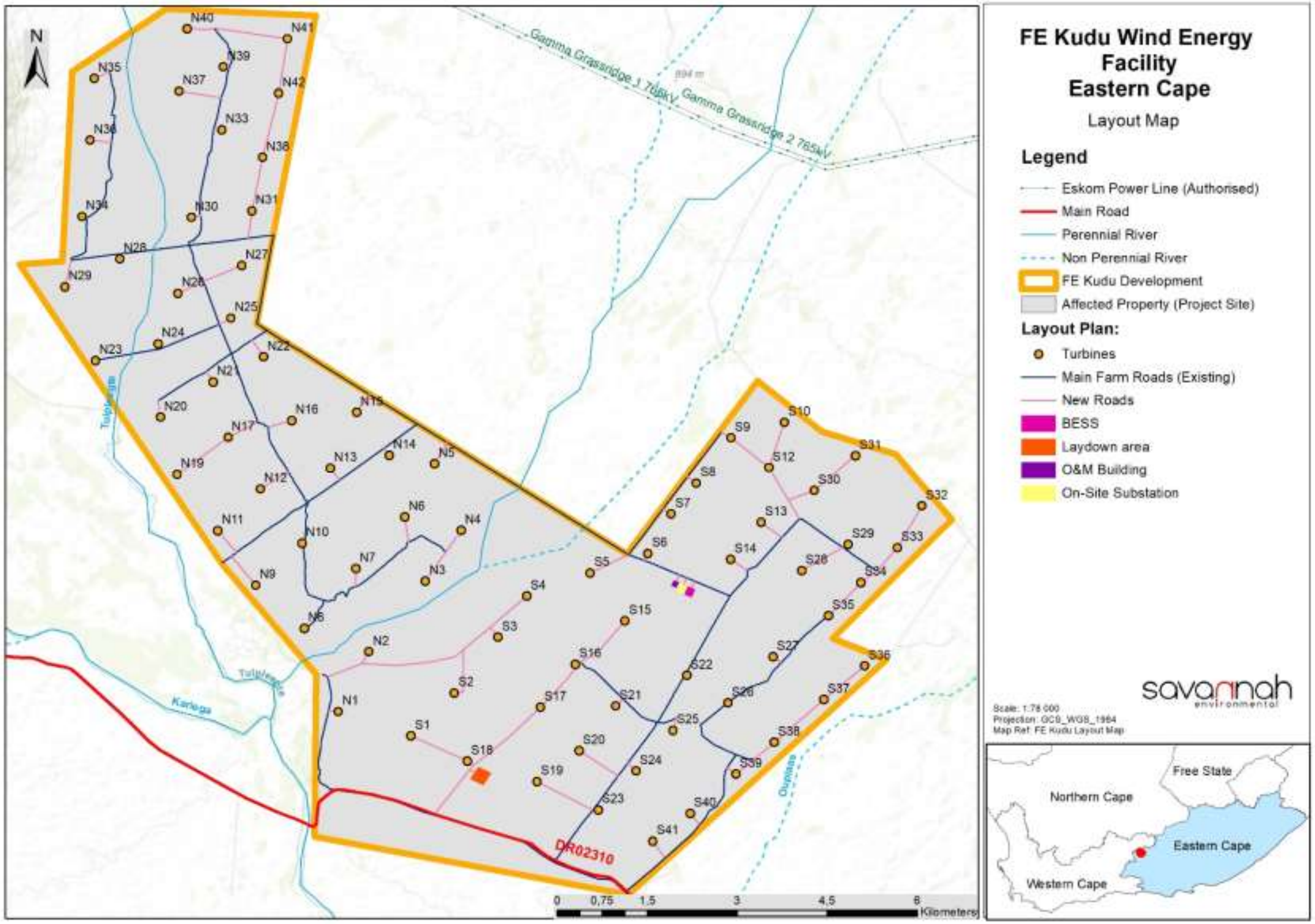

Figure 12.1: Layout map indicating the infrastructure and development footprint for the FE Kudu Wind Energy Facility

A summary of the recommendations and conclusions for the proposed project is provided in this Chapter.

12.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Basic Assessment Report

This chapter of the Basic Assessment report includes the following information required in terms of the EIA Regulations, 2014 - Appendix 1: Content of basic assessment reports:

Requirement	Relevant Section
3(k) where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report	A summary of the findings of the specialist studies undertaken for the FE Kudu Wind Energy Facility has been included in section 12.2.
3(l) an environmental impact assessment which contains (i) a summary of the key findings of the environmental impact assessment, (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.	An environmental impact statement containing the key findings of the environmental impacts of the FE Kudu Wind Energy Facility has been included as section 12.5. An Environmental Sensitivity and Layout map of the FE Kudu Wind Energy Facility has been included as **Figure 12.1** which overlays the development footprint (as assessed within the Basic Assessment) of the wind energy facility with the environmental sensitive features located within the project site. This is an optimised layout which adheres to the avoidance measures based on the sensitivity analysis (Chapter 9). Based on the sensitive areas identified during the impact assessment, a final adjusted layout was created to avoid drainage features identified by the avifauna specialist and this layout has been included as **Figure 12.3.** A summary of the positive and negative impacts associated with the FE Kudu Wind Energy Facility has been included in section 12.2.
3(n) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation.	All conditions required to be included in the Environmental Authorisation of the FE Kudu Wind Energy Facility has been included in section 12.6.
3(p) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.	A reasoned opinion as to whether the FE Kudu Wind Energy Facility should be authorised has been included in section 12.5.

12.2 Evaluation of the FE Kudu Wind Energy Facility

The development footprint assessed within this Basic Assessment Report was designed by the project developer in order to respond to and avoid the sensitive environmental and social features located within the project site. This approach ensured the application of the mitigation hierarchy (i.e., avoid, minimise, mitigate and offset) to the FE Kudu Wind Energy Facility project, which ultimately ensures that the development is appropriate from an environmental perspective and is suitable for development within the development envelope (located within the project site). The application of the mitigation hierarchy was undertaken by the developer prior to the commencement of the Basic Assessment process for Environmental Authorisation, as detailed in Chapter 3, and further considered based on specialist study findings, as concluded in this chapter.

The preceding chapters of this report together with the specialist studies contained within **Appendices D-M** provide a detailed assessment of the potential impacts that may result from the development of the FE Kudu Wind Energy Facility. This chapter concludes the environmental assessment of the wind energy facility by providing a summary of the results and conclusions of the assessment of both the project site and development footprint for the FE Kudu Wind Energy Facility. In so doing, it draws on the information gathered as part of the Basic Assessment process, the knowledge gained by the environmental specialists and the EAP and presents a combined and informed opinion of the environmental impacts associated with the project.

No environmental fatal flaws or unacceptable impacts were identified in the detailed specialist studies conducted, provided that the recommended mitigation measures are implemented. These measures include, amongst others, the avoidance of sensitive features within the development area during construction and operation, and the undertaking of operation phase bird and bat monitoring, as specified by the specialists.

The potential environmental impacts associated with FE Kudu Wind Energy Facility identified and assessed through the Basic Assessment process include:

» Impacts on ecology, flora and fauna.
» Impacts on aquatic resources.
» Impacts on avifauna.
» Impacts on bats.
» Impacts on land use, soils and agricultural potential.
» Impacts on heritage resources, including archaeology, palaeontology and the cultural landscape.
» Noise impacts due to the construction and operation of the wind energy facility.
» Visual impacts on the area imposed by the components of the facility.
» Positive and negative socio- economic impacts.
» Traffic impacts, including increased pressure on the existing road network.

The environmental sensitivities identified by the relevant specialists for the project site, overlain with the relevant environmental sensitivities, are illustrated in **Figure 12.2**.

12.2.1 Impacts on Terrestrial Ecology

Three vegetation units are primarily affected by the proposed project. The site is located almost entirely within Eastern Lower Karoo, Southern Karoo Riviere and Gamka Karoo (all currently having a Least Concern conservation status) vegetation units. According to the DFFE Screening Tool, there are several plant species of concern that may occur within the FE Kudu Wind Energy Facility site. However, none were found to be present during the site visit and are furthermore not deemed likely to be present, as the site is outside of the known range. No other plant Species of conservation concern (SCC) were observed within the site.

A small portion of the site is designated CBA 2 along the southern boundary with more extensive ESA 1 across the site associated with the alluvial areas and watercourses. In terms of Regional Planning, a footprint would be feasible that would minimise loss of CBA and disruption to corridors in ESA areas, which is largely avoided as a result of preliminary sensitivity mapping and layout revisions. The impact as a result of the proposed layout will be negligible, as only a small section of road (280m) falls within designated CBA area. Conservation targets for the vegetation units will not be affected due to the extensive regional coverage and small development footprint of the proposed Wind Energy Facility. Biodiversity Offsets will not be triggered by the proposed activity based on the most recent Biodiversity Offset Guidelines as the residual impact after mitigation is deemed to be low.

Riverine Rabbit and Black-footed Cat were considered unlikely to be present on site due to the lack of suitable habitat on site. No other mammals of concern were observed at the site/likely to be present. Reptiles such as lizards, snakes and tortoises may be present. The National Environmental Screening Tool identifies *Chersobius boulengeri* (Karoo Padloper), as possibly occurring in the area. Site investigations suggest that this species is unlikely to be present due to unsuitability of habitat in the areas of the site where development would occur. No other reptile species of concern are likely to be present within the site. No amphibian species of concern are known from the area with the result that the site is considered low sensitivity for amphibians.

The Ecological Impact Assessment has identified all impacts to be of low significance after mitigation. There are no impacts associated with the development of the FE Kudu Wind Energy Facility on terrestrial biodiversity that cannot be mitigated to an acceptable level. As such, should all the proposed mitigation measures be implemented, the development is deemed acceptable from a terrestrial ecological impact perspective. No impacts of a high significance or fatal flaws are expected to occur after implementation of the recommended mitigation measures.

Mitigation includes watercourse buffers (other than for access roads, most being along existing roads) as well as avoiding significant footprints within the recommended alluvial and ecological corridors (other than minimal access road crossings, where measures must be implemented to allow lateral flow of water and sediment not only within the watercourse channel but across the broader alluvial area as well). Based on the assessed optimised facility layout, these requirements have largely been accommodated as far as technically possible.

12.2.2 Impacts on Aquatic Resources

The FE Kudu Wind Energy Facility project site is dominated by two types of natural aquatic features, some artificial features and a small number of wetland features:

- Ephemeral main watercourse - Numerous drainage features are present comprising of an extensive braided watercourse network, presenting ephemeral conditions. Several watercourses presented surface water at the time of the survey, however not all of them were suitable for the assessment of aquatic biota. The sampled watercourses were tributaries of the Tulpleegte and Kariega rivers.
- Ephemeral watercourses in arid environments – Present as vernal pools that intermittently hold water for short periods (from a few days to months) following sufficient rainfall, whereby the standing surface water may support vernal biota.
- Artificial dams; and
- Wetland features.

The facility layout has implemented the avoidance strategy and positioned turbine platforms and the majority of road networks outside the buffer areas. Proposed watercourse crossings proposed are considered to be acceptable and appropriately placed. There are several road crossings traversing the recommended 32m buffers delineated for the watercourses and vernal pools. Ensuring that aquatic features and 32m buffers are intact increases the resilience of a watercourse to future disturbances. These buffers would ensure adequate ecological integrity maintenance from the adjacent proposed wind energy facilities.

All wind turbines are located outside of the recommended no-go buffer areas. New road infrastructure is of moderate sensitivity to aquatic features and considered acceptable. Existing road crossings are considered to have a low sensitivity to all delineated watercourse and acceptable to be used/upgraded. The development footprint is considered as acceptable in terms of aquatic resources.

Impacts of a medium and high significance on aquatic resources have been identified to be associated with the development of the FE Kudu Wind Energy Facility. As a result of the ephemeral and braided nature of the watercourses and susceptibility to erosion and the flat topography likely to be seasonally flooded, the construction and operation phase activities would influence the hydrology, water quality and soil movement within the affected watercourses and vernal pools, notably where the proposed infrastructure traverse these aquatic features and their associated 32 m buffer. This 32 m buffer would also apply to the vernal pools. The optimized layout has largely avoided the ESAs and associated aquatic features with some watercourse crossings proposed and these are deemed acceptable and appropriately placed. There is however the exception of portions of the roads that come in close proximity to the vernal pools and fall within their buffers. These need to be avoided. Provided the mitigation and recommendations are implemented responsibly the project will present low rated residual impacts to the watercourses.

No impacts of a high significance or fatal flaws are expected to occur after implementation of the recommended mitigation measures. The specialist indicates that with the implementation of the recommended mitigation measures, impacts on these aquatic features can be effectively minimised without negatively affecting/changing the rivers current conditions, and that the development can be authorised.

12.2.3 Impacts on Avifauna

The avifauna described to be associated with development area and the impacts identified and assessed are based on the results of the six seasons of pre-construction monitoring which was conducted from January 2021 to October 2022 in accordance with the best practice guidelines.

Key avifaunal sensitivities have been identified within and within the surrounding area of the project site. The FE Kudu Wind Energy Facility development area is not expected to be of particularly high sensitivity for birds. It does not fall within any Important Bird Areas and the closest protected area is the Camdeboo National Park 85 km east of the development area. The area is generally overgrazed reducing its productivity and its capacity to support high species richness.

The following high sensitivities were identified on site:

- A 200m turbine (including rotor-swept area) exclusion zone should be implemented around boreholes and dams,
- A 100m turbine (including rotor-swept area) exclusion zone on either side of drainage lines. The exclusion zone should also exclude the rotor swept area of the turbines.

The high avifauna sensitivity areas represent turbine exclusion zones.

The Avifauna Impact Assessment identified that all impacts associated with the development of the FE Kudu Wind Energy Facility development footprint will be of a medium significance before mitigation and can be mitigated to an acceptable level of impact with medium (lower impact score) and low sensitivity. No impacts of a high significance or fatal flaws are expected to occur with the implementation of the recommended mitigation measures. The current proposed 80-turbine layout assessed in this report avoids all the recommended avifaunal turbine exclusion zones (including rotor-swept areas) and is therefore deemed acceptable. Turbine N20 has been micro-sited to avoid the recommended avifaunal sensitivity buffer. The development is supported, provided the mitigation measures listed in this report are strictly applied.

12.2.4 Impacts on Bats

The pre-construction monitoring was designed to monitor bat activity across the proposed project site, but mainly within considered the full extent of the Aberdeen WEF Cluster Study Area[40]. The monitoring was undertaken in accordance with South African best practice. During this period the baseline environment was investigated by using acoustic monitoring to document bat activity.

Key habitat features have been identified for bats within the development envelope. These habitat features present specific uses and opportunities for bats including known and potential roosts, natural and artificial permanent, seasonal, and ephemeral surface water resources, geological layers, such as dolerite, which may be associated with karst formations, riparian and other woody vegetation and tree clumps, and local buildings are of great importance as these may serve as suitable sites for the roosting of bats and support of their foraging habits. Local resources impacting bats include the negative impact by disturbance of natural habitat from especially livestock overgrazing and possibly other agricultural activities, built infrastructure (such as roads), and light pollution from scattered dwellings and Aberdeen town. At the same time, developments such as certain buildings, dams, and reservoirs are positively benefitting bats by providing them with favourable roosting habitat and more permanent water supplies. Therefore, onsite anthropogenic disturbances currently do not appear to exert an appreciable negative impact on bats.

Important habitats such as perennial watercourses, rivers, rocky outcrops, buildings, trees, water features, and wetlands have been buffered by 200m. Smaller non-perennial drainage lines have been buffered by 100m. »No confirmed roosts have been identified on site to date, although it is recommended for a final specialist site walk-through to take place prior to construction to confirm this, and to provide further construction and roost management recommendations, if required (i.e. if roosts are found).

Based on the bat activity recorded at the FE Kudu Wind Energy Facility project site the significance ratings for the majority of the impacts to bats posed by the development are predicted to be medium or high before mitigation, depending on the impact being considered. After mitigation, all impacts are predicted to be of a medium to low significance. Based on the opportunity for reduction of the impacts through appropriate mitigation measures from a high or medium significance to a medium acceptable significance, no fatal flaws are expected to occur.

The specialist indicates that provided the mitigation measures are implemented, the development of the FE Kudu Wind Energy Facility will not result in unacceptable impacts to bats and can be authorised.

12.2.5 Impacts on Land Use, Soil and Agricultural Potential

[40] The area of interest ('AOI'), collectively known as the 'Aberdeen WEF Cluster Study Area' is approximately ~19 440 hectares in extent. The FE Kudu WEF makes up ~9 170 ha of this AOI.

The project development area includes areas of medium and low sensitivity. The sensitivity rating considers the land capability and agricultural potential as well as the soil erodibility. Most of the development area has Low-Moderate (Class 07) land capability (4941.19ha) with most of the wind turbines falling within these areas. Turbines N21, 25, 27, 30, 31, 33, 38, 39, 40, 41 and 42, are the only turbines falling on a higher land capability of Moderate (Class 08). The Low-Moderate and Moderate land capability is attributed to the deep effective soil depth of the Swarrland, Addo and Valsrivier soil forms, whereas the Low land capability is assigned to the Gkenrosa and Mispah soil forms which have a shallow effective soil depth. The BESS, O&M building, OSS and Laydown area all fall on Low-Moderate (Class 07) land capability areas.

Although most of the infrastructure falls on Medium sensitive areas, the development would still be well within the allowable development limit.

It is considered by the specialist that the majority of the infrastructure is located in areas with medium sensitivity areas. With the implementation of the recommended mitigation measures, the development footprint is therefore considered to be acceptable from a soils and agricultural perspective with no adjustments to the development footprint required.

Majority of the impacts of the FE Kudu Wind Energy Facility from an agricultural perspective will be of medium to low sensitivity. With the implementation of the recommended mitigation measures, all impacts can be reduced to a low acceptable level. No impacts of a high significance are expected to occur, and no fatal flaws are associated with the development from an agricultural perspective. The specialist indicates that the project will be acceptable, subject to the implementation of the recommended mitigation measures.

12.2.6 Impacts on Heritage Resources (archaeology, palaeontology and cultural landscape)

The site forms part of an intact cultural landscape representative of the Central Plateau of the Great Karoo possessing heritage value for historical, aesthetic, architectural, social and scientific reasons. Based on the desktop mapping and assessment of potential heritage resources and receptors, and subsequent fieldwork, a wind farm in the proposed location is acceptable from a cultural landscape perspective. There are no red flags, which identify the project to be a fatal flaw from a cultural landscape perspective. No structures or cultural landscape elements of significance are located within the area proposed for development and the optimised layout observes the recommended buffer areas and mitigation measures.

At a regional scale, the project is located to the south of the Great Escarpment, to the west of the distinctive Camdeboo Plains and at considerable distance from the cluster of Nature Reserves around Graaff Reinet. The site possesses a number of landscape elements contributing to a composite cultural landscape including topographical features, open plains, water features, historic scenic routes and farmsteads. Various buffers are recommended in order to mitigate anticipated negative impacts to these significant cultural landscape elements.

All impacts identified on the heritage resources (including archaeology, palaeontology and cultural landscape) are of a medium to high significance prior to the implementation of mitigation measures. With the implementation of the mitigation measures the impact significance will be reduced to impacts of a medium to low significance. With the opportunities presented for the reduction of impact through the implementation of the recommended mitigation measures, no unacceptable impacts of a high significance are expected to occur. No fatal flaws are therefore associated with the FE Kudu Wind Energy Facility from a heritage perspective.

The specialist indicates that the FE Kudu Wind Energy Facility can proceed, subject to the implementation of the recommended mitigation measures.

12.2.7 Noise Impacts

Noise sensitive receptors (NSRs) were identified within and around the area surrounding the development area, and ambient noise levels were measured in the location. Based on the results of the Noise Impact Assessment no adjustments to the proposed development footprint are required.

From the noise impacts assessed there will be a medium significance for day-time construction activities (with mitigation proposed to reduce the significance to low, a low significance for night-time construction activities, and a low significance for night-time facility operation activities and an impact to ambient sound levels at noise-sensitive receptors due to air-borne noise from the wind turbines. Only one impact of a high significance was identified related to the period that the access roads past NSR03 and NSR04 are constructed or upgraded. Mitigation measures are included to ensure that the potential annoyance due to noise are minimised and reduced to acceptable levels. Potential measures could include:

- » The applicant can relocate the access road further than 60m from NSR03 and NSR04;
- » The applicant could construct a wall (or use an acoustic barrier) between the road the NSR03/NSR04; and
- » The applicant should notify the NSR when construction activities will take place.

For the layout evaluated, considering a WTG with a SPL of 109.2 dBA (re 1 pW), it is recommended that the proposed FE Kudu Wind Energy Facility (and associated infrastructure) be authorised.

12.2.8 Visual Impacts

A visibility analysis was undertaken for the project. The result of the viewshed analysis displays the potential areas of visual exposure, as well as the potential frequency of exposure, and potential visual sensitive receptors. Negative impacts on visual receptors will occur during the undertaking of construction activities and the operation of the FE Kudu Wind Energy Facility.

During the construction phase of the FE Kudu Wind Energy Facility a noticeable increase in heavy vehicles utilising the roads to the project site will occur. This will result in a visual nuisance to other road users and landowners within the surrounding area.

Construction activities may potentially result in a high temporary visual impact, that may be mitigated to medium.

The operation of the FE Kudu Wind Energy Facility will have a medium visual impact on observers/visitors residing at homesteads within a 5km radius of the proposed wind turbine structures, and a medium visual impact on observers travelling along the roads within a 5km radius of the wind turbines and on residents of (or visitors to) homesteads within a 5 - 10km radius of the wind turbine structures. No mitigation of this impact is possible (i.e. the structures will be visible regardless), but general mitigation and management measures are recommended as best practice. The FE Kudu Wind Energy Facility could have a moderate visual impact on residents of (or visitors to) homesteads within a 10-20km radius of the wind turbine structures.

Shadow flicker is an impact relevant to the operation of the turbines. Shadow flicker only occurs when the sky is clear, and when the turbine rotor blades are between the sun and the receptor (i.e. when the sun is low). Most shadow impact is associated with 3-4 times the height of the object. Based on this, a 1.2km buffer along the edge of the outer most turbines were identified as the zone within which there is a risk of shadow flicker occurring. The visual study found that six (6) turbines labelled N1, S41, S23, S19, S18 and S1 are likely to have a shadow flicker impact on motorists using the secondary road. It is, however, expected that the number of motorists travelling on these roads will be limited and the level of exposure will be brief, thereby, not constituting a shadow flicker visual impact of concern for these receptors.

One (1) turbine labelled N1 may have a shadow flicker impact on Rooidraai which is known as the Karoo Secret Farm Stay. However, this homestead is located within the farm portions earmarked for the proposed Wind Energy Facility development.

In terms of lighting impacts, the area immediately surrounding the proposed facility has a relatively low incidence of receptors and light sources. The anticipated lighting impact during operation is likely to be of medium significance, especially within a 5km to 10km radius of the wind turbine structures.

In terms of ancillary infrastructure, the range of visual exposure will fall within that of the turbines. The anticipated visual impact resulting from this infrastructure is likely to be of low significance both before and after mitigation.

An impact on the sense of place for the area is also identified from a visual perspective. Sense of place refers to a unique experience of an environment by a user, based on his or her cognitive experience of the place. An impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light. The greater environment has a rural, undeveloped character and a natural appearance. These generally undeveloped landscapes are considered to have a high visual quality. The significance of the visual impacts on the sense of place within the region (i.e. beyond a 20km radius of the development and within the greater region) is expected to be of medium significance. However, in the future should all the intended development be constructed, it is expected that the significance of the visual impacts on the sense of place could be reduced to moderate significance (lower rating). No mitigation of this impact is possible (i.e. the structures will be visible regardless), but general mitigation and management measures are recommended as best practice.

The visual impact is expected to be of high significance (within a 10km radius). However, this is not considered to be a fatal flaw.

12.2.9 Social Impacts

Impacts are expected to occur with the development of the FE Kudu Wind Energy Facility during the construction, operation and decommissioning phases. Both positive and negative impacts are identified and assessed.

Positive impacts during construction includes:
» Creation of employment and business opportunities, and
» The opportunity for skills development and on-site training.

Negative impacts during construction includes:
» Impacts associated with the presence of construction workers on local communities.
» Impacts related to the potential influx of jobseekers.

» 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.
» Nuisance impacts, such as noise, dust, and safety, associated with construction related activities and vehicles.
» Impact on productive farmland.

Positive impacts during operation includes:
» The establishment of infrastructure to improve energy security and support renewable sector.
» Creation of employment opportunities.
» Benefits for local landowners.
» Benefits associated with socio-economic contributions to community development.

Negative impacts during operation includes:
» Visual impacts and associated impacts on sense of place.
» Impact on property values.
» Impact on tourism.

The positive effects and impacts of FE Kudu Wind Energy Facility would outweigh the negative effects. This is largely due to the fact that the project is expected to have a positive net impact on economic development, employment, household earnings, government revenue and skills development in the country and most importantly in the local community that experiences a high unemployment rate as well as a small economic base. The negative impacts that are expected to occur as a result of the project will be far more localised and would affect a significantly smaller number of people and households than in the case of the net benefits that would be derived by the project.

Considering the above, the development of the FE Kudu Wind Energy Facility is acceptable from a social perspective.

12.2.10 Impacts on Traffic

Traffic impacts have been identified for the construction, operation and decommissioning phases, with the most significant impact expected to occur during the construction phase.

The traffic generated during the construction phase, although significant, will be temporary and impacts are considered to be negative and of medium significance before and of low significance after mitigation. During the operation phase impact would be minimal. The traffic generated during the decommissioning phase will be similar but less than the construction phase traffic and the impact on the surrounding road network will also be considered negative and of medium significance before and of low significance after mitigation.

No impacts of high significance were identified, and no fatal flaws are associated with the FE Kudu Wind Energy Facility from a traffic perspective.

12.2.11 Assessment of Cumulative Impacts

Cumulative impacts and benefits on various environmental and social receptors will occur to varying degrees with the development of several renewable energy facilities in South Africa. The degree of significance of these cumulative impacts is difficult to predict without detailed studies based on more comprehensive data/information on each of the receptors and the site-specific developments. The alignment of renewable energy developments with South Africa's National Energy Response Plan and the global drive to move away from the use of non-renewable energy resources and to reduce greenhouse gas emissions is undoubtedly positive. The economic benefits of renewable energy developments at a local, regional and national level have the potential to be significant.

The FE Kudu Wind Energy Facility falls within the Beaufort West REDZs which has been identified by the DFFE as an area highly suitable for wind energy facilities given a range of factors considered. Therefore, DFFE envisages dealing with multiple applications and cumulative issues within a REDZ area. The REDZ are of strategic importance for large scale wind and solar photovoltaic development, in terms of Strategic Integrated Project (SIP) 8. These zones are considered to be areas where significant negative impacts on the environment are limited and socio-economic benefits to the country can be enhanced. Four projects within the immediate area surrounding the has been approved. FE Kudu Wind Energy Facility will contribute to the cumulative impact experienced within the area. The cumulative impacts associated with the FE Kudu Wind Energy Facility have been assessed to be acceptable, with no unacceptable loss or risk expected (refer to **Table 12.1** and Chapter 11).

Table 12.1: Summary of the cumulative impact significance for the FE Kudu Wind Energy Facility within the project site

Specialist assessment	**Overall significance of impact of the proposed project considered in isolation**	**Cumulative significance of impact of the project and other projects in the area**
Terrestrial Ecology	Low	Low
Aquatics	Medium	Medium
Avifauna	Low	Medium
Bats	Medium	High
Agriculture	Low	Medium
Heritage (archaeology, palaeontology and cultural landscape)	Medium	High
Noise	Low	Low
Visual	Medium	High
Social Impact Assessment	Low (Negative) Medium (Positive)	Medium(Negative) Medium (Positive)
Traffic	Medium	Medium

Based on the specialist cumulative assessment and findings, the development of the FE Kudu Wind Energy Facility and its contribution to the overall impact of all wind energy facilities to be developed within a 30km radius, it can be concluded that the FE Kudu Wind Energy Facility cumulative impacts will be of a medium to low significance with impacts of a high significance associated with impacts on bats, visual cumulative impacts and impacts on heritage. Therefore, the development of the FE Kudu Wind Energy Facility will not result in unacceptable, cumulative impacts and will not result in a whole-scale change of the environment. well as the specialist consultant.

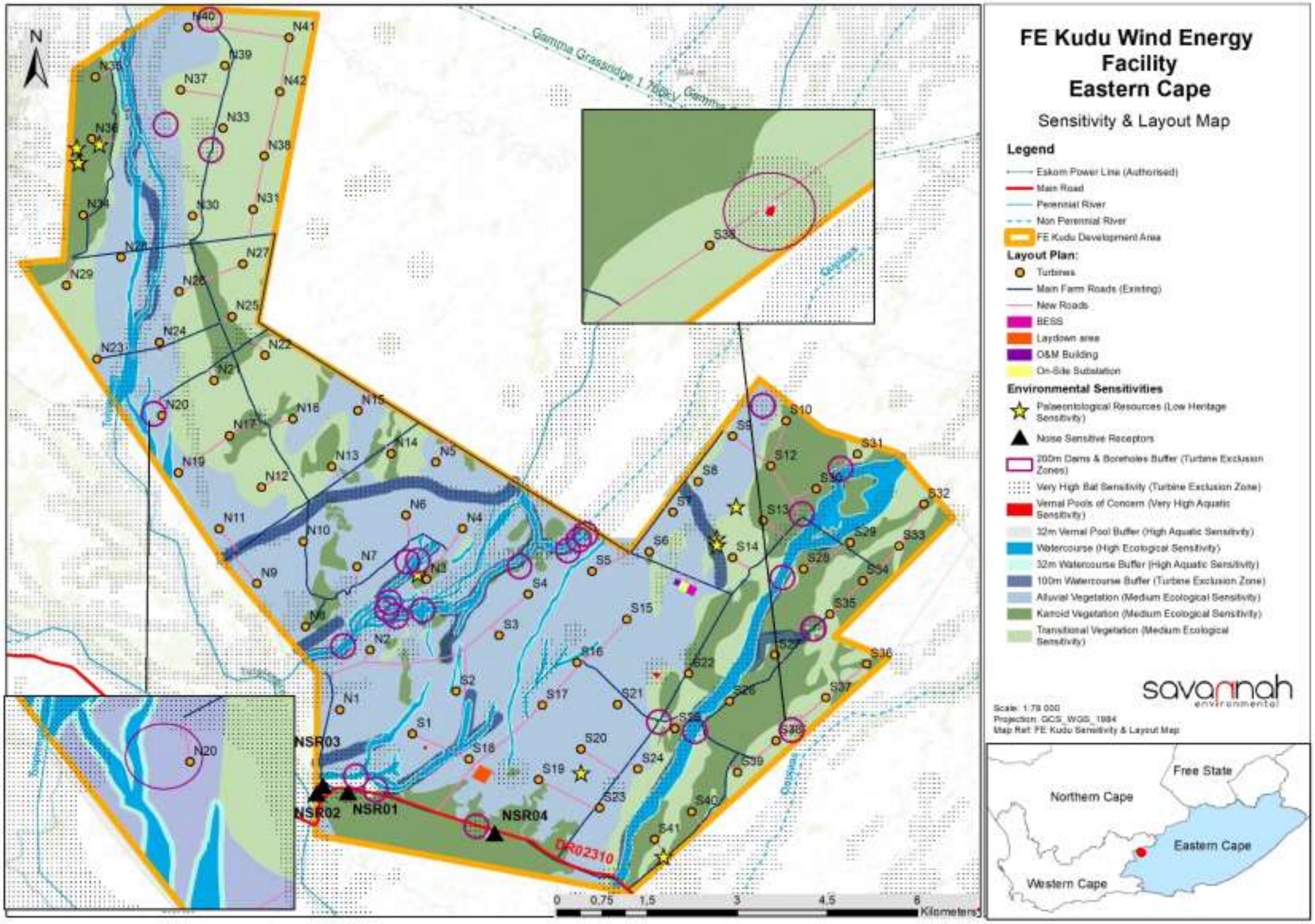

Figure 12.2: The development footprint of the FE Kudu Wind Energy Facility overlaid with the facility layout and environmental sensitivities associated with the project site, as identified by the various specialists

12.3. Adjustment of the Facility Layout (Mitigation Strategy)

The optimised facility layout assessed within this BA Report was designed by the project developer in order to respond to and avoid the sensitive environmental and social features located within the project site, which were identified by the specialists early in the BA process. This approach ensured the application of the mitigation hierarchy (i.e., avoid, minimise, mitigate, and offset) to the proposed project, which ultimately ensures that the development is appropriate from an environmental perspective and is suitable for development within the project site.

Considering this optimised layout, the following specialists identified and recommended that specific turbines and associated infrastructure be relocated within the project site (refer to **Table 12.2**)

Table 12.2: Turbines and associated infrastructure not considered to be acceptable in the positions as proposed in the optimised facility layout based on specialist findings

Turbines/associated infrastructure	Relocation position	Rationale for requirement for repositioning
Turbine N20	180msouth east	Turbine required to be relocated outside of the avifauna turbine exclusion zone.
Road between turbines N23 & N24	17m north west to fall outside of the vernal pool 32m buffer	Road required to be relocated to avoid the 32m aquatic buffer and cater for natural surface runoff
Road between turbines S37 & S38	34m north west to fall outside of the vernal pool 32m buffer	Road required to be relocated to avoid the 32m aquatic buffer and cater for natural surface runoff

With the implementation of the adjusted layout, the development footprint is considered to be suitable and appropriate from an environmental perspective for the wind farm, as it ensures the avoidance, reduction and/or mitigation of all identified detrimental or adverse impacts on sensitive features as far as possible. All associated infrastructure is now placed in acceptable locations from a sensitivity perspective in the adjusted final facility layout.

This adjusted final facility layout considers the required mitigation measures as stated by the specialists and represents a positive outcome in terms of impact avoidance, reduction and mitigation. As such, the impact of this refined adjusted final facility layout is considered to be acceptable, and the layout is preferred. Final micro-siting must however be undertaken prior to construction considering all mitigation measures recommended within this BA Report and associated specialist studies.

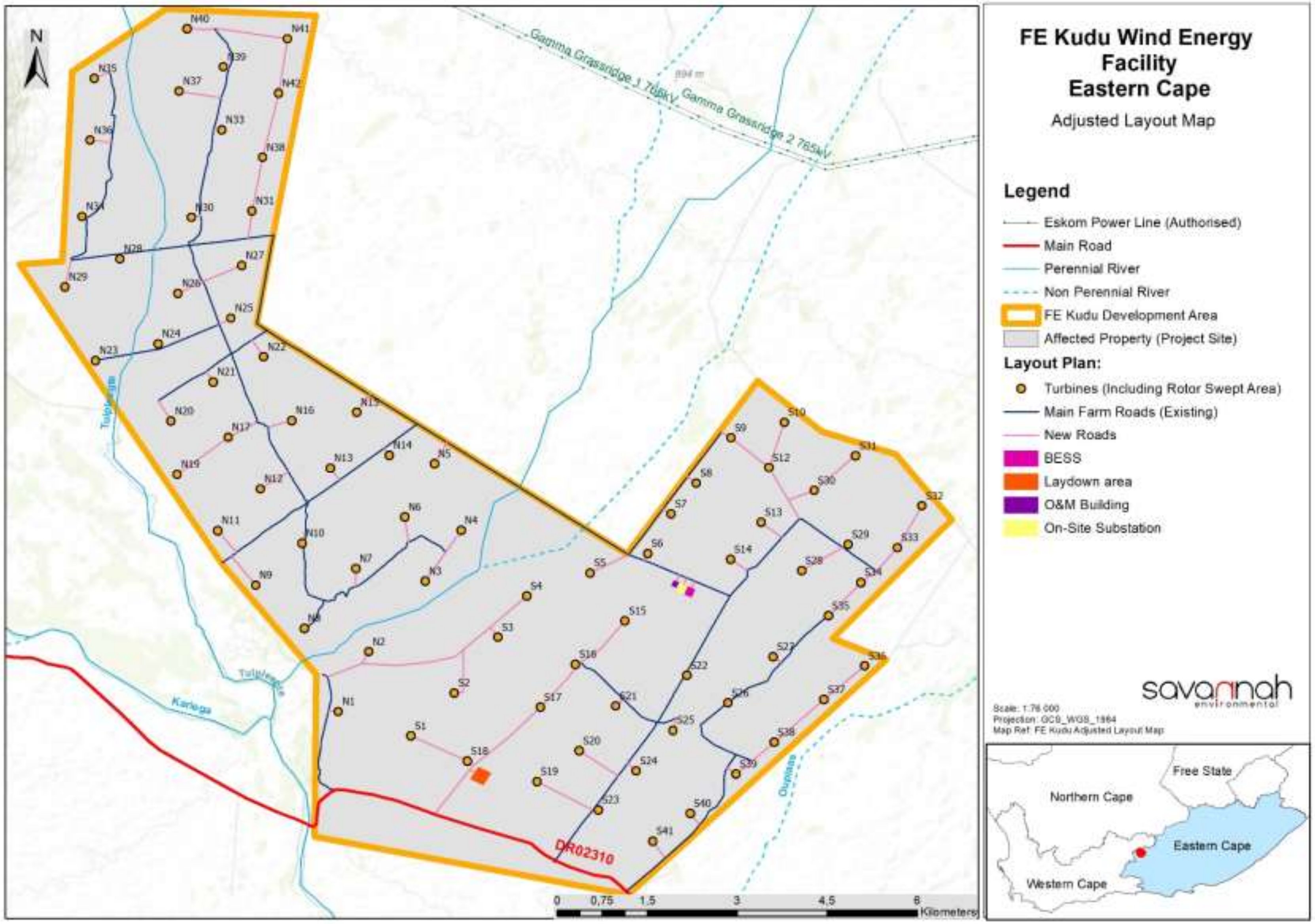

Figure 12.3: Adjusted facility layout for the FE Kudu Wind Energy Facility (also refer to **Appendix O**)

12.4. Environmental Costs of the Wind Energy Facility versus Benefits of the Wind Energy Facility

Environmental costs (including those to the natural environment, economic and social environment) can be anticipated at a local and site-specific level, and are considered acceptable provided the mitigation measures as outlined in the Basic Assessment report and the EMPr are implemented and adhered to. No fatal flaws have been identified. These environmental costs could include:

- » *A loss of biodiversity, flora and fauna due to the clearing of land for the construction and utilisation of land for the wind energy facility* - The cost of loss of biodiversity has been minimised/avoided through the placement of project components and infrastructure outside of the sensitive habitat communities considered to be of very high and high sensitivity.
- » *Impacts on freshwater resources* - the impacts on freshwater resources have been minimised through the adjusted layout largely avoiding the sensitive features identified.
- » *An increase in traffic* – The FE Kudu Wind Energy Facility construction will create an increase in traffic. This impact will however be short-term in extent and is not considered to be significant.
- » *Visual impacts associated with the wind energy facility* - The FE Kudu Wind Energy Facility will be visible and mainly of a high significance. No mitigation of this impact is possible (i.e. the structures will be visible in the landscape), but general mitigation and management are required as best practise to minimise secondary visual impacts which may arise from mismanagement of the site.
- » *Loss of land for agriculture* – The development will remove areas available for agricultural activities, however based on the current conditions of the project site and the small development footprint of the wind energy facility, this will be limited and not significant.
- » *Impacts on birds and bats* – loss of birds and bats species due to collision. The impact is however considered to be acceptable without any impact of high significance.
- » *Socio-economic impacts* – impacts relating to the influx of workers and safety, amongst others. The impact is however considered to be acceptable.

Benefits of the FE Kudu Wind Energy Facility include the following:

- » The project will result in important economic benefits at the local and regional scale through job creation, income and other associated downstream economic development. These will persist during the preconstruction, construction, operation and decommissioning phases of the project.
- » The project provides an opportunity for a new/alternte land use on the affected property which is considered as a more efficient use of the land and provides an opportunity for alternative generation of income from the property which would support the agricultural activities undertaken within the project site.
- » The project contributes towards the Provincial and Local goals for the development of renewable energy as outlined in the respective IDPs.
- » The project serves to diversify the economy and electricity generation mix of South Africa through the addition of wind energy.
- » The water requirement for a wind farm is negligible compared to the levels of water used by coal-based technologies. This generation technology is therefore supported in dry climatic areas.
- » South Africa's per capita greenhouse gas emissions are amongst the highest in the world due to the reliance on fossil fuels. The FE Kudu Wind Energy Facility will contribute to achieving goals for implementation of renewable energy and sustaining a 'green' economy within South Africa.

The benefits of the FE Kudu Wind Energy Facility are expected to occur at a national, regional and local level. As the costs to the environment at a site-specific level have been largely limited through the appropriate placement of infrastructure on the project site within lower sensitive areas through the avoidance of features and areas considered to be sensitive, the benefits of the project are expected to partially offset the localised environmental costs of the wind energy facility.

12.5. Overall Conclusion (Impact Statement)

The preferred activity was determined by the developer to be the development of a renewable energy facility on site using wind as the preferred technology, due to the availability of a suitable wind resource. Independent specialists appointed to undertake the assessment of potential impacts associated with the project assessed a larger area in order to inform the best location for the FE Kudu Wind Energy Facility infrastructure. The specialists considered desktop data, field work, existing literature and the National Web-based Environmental Screening Tool to inform the identification of sensitivities. A proposed layout was designed after provision of sensitivity data by the specialists with the aim of avoiding sensitive areas identified.

Based on the specialist investigations of the larger area, a technically viable development footprint was proposed by the developer and assessed as part of the BA process. The findings of the assessment of the development footprint undertaken by independent specialists have informed the results of this BA report. The specialist findings have indicated that there are no identified fatal flaws associated with the implementation of the project within the project site.

From a review of the relevant policy and planning framework, it was concluded that the project is well aligned with the policy framework, and a clear need for the project is seen from a policy perspective at a local, provincial, and National level.

Through the BA process, all specialists assessed the full extent of the area as shown within the sensitivity map (refer to **Figure 12.4**). When considering biodiversity and socio-economic benefits and impacts on the affected and surrounding areas, the following is concluded from the specialist studies undertaken within this BA process.

- » The adjusted facility layout (**Figure 12.3 and 12.4**) ensures that the majority sensitivities identified through the BA process (as supported by the pre-construction monitoring) are avoided as far as practically possible and recommended buffer areas are honoured. This approach is in line with the application of the mitigation hierarchy, where all the sensitive areas which could be impacted by the development have been avoided (i.e., tier 1 of the mitigation hierarchy).
- » Where impacts could not be avoided, appropriate mitigation has been proposed to minimise impacts. It follows, therefore, that the project does not adversely impact on the ecological integrity of the area.
- » In addition, the social assessment has identified 10 short-term (construction related) impact indicators and 10 operation related socio-economic impact indicators. Over both phases of the proposed development seven impacts are forecasted to be negative before and after mitigation, while 13 are anticipated to be positive, before and after mitigation.
- » The benefits of the FE Kudu Wind Energy Facility are expected to occur at a national, regional and local level.
- » As the costs to the environment at a site-specific level have been largely limited through the appropriate placement of infrastructure on the project site within lower sensitive areas through the

avoidance of features and areas considered to be sensitive, which has been further considered through the proposed facility layout (**Figure 12.3**), the benefits of the project are expected to partially offset the localised environmental costs of the FE Kudu Wind Energy Facility. From an economic perspective, both positive and negative impacts are expected.

Based on the conclusions of the specialist studies and the facility layout which prioritised the avoidance of environmental sensitivities, it can be concluded that the development of the FE Kudu Wind Energy Facility will not result in unacceptable environmental impacts (subject to the implementation of the recommended mitigation measures). Impacts can be mitigated to acceptable levels or enhanced through the implementation of the recommended mitigation or enhancement measures. This is however not relevant for the visual impact of the wind farm as the turbines will be visible regardless of the mitigation applied. This high significance rating is, however, not considered as a fatal flaw by the specialist. The facility layout and EMPr presented within this BAR should therefore be authorised for implementation.

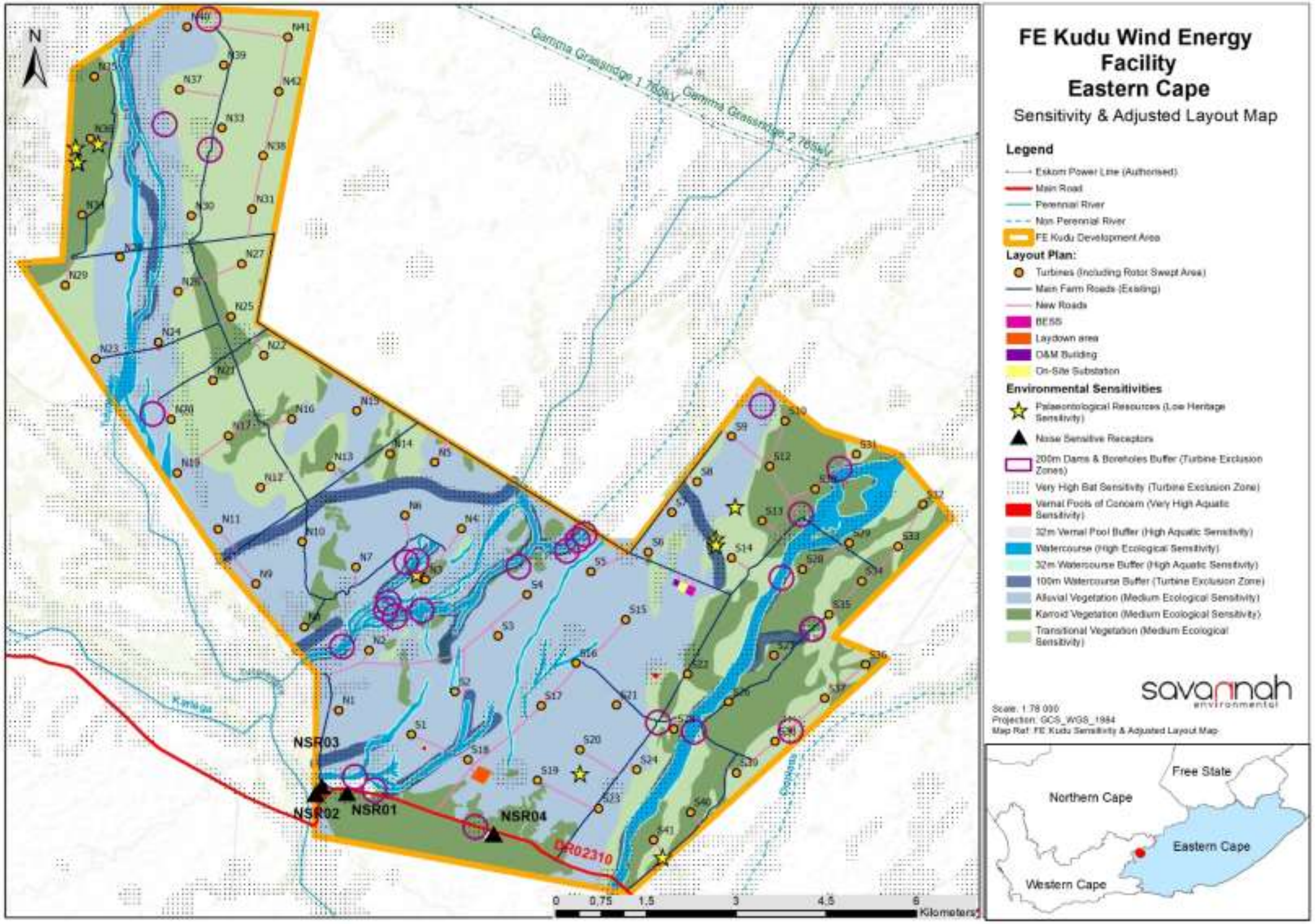

Figure 12.4: Adjusted facility layout overlain with the sensitivities identified for the FE Kudu Wind Energy Facility (also refer to **Appendix O**)

12.6. Overall Recommendation

Considering the findings of the independent specialist studies, the impacts identified, the development footprint proposed by the developer within the development envelope, the avoidance of the sensitive environmental features within the project site through the optimised development footprint, as well as the potential to further minimise the impacts to acceptable levels through mitigation, it is the reasoned opinion of the EAP that the FE Kudu Wind Energy Facility is acceptable within the landscape and can reasonably be authorised (**Figure 12.3**).

The following infrastructure would be included within an authorisation issued for the project:

- » Up to 80 wind turbines, turbine foundations and turbine hardstands
- » An on-site substation hub incorporating:
  - A132kV on-site facility substation
  - Switchyard with collector infrastructure
  - Battery Energy Storage System (BESS)
  - Operation and Maintenance buildings
- » A balance of plant area incorporating:
  - Temporary laydown areas
  - A construction camp laydown and temporary concrete batching plant
- » Power lines internal to the wind farm, trenched and located adjacent to internal access roads, where feasible[41].
- » Access roads to the site and between project components with a width up to 8m for primary access routes.

The 600MW FE Kudu Wind Energy Facility is located on Portion 2 of Farm Oorlogspoort 85 and can be accessed via an existing (unnamed) gravel road originating off the DR02310 which turns off from the R61. This existing road traverses the Remaining Extent of Farm Pretorius Kuil 89 and Portion 2 of Farm Oorlogspoort 85.

The following key conditions would be required to be included within an authorisation issued for the FE Kudu Wind Energy Facility:

- » The adjusted final facility layout as presented in **Figure 12.3** should be authorised for implementation.
- » Final micro-siting must however be undertaken prior to construction considering all mitigation measures recommended within this BA Report and associated specialist studies.
- » All mitigation measures detailed within this Basic Assessment report, as well as the specialist reports contained within **Appendices D to M**, are to be implemented.
- » No turbines are permitted within the identified turbine exclusion areas as detailed in **Figure 12.4.**
- » A pre-construction walk-through of the final layout, including roads and underground cables, should be undertaken before construction commences and adjusted where required to ensure avoidance of development on sensitive habitats and associated species of concern.
- » The EMPr as contained within **Appendix N** of this Basic Assessment report should form part of the contract with the Contractors appointed to construct and maintain the wind energy facility in order to ensure compliance with environmental specifications and management measures. The

[41] The intention is for internal project cabling to follow the internal roads.

implementation of this EMPr for all life cycle phases of the FE Kudu Wind Energy Facility is considered key in achieving the appropriate environmental management standards as detailed for this project.

» Stormwater management and erosion management at the site should take place according to a detailed Stormwater Management Plan and an Erosion Management Plan and Rehabilitation Plan.
» Implementation of a chance finds procedure for the rescuing of any fossils or heritage resources discovered during construction.
» If any archaeological material or human burials are uncovered during construction activities, work in the immediate area should be halted, the find reported to the heritage authorities and inspected by an archaeologist. Such heritage is the property of the State and may require excavation and curation in an approved institution.
» Maintain vegetation cover (i.e. either natural or cultivated) immediately adjacent to the actual development footprint, both during construction and operation of the proposed facility.
» Monitor all rehabilitated areas for one year following decommissioning, and implement remedial actions as and when required.

A validity period of 10 years of the Environmental Authorisation is requested, should the project obtain approval from DFFE.

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251166	Palaeontological Specialist Reports	John E Almond	31/12/2014	PALAEONTOLOGICAL IMPACT ASSESSMENT FOR THE PROPOSED ABERDEEN 200 MW WIND FARM, CAMDEBOO LOCAL MUNICIPALITY, EASTERN CAPE.
354680	HIA Phase 1	Lita Webley, David Halkett	30/11/2015	Heritage Impact Assessment: Proposed Uranium Mining and Associated infrastructure on portions of the farm Quaggasfontein and Ryst Kuil near Beaufort West in the Western Cape and De Pannen near Aberdeen in the Eastern Cape
354681	AIA Phase 1	Lita Webley	30/11/2015	Archaeological Impact Assessment: Proposed uranium mining and associated infrastructure on portions of the farms Quaggasfontein and Ryst Kuil near Beaufort West in the Western Cape and De Pannen near Aberdeen in the Eastern Cape
354683	PIA Phase 1	Bruce Rubidge	24/04/2008	Palaeontological study of the Rystkuil channel
6805	AIA Phase 1	Len van Schalkwyk, Elizabeth Wahl	01/09/2007	Heritage Impact Assessment of Gamma Grassridge Power Line Corridors and Substation, Eastern, Western and Northern Cape Provinces, South Africa
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