PROPOSED FE KUDU WIND ENERGY FACILITY, EASTERN CAPE PROVINCE

VISUAL ASSESSMENT

Produced for:

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DECLARATION

I, **Lourens du Plessis**, as an independent consultant who compiled this Visual Impact Assessment, declare that it correctly reflects the findings made at the time of the report's compilation. I further declare that I, act as an independent consultant in terms of the following:

- Do not have any financial interest in the undertaking of the activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act107 of 1998);
- Undertake to disclose, to the competent authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the National Environmental Management Act,1998 (Act 107 of 1998);
- Based on information provided to me by the project proponent, and in addition to information obtained during the course of this study, will present the results and conclusion within the associated document to the best of my professional judgement.

____

Lourens du Plessis
Professional GISc Practitioner

1. STUDY APPROACH

1.1 Qualification and experience of the practitioner

Lourens du Plessis (t/a LOGIS) is a Professional Geographical Information Sciences (GISc) Practitioner registered with The South African Geomatics Council (SAGC), and specialises in Environmental GIS and Visual Impact Assessments (VIA).

Lourens has been involved in the application of Geographical Information Systems (GIS) in Environmental Planning and Management since 1990. He has extensive practical knowledge in spatial analysis, environmental modelling, and digital mapping, and applies this knowledge in various scientific fields and disciplines. His GIS expertise are often utilised in Environmental Impact Assessments, Environmental Management Frameworks, State of the Environment Reports, Environmental Management Plans, tourism development and environmental awareness projects.

He holds a BA degree in Geography and Anthropology from the University of Pretoria and worked at the GisLAB (Department of Landscape Architecture) from 1990 to 1997. He later became a member of the GisLAB and in 1997, when Q-Data Consulting acquired the GisLAB, worked for GIS Business Solutions for two years as project manager and senior consultant. In 1999 he joined MetroGIS (Pty) Ltd as director and equal partner until December 2015. From January 2016 he worked for SMEC South Africa (Pty) Ltd as a technical specialist until he went independent and began trading as LOGIS in April 2017.

Lourens has received various awards for his work over the past two decades, including EPPIC Awards for ENPAT, a Q-Data Consulting Performance Award and two ESRI (Environmental Systems Research Institute) awards for Most Analytical and Best Cartographic Maps, at Annual International ESRI User Conferences. He is a co-author of the ENPAT atlas and has had several of his maps published in various tourism, educational and environmental publications.

He is familiar with the "Guidelines for Involving Visual and Aesthetic Specialists in EIA Processes" (Provincial Government of the Western Cape: Department of Environmental Affairs and Development Planning) and utilises the principles and recommendations stated therein to successfully undertake visual impact assessments.

1.2 Assumptions and limitations

This Report has been prepared by LOGIS at the request of Savannah Environmental (Pty) Ltd (hereby referred to as Savannah) as the appointed Environmental Assessment Practitioner (EAP) on behalf of the Project Developer, to provide them with an independent specialist assessment. Unless otherwise agreed by LOGIS in writing, LOGIS does not accept responsibility or legal liability to any person other than the EAP and Project Developer for the contents of, or any omissions from, this Report.

To prepare this Report, LOGIS utilised only the documents and information provided by Savannah or any third parties directed to provide information and documents by Savannah. LOGIS has not consulted any other documents or information in relation to this Report, except where otherwise indicated.

The findings, recommendations and conclusions given in this report are based on the author's best scientific and professional knowledge, as well as, the available information. This report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken. LOGIS reserve the right to modify aspects of the report including the recommendations if and when new information may become available from on-going research or further work in this field, or pertaining to this investigation.

Although LOGIS exercises due care and diligence in rendering services and preparing documents, LOGIS accepts no liability, and Savannah, by receiving this document, indemnifies LOGIS and its directors, managers, agents and employees against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with the services rendered, directly or indirectly by the use of the information contained in this document.

This report may not be altered or added to without the prior written consent of the author. This also refers to electronic copies of this report which are supplied for the purposes of inclusion as part of other reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If this report is used as part of a main report, the report in its entirety must be included as an appendix or separate section to the main report.

This assessment was undertaken during the planning stage of the project and is based on information available at that time.

This Visual Impact Assessment and all associated mapping has been undertaken according to the worst-case scenario.

1.3 Legal framework

The following legislation and guidelines have been considered in the preparation of this report:

- **The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA):** This report is in line with Appendix 6 of NEMA: Environmental Impact Assessment (EIA) Regulations (2014, as amended) which details the minimum requirements a specialist report must contain for an Environmental Impact Assessment.
- **Guideline for Involving Visual and Aesthetic Specialists in EIA Processes (DEADP, Provincial Government of the Western Cape, 2005):** This guideline was developed for use in the Western Cape, however in the absence of the development of any other guideline, this provides input for the preparation of visual specialist input into EIA processes. The guideline documents the requirements for visual impact assessment, typical issues that trigger the need for specialist visual input, the scope and extent of a visual assessment, information required, as well as the assessment ad reporting of visual impacts and management actions.
- **Screening Tool as per Regulation 16 (1)(v) of the Environmental Impact Assessment Regulations, 2014 as amended:** a Screening report was generated for this proposed project, whereby a visual impact assessment was identified as one of the specialist studies that would be required.

1.4 Information base

This assessment was based on information from the following sources:

- Topographical maps and GIS generated data were sourced from the Surveyor General, Surveys and Mapping in Mowbray, Cape Town;
- Chief Directorate National (CDN) Geo-Spatial Information, varying dates. *1:50 000 Topographical Maps and Data.*
- DFFE, 2018/2020. *National Land-cover Database 2018/2020 (NLC2018/2020).*
- DFFE, 2022. *South African Protected Areas Database (SAPAD_OR_2022_Q2).*
- JAXA, 2021. Earth Observation Research Centre. *ALOS Global Digital Surface Model (AW3D30).*
- Google Earth Pro. *Up to date and recent satellite images.*
- Professional judgement based on experience gained from similar projects;
- Literature research on similar projects;
- 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 NEMA

The quality of this data is rated as good.

1.5 Level of confidence

Level of confidence[1] is determined as a function of:

- The information available, and understanding of the study area by the practitioner:

[1] Adapted from Oberholzer (2005).

- **3**: A high level of information is available of the study area and a thorough knowledge base could be established during site visits, surveys etc. The study area was readily accessible.
- **2**: A moderate level of information is available of the study area and a moderate knowledge base could be established during site visits, surveys etc. Accessibility to the study area was acceptable for the level of assessment.
- **1**: Limited information is available of the study area and a poor knowledge base could be established during site visits and/or surveys, or no site visit and/or surveys were carried out.

- The information available, understanding of the project and experience of this type of project by the practitioner:

  - **3**: A high level of information and knowledge is available of the project and the visual impact assessor is well experienced in this type of project and level of assessment.
  - **2**: A moderate level of information and knowledge is available of the project and the visual impact assessor is moderately experienced in this type of project and level of assessment.
  - **1**: Limited information and knowledge is available of the project and the visual impact assessor has a low experience level in this type of project and level of assessment.

These values are applied as follows:

Table 1: Level of confidence

	Information on the project & experience of the practitioner			
Information on the study area		**3**	**2**	**1**
	3	9	6	3
	2	6	4	2
	1	3	2	1

The level of confidence for this assessment is determined to be **9** and indicates that the author's confidence in the accuracy of the findings is Moderate to High:

- The information available, and understanding of the study area by the practitioner is rated as **3**
- The information available, understanding and experience of this type of project by the practitioner is rated as **3**

1.6 Methodology

The study was undertaken using Geographical Information Systems (GIS) software as a tool to generate viewshed analyses and to apply relevant spatial criteria to the proposed facility. A detailed Digital Terrain Model (DTM) for the study area was created from topographical data provided by NASA in the form of a 30m SRTM (Shuttle Radar Topography Mission) elevation model.

The Plan of Study for the Visual Impact Assessment (VIA) is stated below.

The VIA will be determined according to the nature, extent, duration, intensity or magnitude, probability and significance of the potential visual impacts, and will propose management actions and/or monitoring programs, and may include recommendations related to the wind turbine generator (WTG) layout.

The visual impact will be determined for the highest impact-operating scenario (worst-case scenario) and varying climatic conditions (i.e. different seasons, weather conditions, etc.) will not be considered.

The VIA will consider potential cumulative visual impacts, or alternatively the potential to concentrate visual exposure/impact within the region (if applicable).

The following VIA-specific tasks have been undertaken:

- **Determine potential visual exposure**

The visibility or visual exposure of any structure or activity is the point of departure for the visual impact assessment. It stands to reason that if (or where) the proposed facility and associated infrastructure were not visible, no impact would occur.

The viewshed analyses of the proposed facility and the related infrastructure are based on a 30m SRTM digital terrain model of the study area.

The first step in determining the visual impact of the proposed facility is to identify the areas from which the structures would be visible. The type of structures, the dimensions, the extent of operations and their support infrastructure are taken into account.

- **Determine visual distance/observer proximity to the facility**

In order to refine the visual exposure of the facility on surrounding areas/receptors, the principle of reduced impact over distance is applied in order to determine the core area of visual influence for this type of structure.

Proximity radii for the proposed infrastructure are created in order to indicate the scale and viewing distance of the facility and to determine the prominence of the structures in relation to their environment.

The visual distance theory and the observer's proximity to the facility are closely related, and especially relevant, when considered from areas with a high viewer incidence and a predominantly negative visual perception of the proposed facility.

- **Determine viewer incidence/viewer perception (sensitive visual receptors)**

The next layer of information is the identification of areas of high viewer incidence (i.e. main roads, residential areas, settlements, etc.) that would be exposed to the project infrastructure.

This is done in order to focus the attention on areas where the perceived visual impact of the facility will be the highest and where the perception of affected observers will be negative.

Related to this dataset, is a land use character map, that further aids in identifying sensitive areas and possible critical features (i.e. tourist facilities, national parks, etc. – if applicable), that should be addressed.

- **Determine the visual absorption capacity (VAC) of the landscape**

This is the capacity of the receiving environment to absorb the potential visual impact of the proposed facility. The VAC is primarily a function of the vegetation, and will be high if the vegetation is tall, dense and continuous. Conversely, low growing sparse and patchy vegetation will have a low VAC.

The VAC would also be high where the environment can readily absorb the structure in terms of texture, colour, form and light / shade characteristics of the structure. On the other hand, the VAC for a structure contrasting markedly with one or more of the characteristics of the environment would be low.

The VAC also generally increases with distance, where discernible detail in visual characteristics of both environment and structure decreases.

- **Calculate the visual impact index**

The results of the above analyses are merged in order to determine the areas of likely visual impact and where the viewer perception would be negative. An area with short distance visual exposure to the proposed infrastructure, a high viewer incidence and a predominantly negative perception would therefore have a higher value (greater impact) on the index. This focusses the attention to the critical areas of potential impact and determines the potential **magnitude** of the visual impact.

Geographical Information Systems (GIS) software will be used to perform all the analyses and to overlay relevant geographical data sets in order to generate a visual impact index.

- **Determine impact significance**

The potential visual impacts are quantified in their respective geographical locations in order to determine the significance of the anticipated impact on identified receptors. Significance is determined as a function of extent, duration, magnitude (derived from the visual impact index) and probability. Potential cumulative and residual visual impacts are also addressed. The results of this section is displayed in impact tables and summarised in an impact statement.

- **Propose mitigation measures**

The preferred alternative (or a possible permutation of the alternatives) will be based on its potential to reduce the visual impact. Additional general mitigation measures will be proposed in terms of the planning, construction, operation and decommissioning phases of the project.

- **Reporting and map display**

All the data categories, used to calculate the visual impact index, and the results of the analyses will be displayed as maps in the accompanying report. The methodology of the analyses, the results of the visual impact assessment and the conclusion of the assessment will be addressed in this VIA report.

- **Site visit and photo simulations**

A site visit was undertaken on the 11-12 July 2023 in order to verify the results of the spatial analyses and to identify any additional site-specific issues that may need to be addressed in the VIA report. It should be noted that, from a visual perspective, the different seasons do not influence the results of the impact assessment, and as such regardless of the timing of the site visit, the level of confidence for the assessment and findings is high.

Photographs from strategic viewpoints were taken in order to simulate realistic post construction views of the Wind Energy Facility (WEF). This aids in visualising the perceived visual impact of the proposed WEF and place it in spatial context.

2. PROJECT DESCRIPTION

FE Kudu (Pty) Ltd is proposing the development of a wind energy facility and associated infrastructure on a site located approximately 40km west of Aberdeen in the Eastern Cape Province. The project is located within the Dr Beyers Naude Local Municipality and the greater Sarah Baartman District Municipality. The project site comprises a single affected property, Portion 2 of Farm Oorlogspoort 85. The project is known as the 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 entire extent of the site falls within the Beaufort West Renewable Energy Development Zones (i.e. REDZ Focus Area 11).

The FE Kudu Wind Energy Facility will have a contracted capacity of up to 600MW and comprise wind turbines with a capacity of up to 7.5MW each. The project has a preferred project site of approximately ~9 170ha. Access to the site will be via an existing road off of the nearby R61.

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.

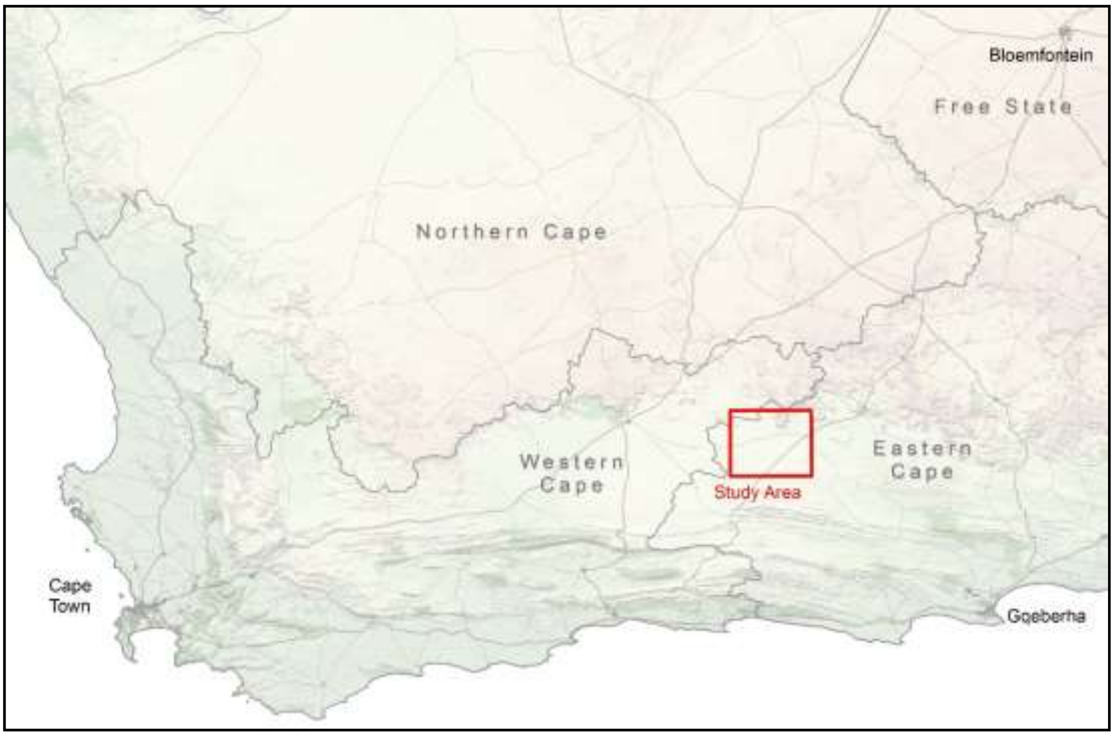


Figure 1: Regional locality of the study area

A technically viable development footprint was proposed by the developer and assessed as part of the studies. The details of the project are as follows:

Table 2: Infrastructure and dimension breakdown of the proposed WEF

Project Name	FE Kudu Wind Energy Facility
Location	Portion 2 of Farm Oorlogspoort 85
Applicant	FE Kudu (Pty) Ltd
Contracted capacity	Up to 600MW (turbines up to 7.5MW in capacity)
Number of turbines	Up to 80 turbines[3]
Turbine hub height	Up to 164m
Turbine top tip height	Up to 250m
Rotor swept area	up to 21 000m^2
Capacity of on-site substation	132kV

[2] The intention is for internal project cabling to follow the internal roads.
[3] 42 north turbines, and 41 south turbines

Area occupied by the on-site substation	~ 2ha in extent
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.
Operation and maintenance (O&M) buildings	~ 1ha in extent
Balance of plant area	Temporary laydown areas with an extent up to 6ha. 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	~up to 7500m^2 per turbine
Turbine foundation	~ 1000m^2 per turbine

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. SCOPE OF WORK

This report is the Visual Impact Assessment (VIA) of the proposed **FE Kudu Wind Energy Facility** as described above.

The determination of the potential visual impacts is undertaken in terms of nature, extent, duration, magnitude, probability and significance of the construction and operation of the proposed infrastructure.

The study area for the visual assessment includes a minimum 20km buffer zone from the proposed wind turbine structures. Anticipated issues related to the potential visual impact of the proposed Wind Energy Facility (WEF) include the following:

- The visibility of the facility to, and potential visual impact on, observers travelling along the national, arterial or secondary roads within the study area.
- The visibility of the facility to, and visual impact on residents of homesteads within the study area.
- The potential visual impact of the facility on the visual character or sense of place of the region.
- The potential visual impact of the facility on tourist routes or tourist destinations (if present).
- The potential visual impact of the construction of ancillary infrastructure (i.e. substations) on observers in close proximity to the facility.
- The visual absorption capacity of the natural vegetation (if applicable).
- The potential cumulative visual impact of the proposed WEF and associated infrastructure in context of the other WEFs in process and authorised within the study area, or potential consolidation of visual impacts.
- The potential visual impact of lighting of the facility in terms of light glare, light trespass and sky glow.
- Potential visual impacts associated with the construction phase.
- The potential visual impact of shadow flicker.
- The potential to mitigate visual impacts and inform the design process.

It is envisaged that the issues listed above may constitute a visual impact at a local and/or regional scale.

4. THE AFFECTED ENVIRONMENT

The proposed development site is located in a rural area, currently zoned as agriculture, at a distance of approximately 37km north west of the town Aberdeen.

Figure 2: The town of Aberdeen as viewed from the N9 approaching from Willowmore.

Topography, hydrology and vegetation

The study area occurs on land that 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 north east of the site). 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).

Figure 3: The Camdeboo Mountains located to north east of the proposed development site.

Figure 4: The Oorlogspoortberge located directly west to the proposed development site.

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*. Refer to **Map 1** for a shaded relief map of the study area.

Figure 5: Photograph showing the predominantly flat topography of the region.

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. 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, as well as irrigation to a large area of arable land. A number of man-made farm dams are also scattered through the study area.

Vegetation cover in this semi-desert region is primarily *low shrubland and grassland,* and *bare rock and soil* (depending on the season). The vegetation types are described as *Eastern Lower Karoo* (along the plains), *Southern Karoo Riviere* (along the Kariega and Kraai River floodplains) and *Upper Karoo Hardeveld*, and *Karoo Escarpment Grassland* along the mountain ranges. Refer to **Map 2** for the land cover map of the study area.

Figure 6: Low shrubland vegetation cover occurring on the development site.

Figure 7: The general environment within the study area.

Land use and settlement patterns

The majority of the study area is sparsely populated (less than 3 people per km^2) and consists of a landscape of wide-open spaces and very little development. The low rainfall and scarcity of water has as a consequence resulted that the region has not been transformed entirely by dryland agriculture or irrigated cultivation of crops. The study area is therefore largely in a natural state, with mainly sheep farming as the primary economic activity. The District is renowned for its wool and mohair production, being the largest mohair producing area in South Africa. Farm residences, or homesteads, dot the landscape at an irregular interval. These homesteads are generally located at great distances from each other (i.e. more than 5km apart).

Figure 8: Example of homesteads located within the study area.

The site is nestled between the R61 arterial road (south of the site) linking the towns of Aberdeen, 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 site will most likely be from a secondary gravel road leading off from the R61.

Figure 9: View of the proposed development site from the R61.

Figure 10: View of the secondary gravel road leading to the proposed development site from the R61.

There is only one designated protected area within the region, namely; the Aberdeen Nature Reserve (also known as the Fonteinbos Nature Reserve) which is situated on the banks of the Kraai River, 1km west of the town of Aberdeen and approximately 30km from the FE Kudu Wind Energy Facility. The reserve covers an area of 1,500ha and features a natural spring, which as mentioned above supplies water to the town of Aberdeen, as well as irrigation to an area of arable land.

Figure 11: View over the Aberdeen Nature Reserve which is situated on the banks of the Kraai River.

Other than this protected area, the other identified tourist attractions or destinations in closer proximity to the development site is the town of Aberdeen itself, as well as, the Karoo Secret Farm Stay (located on the farm known as Rooidraai). Aberdeen boasts a well-preserved architectural heritage with an array of examples of Georgian, Victorian, Edwardian, Art Nouveau, Gothic Revival and Flemish Revival styles of architecture interspersed with the typical Karoo style cottages throughout the town.[4] While Karoo Secret Farm Stay, located on the plains of Camdeboo on the south western border of the site, is a working Karoo farm that has a variety of tourist accommodation offerings and activities available including, cycling and hiking trails, opportunities for birding, as well as, various activities for relaxation such as sundowners, swimming, tennis, etc.

Further to this, the entire proposed FE Kudu Wind Energy Facility site is located within the Beaufort West Renewable Energy Development Zone (REDZ). Refer to **Figure 12** for the regional locality of the site in relation to the Beaufort West REDZ. REDZ are described as, *"areas where large scale wind and solar PV energy facilities can be developed in terms of SIP 8 and in a manner that limits significant negative impacts on the environment, while yielding the highest possible socio-economic benefits to the country."*[5]

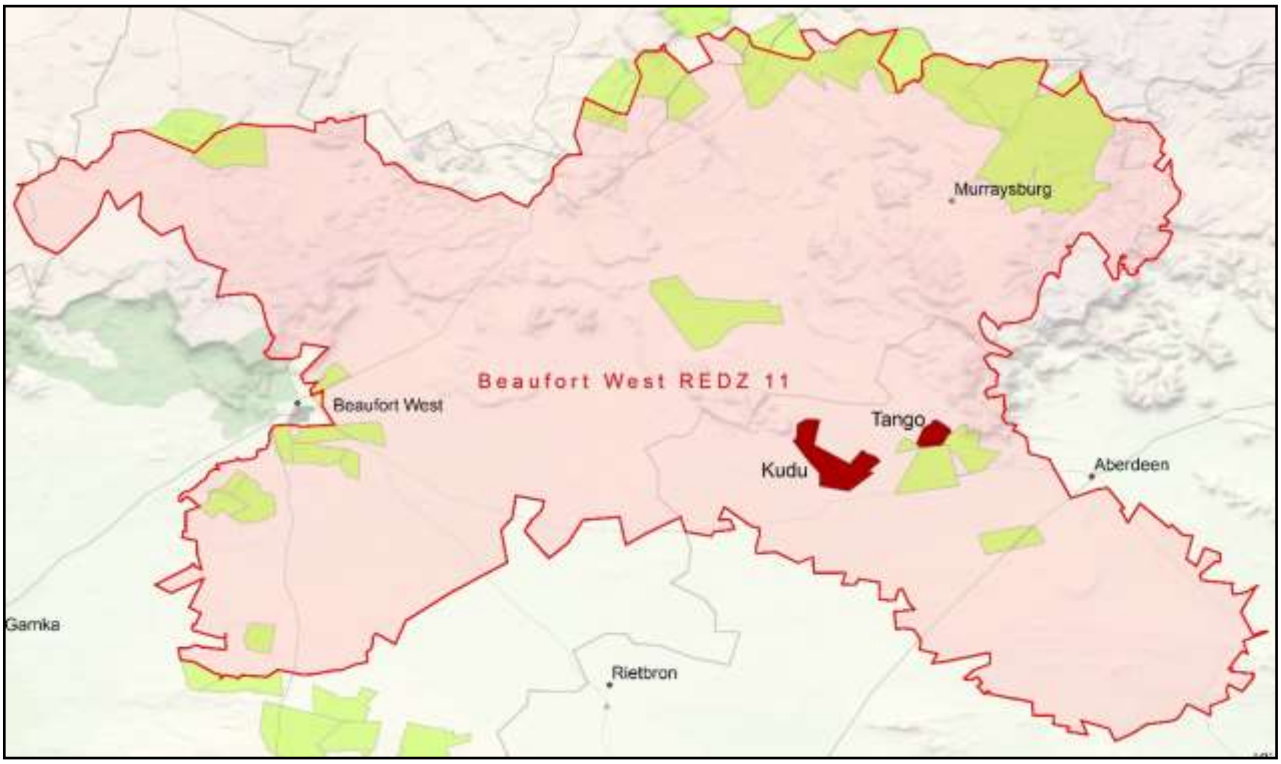
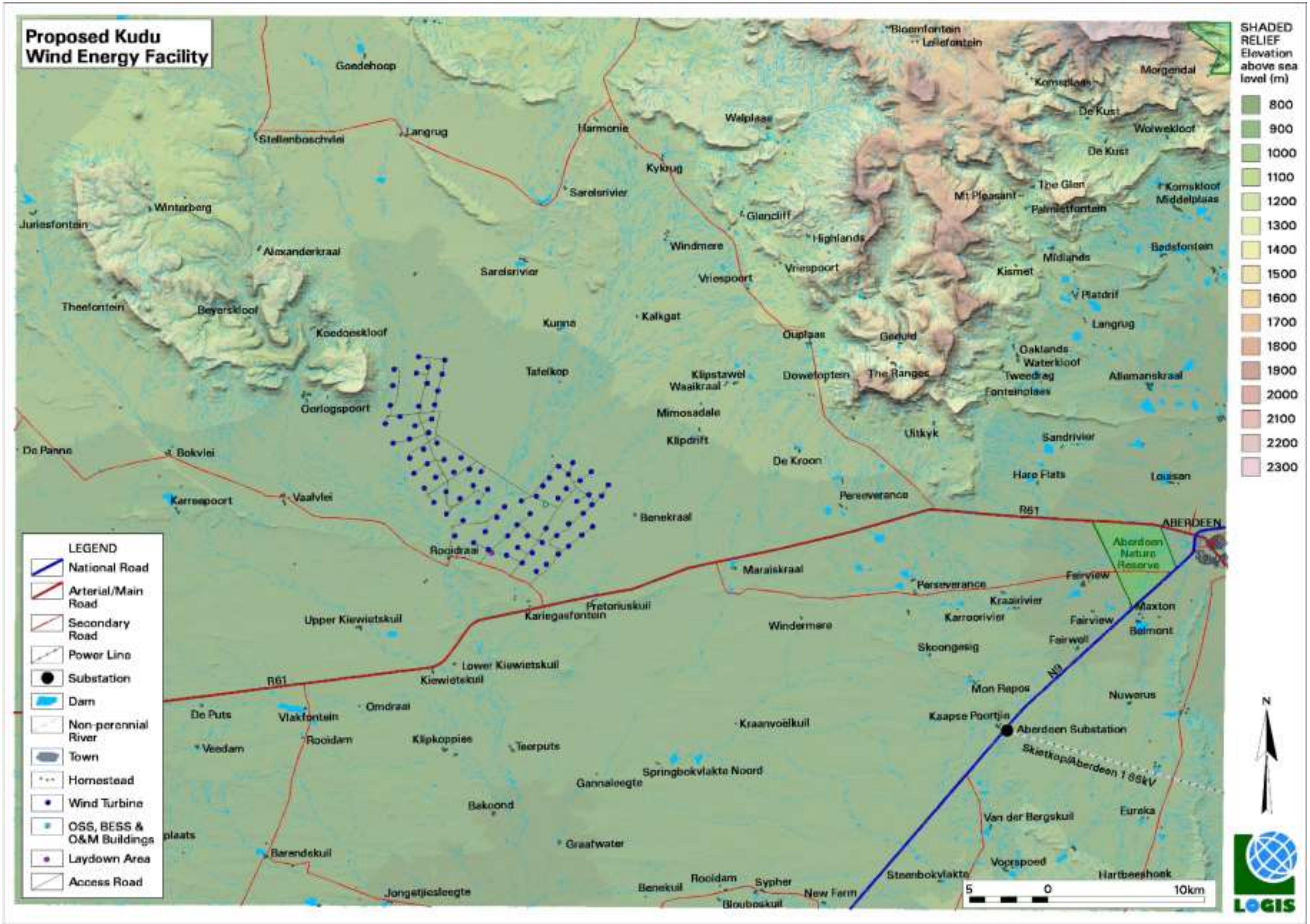


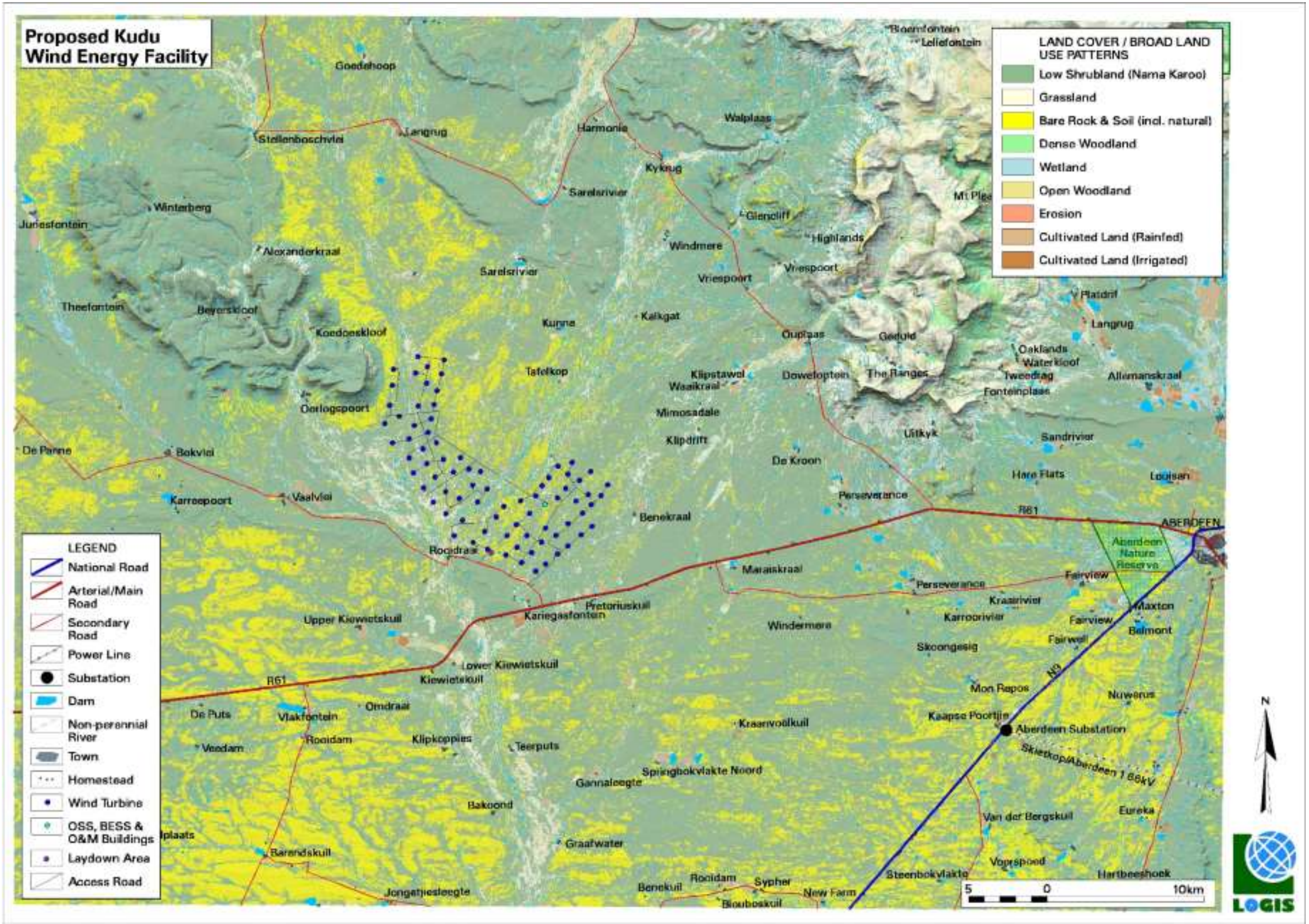
Figure 12: Regional locality of the Proposed FE Kudu Wind Energy Facility in relation to the Beaufort West Renewable Energy Development Zone (REDZ) (Source: REEA_OR_2023_Q1) and other projects located therein.

[4] Sources: DEAT (ENPAT Western Cape), NBI (Vegetation Map of South Africa, Lesotho and Swaziland), NLC2013-14 (ARC/CSIR), REEA_OR_2022_Q1 and SAPAD2021-22 (DEA).

[5] Source: https://redzs.csir.co.za



Map 1: Shaded relief map of the study area



Map 2: Land cover / broad land use map of the study area

5. RESULTS

5.1 Potential visual exposure

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 result of the visibility analysis is displayed on **Map 3**.

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.

The homesteads and roads expected to be visually influenced are listed below. The identification of these homesteads or farm dwellings are based on their locations as per the SA 1: 50 000 topographical maps[6]. Should a homestead / residence / institution not be listed in terms of the SA 1: 50 000 topographical maps, then it is assumed that the impacts will be similar to the other identified residences within the same proximity radii. It should also be noted that this section of the report focusses only on the potential visual exposure at varying distances and it does not yet refer to visual impact significance or any correlation thereto.

Less than 5km from the wind turbines:

- Kariegasfontein (in process Kariega Wind Facility Cluster)[7]
- Pretoriuskuil (in process Kariega Wind Facility Cluster)
- Rooidraai- Karoo Secret Farm Stay (proposed FE Kudu Wind Energy Facility)
- Benekraal (in process Kariega Wind Facility Cluster)

[6] The names listed here are of the homestead or farm dwelling as indicated on the SA 1: 50 000 topographical maps and do not refer to the registered farm name.

[7] 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.

- Observers travelling along the R61 and secondary road located to the south and west of the proposed WEF respectively

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 WEF respectively

Located within a 10 - 20km radius:

- 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
- 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 east and west of the proposed WEF respectively

Located beyond 20km:

- Wapadsleegte
- Jongetjiesleegte
- New Farm
- Blouboskuil
- Benekuil
- Sypher
- Rooidam

- Steenbokvlakte
- Voorspoed
- Van der Bergskuil
- Eureka
- Kaapse Poortjie
- Nuwerus
- Mon Repos
- Skoongesig
- Fairwell
- Belmont
- Fairview (2)
- Karroorivier
- Maxton
- Kraairivier
- Perseverance (Aberdeen 1, 2 & 3 Wind Farms)
- Hare Flats
- Louisan
- Uitkyk
- Highlands
- De Panne
- 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 involved in either the adjacent already authorised Eskom Aberdeen Wind Farm and Aberdeen 1, 2 and 3 Wind Farms or the in process Kariega Wind Facility Cluster. 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 WEFs 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.

5.2 Cumulative visual assessment

Cumulative visual impacts can be defined as the additional changes caused by a proposed development in conjunction with other similar developments or as the combined effect of a set of developments. In practice the terms 'effects' and 'impacts' are used interchangeably.

Cumulative visual impacts may be:

- Combined, where the wind turbines of several WEFs are within the observer's arc of vision at the same time;
- Successive, where the observer must turn his or her head to see the various WEF's wind turbines; and
- Sequential, when the observer must move to another viewpoint to see different developments, or different views of the same development (such as when travelling along a route).

The visual impact assessor is required (by the competent authority) to identify and quantify the cumulative visual impacts and to propose potential mitigating measures. This is often problematic as most regulatory bodies do not have specific rules, regulations, or standards for completing a cumulative visual assessment, nor do they offer meaningful guidance regarding appropriate assessment methods. There are also not any authoritative thresholds or restrictions related to the capacity of certain landscapes to absorb the cumulative visual impacts of wind turbines.

To complicate matters even further, cumulative visual impact is not just the sum of the impacts of two developments. The combined effect of both may be much greater than the sum of the two individual effects, or even less.

The cumulative impact of the WEF development on the landscape and visual amenity is a product of:

- The distance between individual WEFs (or turbines);
- The distance over which the wind turbines are visible;
- The overall character of the landscape and its sensitivity to the structures;
- The siting and design of the WEFs themselves; and
- The way in which the landscape is experienced.

The specialist is required to conclude if the proposed development will result in any unacceptable loss of visual resource considering all the projects existing and proposed in the area.

The approach for this assessment includes all renewable energy projects within 30 km that have received an EA, as well as the known in process and proposed projects. The information was collected from the National DFFE Renewable Energy EIA Application (REEA) database, 2023 Quarter 1 and other information provided by the EAP.

The REEA database is the most accurate and up-to-date data available to the project team. There may be some projects with "in-process" applications for which data is not yet publicly available. This is the data found to be available and efforts were made to determine recent amendments. The REEA database contains land parcels, and not the footprints. In most cases the actual development footprint of the nearby Renewable Energy developments could not be easily quantified or accessed spatially. Hence the land parcels considered, are larger than the land the facility will occupy. It is important to note that the existence of an approved EA does not directly equate to actual development of the project. For these reasons this data tends towards a worst-case scenario.

For the purpose of this study, other proposed, in process and authorised wind turbines within a 30km radius of the proposed FE Kudu Wind Energy Facility, are indicated on **Map 4**. The proposed, in process and authorised WEFs occurring in the study are as follows:

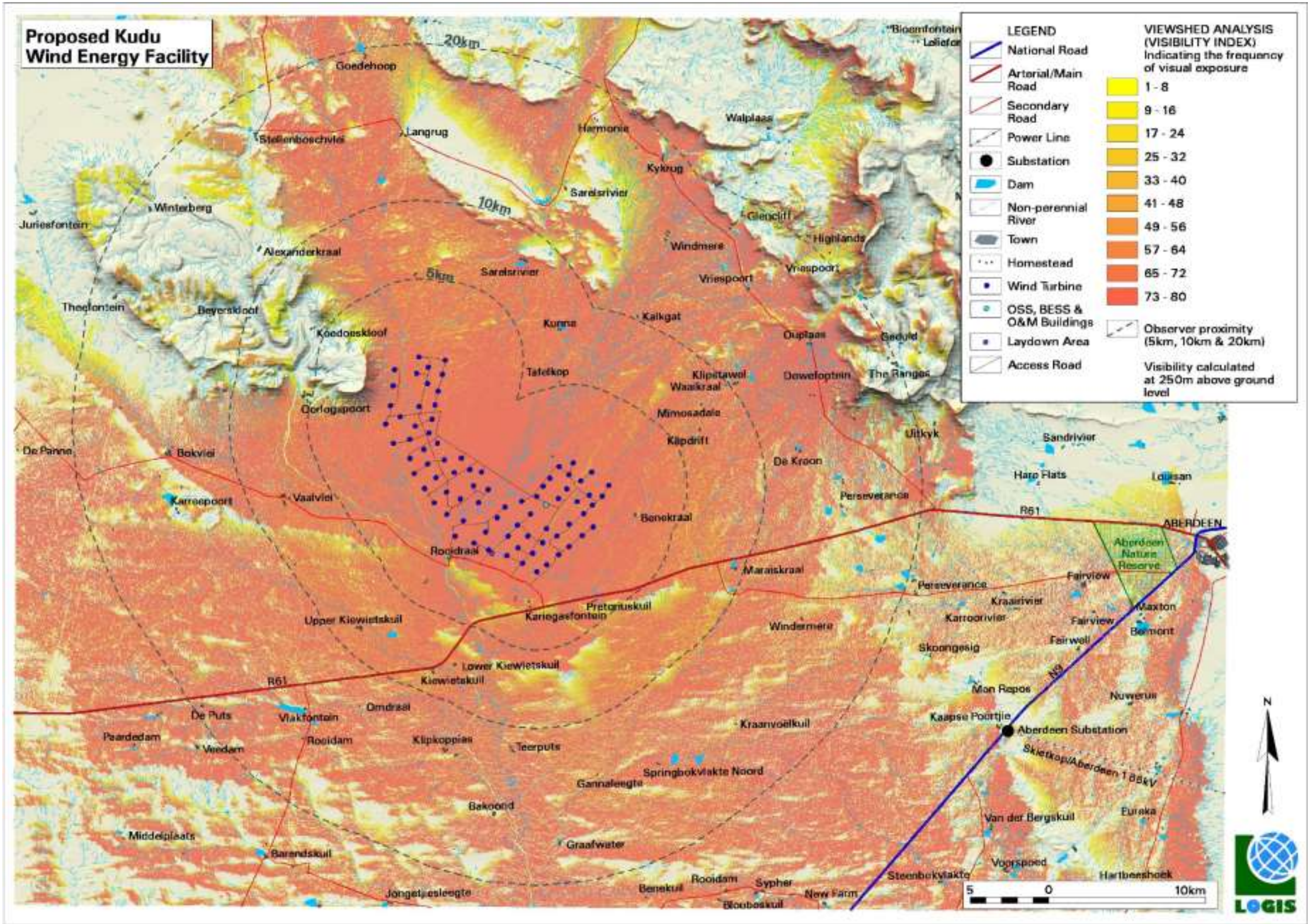
- Authorised Eskom Aberdeen Wind Farm (east of the site)
- Authorised Aberdeen 1, 2 and 3 Wind Farms (located south of the R61 and approximately 10 km south east of the site)
- In process Kariega Wind Facility Cluster (adjacent east of the site)
- In process Tango Wind Energy Facility (located approximately 10km east of the site)

Results

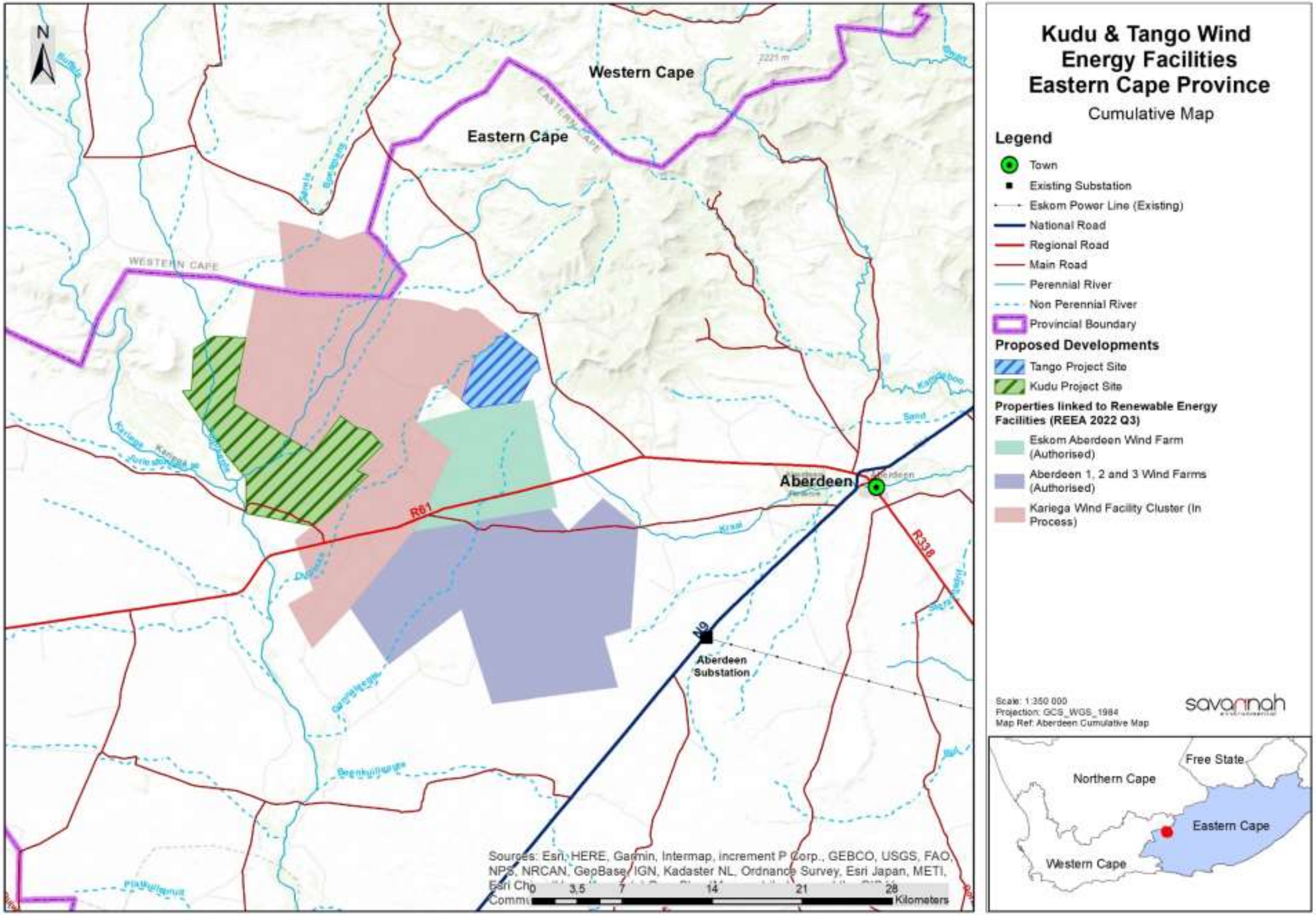
No final wind turbine layouts for these projects were available at the time of the drafting this VIA report, therefore no cumulative (or combined) viewshed analyses were produced, it is however, expected that the cumulative visual impact would be high, due to the relatively short distances in between the proposed WEFs. Once all the facilities are constructed it is expected that a cumulative visual impact of significance will be experienced by sensitive receptors within the region (within 30km).

However, it should be borne in mind that 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.

In light of this, the potential cumulative visual impact is considered to be high but within acceptable limits.



Map 3: Viewshed analysis of the proposed FE Kudu Wind Energy Facility, indicating the frequency of visual exposure



Map 4: Other proposed and authorised wind turbines within the study area considered in the cumulative assessment

5.3 Visual distance / observer proximity to the WEF

The proximity radii are based on the anticipated visual experience of the observer over varying distances. The distances are adjusted upwards for larger WEFs (e.g. more than 50 wind turbines) and downwards for smaller WEFs (e.g. less than 50 turbines). This methodology was developed in the absence of any known and/or accepted standards for South African WEFs.

The principle of reduced impact over distance is applied in order to determine the core area of visual influence for these types of structures. It is envisaged that the nature of the structures and the rural character of the study area would create a significant contrast that would make the facility visible and recognisable from greater distances.

The proximity radii for the wind turbines were created in order to indicate the scale and viewing distance of the facility and to determine the prominence of the structures in relation to their environment. It should be noted that even though the proximity radii are indicated as (near) concentric circles from the wind turbines, the visual prominence of the structures will only apply where they are visible, as determined in the previous section (**Section 5.1**) of this report.

The proximity radii, based on the dimensions of the proposed development footprint are indicated on **Map 5**, and include the following:

- 0 - 5km. Short distance view where the WEF would dominate the frame of vision and constitute a very high visual prominence.
- 5 – 10km. Short to medium distance view where the structures would be easily and comfortably visible and constitute a high visual prominence.
- 10 - 20km. Medium to long distance view where the facility would become part of the visual environment, but would still be visible and recognisable. This zone constitutes a moderate visual prominence.
- > 20km. Long distance view of the facility where the structures are not expected to be immediately visible and not easily recognisable. This zone constitutes a lower visual prominence for the facility.

Figure 13: Schematic representation of a wind turbine from 1, 2, 5 and 10km under perfect viewing conditions.

The visual distance theory and the observer's proximity to the facility are closely related, and especially relevant, when considered from areas with a high viewer incidence and a potentially negative visual perception of the proposed facility.

5.4 Viewer incidence / viewer perception

The number of observers and their perception of a structure determine the concept of visual impact. If there are no observers or if the visual perception of the structure is favourable to all the observers, there would be no visual impact. It is necessary to identify areas of high viewer incidence and to classify certain areas according to the observer's visual sensitivity towards the proposed WEF and its related infrastructure. It would be impossible not to generalise the viewer incidence and sensitivity to some degree, as there are many variables when trying to determine the perception of the observer; regularity of sighting, cultural background, state of mind, purpose of sighting, etc. which would create a myriad of options.

Viewer incidence is calculated to be the highest along the public roads within the study area (R61 and various secondary roads). Travellers using these roads may be negatively impacted upon by visual exposure to the WEF. Additional sensitive visual receptors are located at the farm residences (homesteads) throughout the study area. It is expected that the viewer's perception, unless the observer is associated with (or supportive of) the WEF, would generally be negative.

Due to the remote location of the proposed FE Kudu Wind Energy Facility there are a relatively limited number of potential sensitive visual receptors located within a 20km radius of the proposed facility. These potentially affected sensitive visual receptors are listed in **Section 5.1**. It is expected that these landowners may experience visual impacts ranging from moderate to high significance, depending on their proximity to the wind turbine structures, and their potential sensitivity (aversion) to wind turbine infrastructure. Refer to **Map 5** for the location of the potential sensitive visual receptors discussed above.

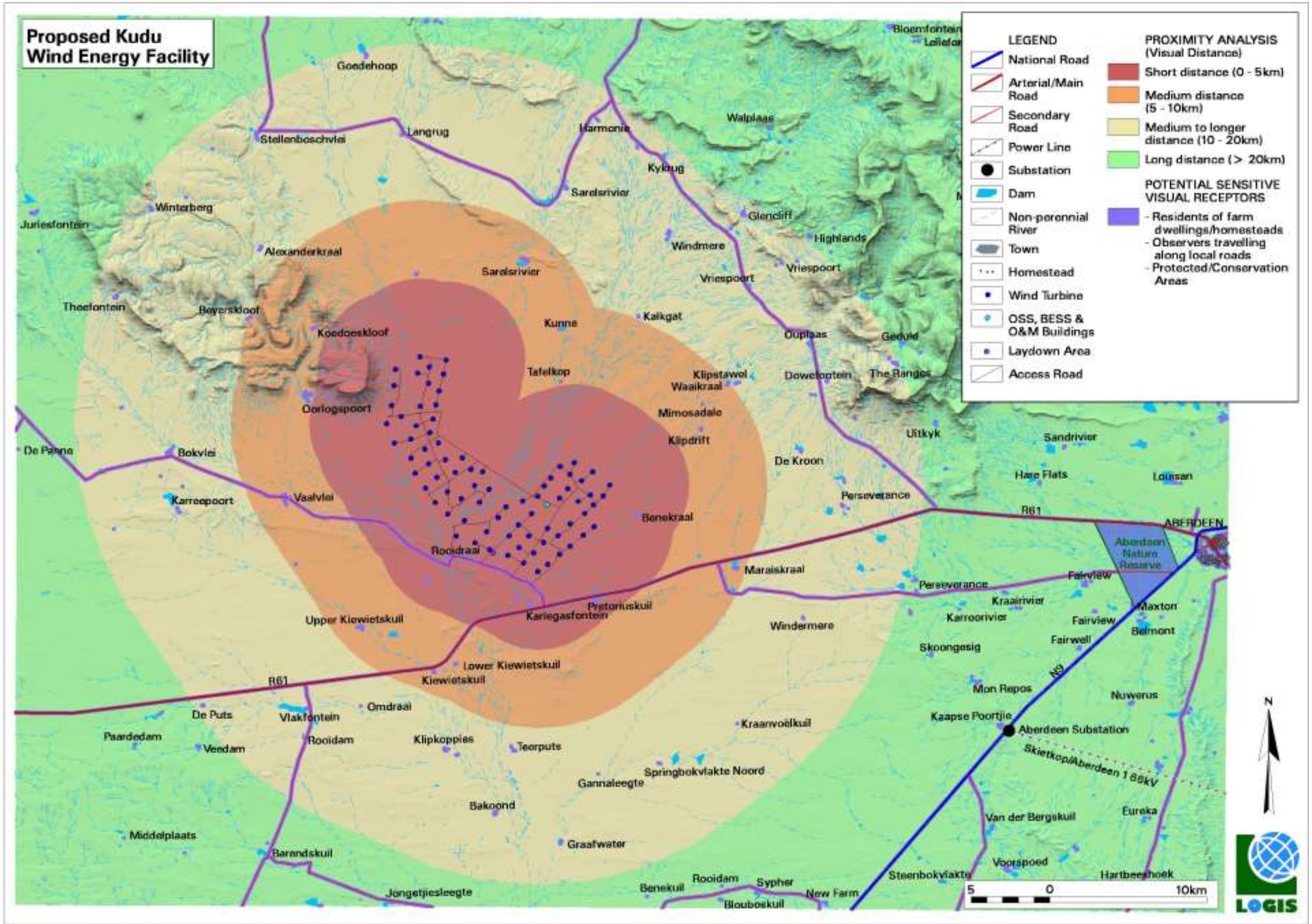
The author is not aware of any specific objections raised against the construction and operation of the proposed FE Kudu Wind Energy Facility.

5.5 Visual absorption capacity

The broader study area is located within the Succulent Karoo biome characterised by large open, *low shrubland*, *grassland* and bare soil in places (refer to **Figure 14**). Overall, the Visual Absorption Capacity (VAC) of the receiving environment is deemed low by virtue of the nature of the vegetation and the low occurrence of urban development. In addition, the scale and form of the proposed structures mean that it is unlikely that the environment will visually absorb them in terms of texture, colour, form and light/shade characteristics.

Where homesteads and settlements occur, some more significant vegetation and trees may have been planted, which would contribute to the visual absorption capacity (i.e. shielding the observers from the facility). As this is not a consistent occurrence, however, VAC will not be taken into account for any of the homesteads or settlements, thus assuming a worst-case scenario in the impact assessment.

Figure 14: Low shrubland, grassland and bare soil within the study area – low VAC.



Map 5: Proximity analysis and potential sensitive visual receptors

5.6 Visual impact index

The combined results of the visual exposure, viewer incidence/perception and visual distance of the proposed FE Kudu Wind Energy Facility are displayed on **Map 6**. Here the weighted impact and the likely areas of impact have been indicated as a visual impact index. Values have been assigned for each potential visual impact per data category and merged in order to calculate the visual impact index.

The criteria (previously discussed in this report) which inform the visual impact index are:

- Visibility or visual exposure of the structures
- Observer proximity or visual distance from the structures
- The presence of sensitive visual receptors
- The perceived negative perception or objections to the structures (if applicable)
- The visual absorption capacity of the vegetation cover or built structures (if applicable)

An area with short distance visual exposure to the proposed infrastructure, a high viewer incidence and a potentially negative perception (i.e. a sensitive visual receptor) would therefore have a **higher** value (greater impact) on the index. This helps in focussing the attention to the critical areas of potential impact and determining the potential **magnitude** of the visual impact.

The index indicates that **potentially sensitive visual receptors** within a 5km radius of the WEF may experience a **very high** visual impact. The magnitude of visual impact on sensitive visual receptors subsequently subsides with distance to; **high** within a 5 – 10km radius (where sensitive receptors are present) and **moderate** within a 10 – 20km radius (where sensitive receptors are present). Receptors beyond 20km are expected to have a **low** potential visual impact.

Likely areas of potential visual impact and potential sensitive visual receptors[8] located within a 20km radius of the proposed WEF are displayed on **Map 7**.

Magnitude of the potential visual impact

The WEF may have a visual impact of **very high** magnitude on the following identified observers within a 5km radius:

Residents of/visitors to:

- Kariegasfontein (in process Kariega Wind Facility Cluster)[9]
- Pretoriuskuil (in process Kariega Wind Facility Cluster)
- Rooidraai- Karoo Secret Farm Stay (proposed FE Kudu Wind Energy Facility)
- Benekraal (in process Kariega Wind Facility Cluster)

Note: *All residences/farmsteads within a 5 km radius of the proposed WEF are all located on farms earmarked for other proposed, already authorised or in process WEFs which reduces the probability of this impact occurring on these receptors i.e. it is assumed that these landowners are supportive of WEF developments within the region based on their involvement with wind energy development on their properties.*

Observers travelling along the:

- Observers travelling along the R61 and secondary road located to the south and west of the proposed WEF respectively

The WEF may have a visual impact of **high** magnitude on the following identified observers within a 5 – 10km radius:

---

[8] The names indicated on the map and listed below here are of the homestead or farm dwelling as indicated on the SA 1: 50 000 topographical maps and do not refer to the registered farm name. Should a homestead / residence / institution not be listed in terms of the SA 1: 50 000 topographical maps, then it is assumed that the impacts will be similar to the other identified residences within the same proximity radii.

[9] 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.

Residents of/visitors to:

- 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)

Note: *The location of Maraiskraal, Mimosadale, Waaikraal, Tafelkop, Kunna and Sarelsrivier on farms earmarked for other proposed, already authorised or in process WEFs reduces the probability of this impact occurring on these receptors i.e. it is assumed that these landowners are supportive of WEF developments within the region based on their involvement with wind energy development on their properties.*

Observers travelling along the:

- Observers travelling along the R61 and secondary road located to the south west and west of the proposed WEF respectively

The WEF may have a visual impact of **moderate** magnitude impact on the following identified observers located between a 10 – 20km radius of the wind turbine structures:

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
- 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

Note: *The location of Kraanvoëlkuil, Windermere, Perseverance, De Kroon, Klipstawel, KalkgatRooidraai and Sarelsrivier on farms earmarked for other proposed, already authorised or in process WEFs reduces the probability of this impact occurring on these receptors i.e. it is* *assumed that these landowners are supportive of WEF developments within the region based on their involvement with wind energy development on their properties.*

Observers travelling along the:

- Observers travelling along the R61 and secondary road located to the south west and east and west of the proposed WEF respectively

The WEF may have a visual impact of **low** magnitude impact on the following identified observers located beyond the 20km radius of the wind turbine structures:

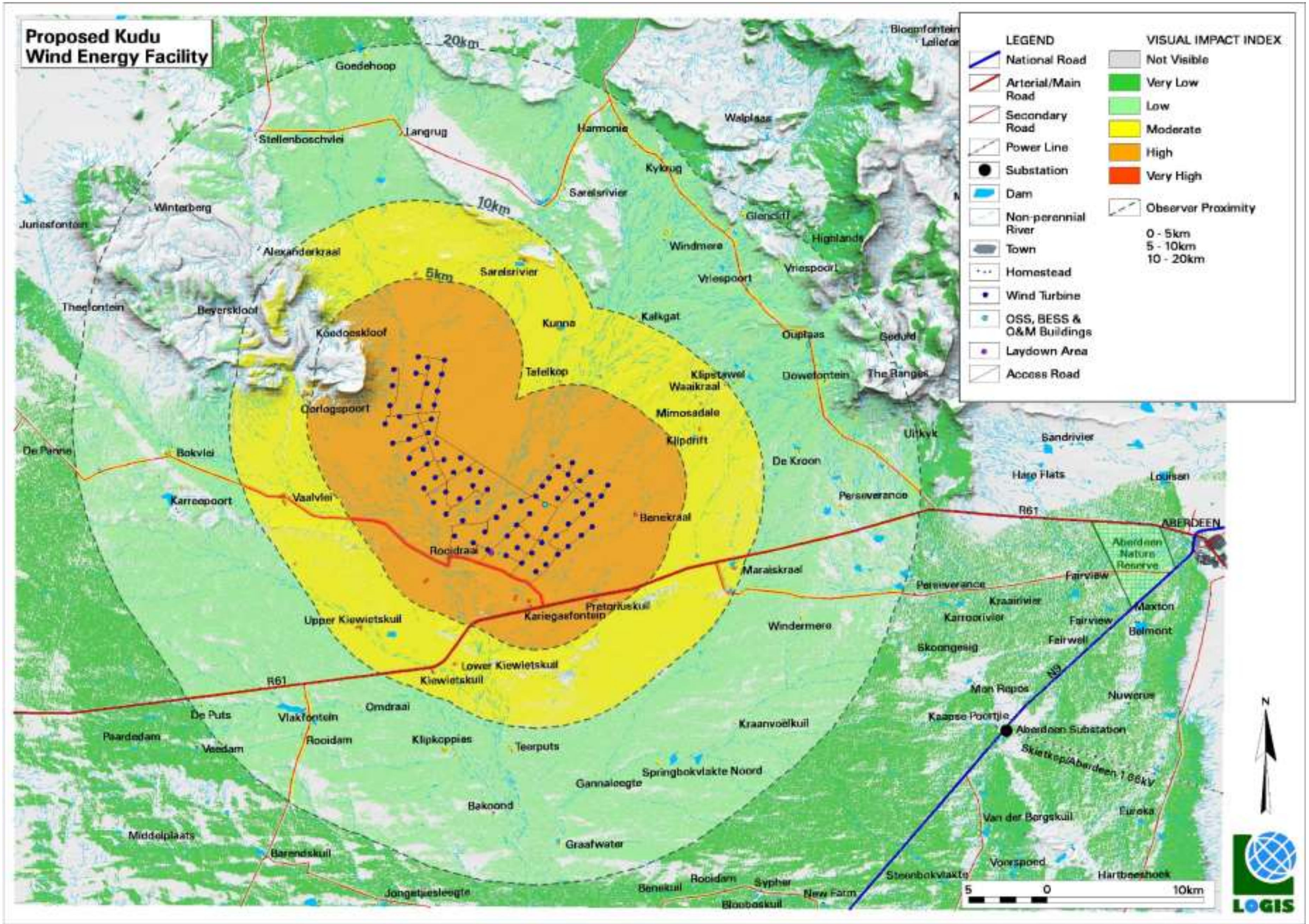
Residents of/visitors to:

- Wapadsleegte
- Jongetjiesleegte
- New Farm
- Blouboskuil
- Benekuil
- Sypher
- Rooidam
- Steenbokvlakte
- Voorspoed
- Van der Bergskuil
- Eureka
- Kaapse Poortjie
- Nuwerus
- Mon Repos
- Skoongesig
- Fairwell
- Belmont
- Fairview (2)
- Karroorivier
- Maxton
- Kraairivier
- Perseverance (Aberdeen 1, 2 & 3 Wind Farms)
- Hare Flats
- Louisan
- Uitkyk
- Highlands
- De Panne
- Paardedam
- Veedam
- Middelplaats
- Barendskuil
- Aberdeen Nature Reserve
- Residents of the outskirts of the town of Aberdeen

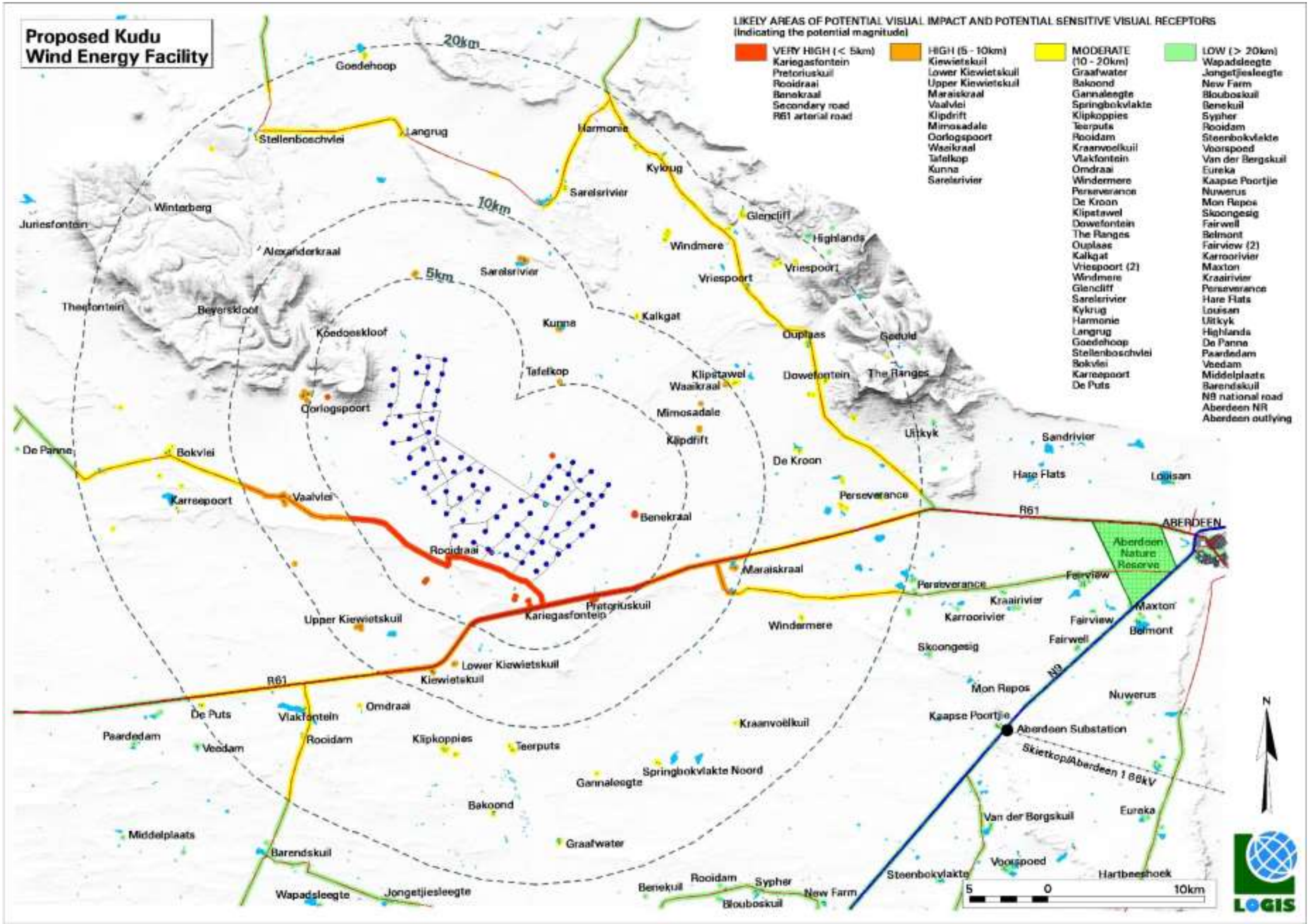
Observers travelling along:

- Portions of the N9 national road

Note: *Where any of the above-mentioned homesteads are derelict or deserted, the visual impact will be non-existent, until such time as it is inhabited again.*



Map 6: Visual impact index



Map 7: Likely areas of potential visual impact and potential sensitive visual receptors

6. SHADOW FLICKER ASSESSMENT

Shadow flicker is an effect which is caused when the shadow of an object repeatedly passes or pulsates over the same point in the landscape. Shadow flicker can be caused by the wind turbines when the sun passes behind the hub or rotor blades of a wind turbine and casts a shadow that continually passes over the same point as the rotor blades of the wind turbine rotate. Shadow flicker only occurs when the sky is clear, and when the turbine rotor blades are between the sun and the receptor.

De Gryse in Scenic Landscape Architecture (2006) notes that "*shadow flickering associated with the rotation of the rotor blades has the potential to alter the viewed landscape, and to detract from the experience of people …*". Therefore, the effect of shadow flicker is likely to be experienced by people situated directly within the shadow cast by the rotor blades of the wind turbine. As such, shadow flicker is expected to have an impact on people residing in homesteads located within close proximity of a wind turbine and at a specific orientation, particularly in areas where there is little screening present.

Since the proposed FE Kudu Wind Energy Facility is located in the Southern Hemisphere it can be expected that shadow flicker will be experienced by sensitive receptors who are predominately located on the southern half of the potential flicker zones, namely to the west, south west, south, south east and east following the traction of the sun from east to west. It is expected that the shadow flicker zone of influence will be its greatest early in the mornings and later afternoons when the sun is at its lowest casting a longer shadow.

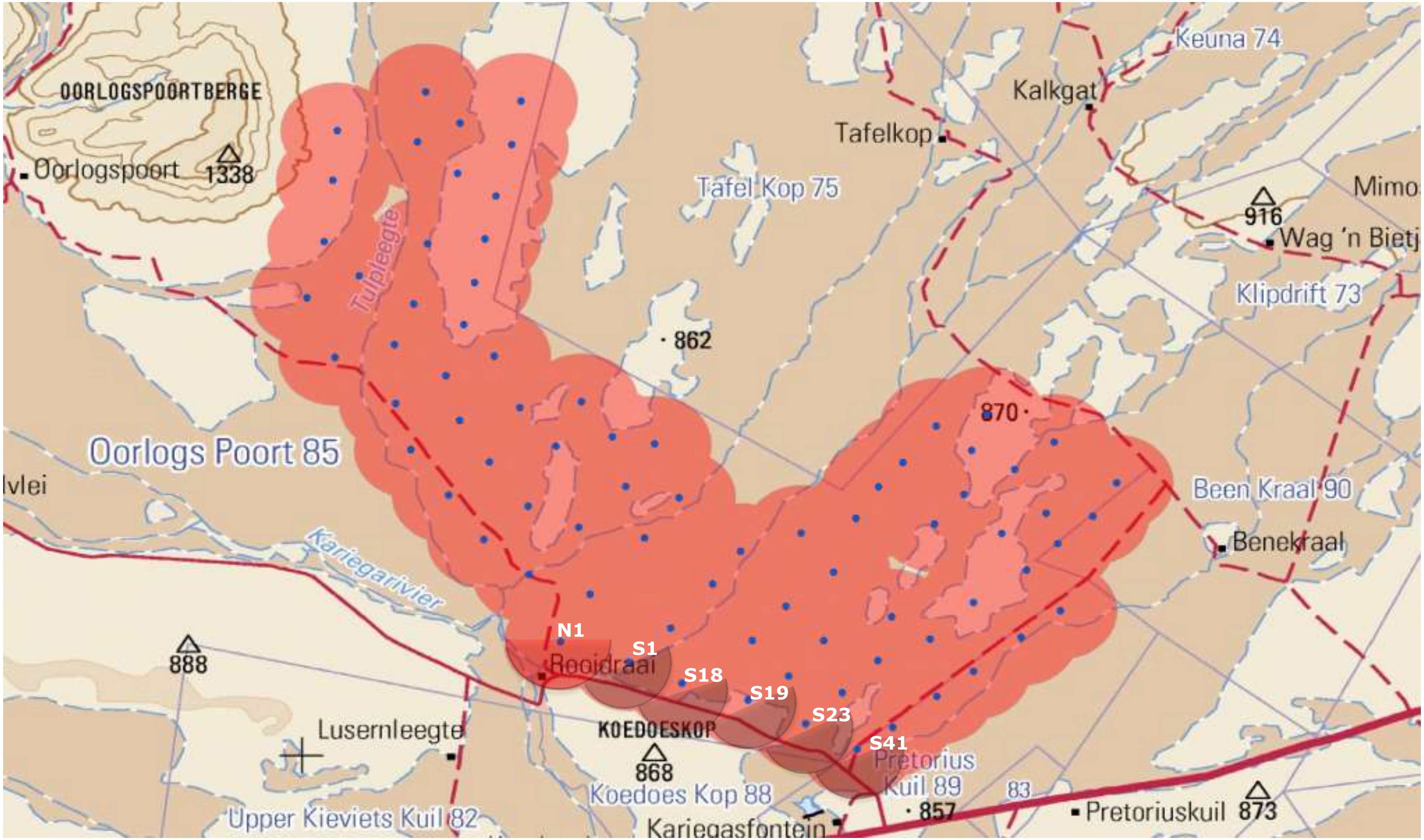
Shadow flicker may also be experienced by, and impact on motorists, if a wind turbine is located in close proximity to an existing road. It is however expected that the shadow flicker experienced by motorist traveling along roads will be fleeting and not constitute a shadow flicker visual impact of concern.

The impact of shadow flicker can be effectively mitigated by choosing the correct site and layout for the wind turbines, taking the orientation of the turbines relative to the nearby homesteads / roads and the latitude of the site into consideration. Tall structures and trees will also obstruct shadows and prevent the effect of shadow flicker from impacting on surrounding sensitive receptors, however, since this is not a consistent factor or given to occur around any of the structures within the study area it will not be considered in this assessment. It should also be noted that shadow flicker is only of concern on occupied residences, if any of the identified homesteads are derelict, deserted or not permanently occupied, the shadow flicker visual impact will be non-existent, and not constitute a shadow flicker visual impact of concern, until such time as they are inhabited again.

De Gryse found that "*most shadow impact is associated with 3-4 times the height of the object. While shadows may extend further than this, they become insignificant in their visual intrusion because of the reduced intensity of the shadow at such distances.*" Based on this research, the shadow flicker assessment for the proposed **FE Kudu Wind Energy Facility** was undertaken on a likely 80 turbine layout using a 250m blade tip height (hub height of up to 164m and rotor diamter of 172m). As such, sensitive receptors are considered to be affected where shadows are predicted to **occur within 1km of a turbine**. As such, sensitive receptors who fall within this zone are likely to be impacted upon. Refer to **Map 8**.

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.



Map 8: Potential sensitive receptors exposed to shadow flicker from the proposed FE Kudu Wind Energy Facility

7. PHOTO SIMULATIONS

Photo simulations were undertaken (in addition to the above spatial analyses) in order to illustrate the potential visual impact of the proposed FE Kudu Wind Energy Facility within the receiving environment. The purpose of the photo simulation exercise is to support/verify the findings of the VIA, and is not an exercise to illustrate what the facilities will look like from all directions (i.e. it is not an artist's impression). Instead, the photo simulations indicate the anticipated visual alteration of the landscape from various sensitive visual receptors located at different distances from the facility should it be constructed. The simulations are based on the wind turbine dimensions and layout. The photograph positions are indicated on **Figure 15** below and should be referenced with the photo simulation being viewed in order to place the observer in spatial context of the proposed facility.

The simulated views show the placement of the wind turbines during the long-term operation phase of the facilities lifespan. It is assumed that the necessary post-construction phase rehabilitation and mitigation measures, as proposed by the various specialists in the environmental impact assessment reports, have been undertaken.

It is imperative that the natural vegetation be restored to its original (current) status for these simulated views to ultimately be realistic. The additional infrastructure (e.g. the proposed substation, access roads, etc.) associated with the facility are not included in the photo simulations.

The simulated wind turbines, as shown on the photographs, were adapted to the atmospheric conditions present when the original photographs were taken. This implies that factors such as haze and solar glare were also simulated in order to realistically represent the observer's potential view of the Cluster.

The photo simulations are displayed as "before", "after" and "cumulative" views of the affected landscape.

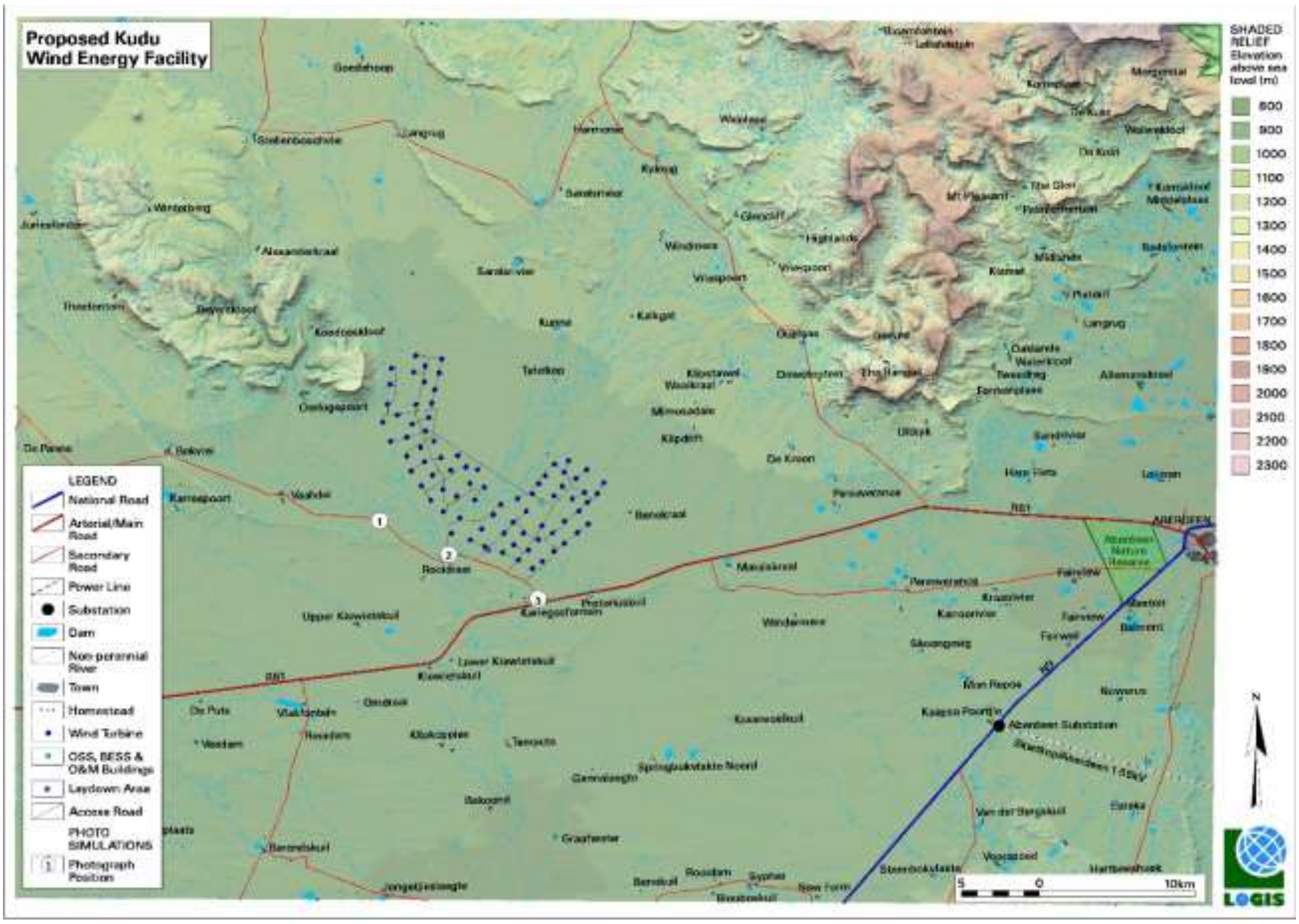


Figure 15: Photo simulation locations undertaken for the photo simulations of the FE Kudu WEF

1.1. Photo simulation 1

Figure 16: Photo simulation 1 – before. Viewpoint from a secondary road located west of the site looking east towards the proposed FE Kudu Wind Facility.

Figure 17: Photo simulation 1 – after. The closest wind turbine in the FE Kudu Wind Facility is 3km from this point.

1.2. Photo simulation 2

Figure 18: Photo simulation 2 – before. Viewpoint from a secondary road located south of the site looking north towards the proposed FE Kudu Wind Facility

Figure 19: Photo simulation 2 – after. The closest wind turbine in the FE Kudu Wind Facility is 1km from this point.

1.3. Photo simulation 3

Figure 20: Photo simulation 3 – before. Viewpoint from the R61 looking north towards the proposed FE Kudu Wind Facility.

Figure 21: Photo simulation 3 – after. The closest wind turbine of the FE Kudu Wind Facility is 2km from this point.

8. VISUAL IMPACT ASSESSMENT

8.1 Impact rating methodology

The previous section of the report identified specific areas where likely visual impacts would occur. This section will attempt to quantify these potential visual impacts in their respective geographical locations and in terms of the identified issues (see **Section 3**) related to the visual impact.

The methodology for the assessment of potential visual impacts states the **nature** of the potential visual impact (e.g. the visual impact on users of major roads in the vicinity of the proposed infrastructure) and includes a table quantifying the potential visual impact according to the following criteria:

Extent – The distance the visual impact extends from the proposed development and to what extent it will have the highest impact. In the case of this type of development the extent of the visual impact is most likely to have a higher impact on receptors closer to the development and decrease as the distance increases[10].

- Long distance (very low = 1)
- Medium to longer distance (low = 2)
- Short distance (medium = 3)
- Very short distance (high = 4)

Duration – The timeframe in both the construction and operational phase over which the effects of the impact will be felt.

- Very short (0-1 yrs. = 1)
- Short (2-5 yrs. = 2)
- Medium (5-15 yrs. = 3)
- Long (>15 yrs. = 4)
- Permanent (= 5)

Magnitude – The severity or size of the impact. This value is read off the Visual Impact Index maps. Where more than one value is applicable, the higher of these will be used as a worst-case scenario.

- None (= 0)
- minor (= 2)
- low (= 4)
- medium/moderate (= 6)
- high (= 8)
- very high (= 10)

Probability – The likelihood of the impact occurring.

- Very improbable (= 1)
- Improbable (= 2)
- Probable (= 3)
- Highly probable (= 4)
- Definite (= 5)

Status - The perception of Interested and Affected Parties towards the proposed development.

- Positive
- Negative
- Neutral

Reversibility – The possibility of visual recovery of the impact following the decommissioning of the proposed development.

- Reversible (= 1)
- Recoverable (= 3)
- Irreversible (= 5)

[10] Long distance = > 20km. Medium to longer distance = 10 – 20km. Short distance = 5 – 10km. Very short distance = < 5km (refer to Section Visual distance / observer proximity to the WEF).

Significance - The **significance** of the potential visual impact is equal to the **consequence** multiplied by the **probability** of the impact occurring, where the consequence is determined by the sum of the individual scores for magnitude, duration and extent (i.e. **significance = consequence (magnitude + duration + extent) x probability**).

The significance weighting for each potential visual impact (as calculated above) is as follows:

- <29 points: Low
  Where the impact would not have a direct influence on the decision to develop in the area.
- 30-58 points: Medium/moderate
  Where the impact could influence the decision to develop in the area.
- >59: High
  Where the impact must have an influence on the decision to develop in the area.

8.2 Direct Impact Assessment

The direct visual impacts of the proposed FE Kudu Wind Energy Facility are assessed as follows:

8.2.1. Construction Phase

During the construction period it is expected that any visual impact of concern on sensitive visual receptors within the study area will be temporary and limited to a short-term period (2-5 years). The below direct construction visual impacts of the proposed FE Kudu Wind Energy Facility are assessed as follows:

8.2.1.1. Potential visual impact of construction activities on identified sensitive visual receptors in close proximity (within 0 – 5km) to the proposed WEF

During the construction period, there will be an increase in heavy vehicles utilising the roads to the construction sites that may cause, at the very least, a visual nuisance to other road users and landowners in the area in close proximity (within 5km). Additionally, dust as a result of the construction activities and construction equipment (i.e. cranes), temporary laydown areas, construction camps, etc. may also be visible at the site, resulting in a visual impact occurring during construction. Sensitive receptors in this zone consist of observers travelling along the R61 south of the site and the secondary road traversing to the west, as well as, residents of various homesteads (refer to Section 5.6 for a full list).

Construction activities may potentially result in a **high** (significance rating = 64) temporary visual impact, that may be mitigated to **moderate** (significance rating = 42).

Table 3: Visual impact of construction on sensitive visual receptors in close proximity to the proposed WEF.

Nature of Impact: Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed WEF.		
	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.

8.2.2. Operational Phase

During the operational phase of the proposed FE Kudu Wind Energy Facility, it is generally accepted that the wind turbine structures associated with the proposed facility will constitute the largest visual impact of concern on sensitive visual receptors within the study area, as a result of their sheer scale in relation to other proposed infrastructure that may be located on the site. The below direct operational visual impacts of the proposed FE Kudu Wind Energy Facility are assessed as follows:

8.2.2.1. Potential visual impact on sensitive visual receptors (residents and visitors) located within a 5km radius of the wind turbine structures

The operation of the FE Kudu Wind Energy Facility is expected to have a **moderate** visual impact (significance rating = 54) on observers/visitors residing at homesteads within a 5km radius of the wind turbine structures.

A mitigating factor within this scenario is that the identified homesteads within a 5 km radius are all on farms earmarked for already authorised, in process or proposed WEFs on their properties and their support for WEF developments is assumed therefore reducing 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 table below illustrates this impact assessment.

Of note is that the impact dealt with in the table below only addressed the potential visual impact associated with the visual intrusion of wind turbines structures themselves. The impacts associated with any other potential visual impacts as a result of the proposed development, such as ancillary infrastructure, sense of place or lighting impacts are dealt with separately in below sections of this report.

Table 4: Visual impact on observers (residents and visitors) in close proximity to the proposed wind turbine structures

Nature of Impact:
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	Moderate **(54)**	Moderate **(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 WEF infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain.		

8.2.2.2. Potential visual impact on sensitive visual receptors (observers travelling along roads) located within a 5km radius of the wind turbine structures

During the entire operational lifespan of the FE Kudu Wind Energy Facility, it is expected that daily commuters and possible tourists travelling along the various roads within 5km of the wind turbine structures may be negatively impacted upon by the visual exposure to the proposed infrastructure, however brief. It is assumed that the observers travelling along these roads will view the visual intrusion of the turbines in a negative light when compared with the rural and scenic quality of the surrounding landscape.

The operation of the FE Kudu Wind Energy Facility is expected to have a **moderate** visual impact (significance rating = 54) on observers traveling along the roads within a 5km radius of the wind turbine structures. This includes observers travelling along the R61 and secondary road.

Since observers traveling along these roads will only be exposed to the visual intrusion for a short period of time and the roads are 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 table below illustrates this impact assessment.

Table 5: Visual impact on observers travelling along roads in close proximity to the proposed wind turbine structures

Nature of Impact: Visual impact on observers travelling along the 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	Moderate **(54)**	Moderate **(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 WEF infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain.		

8.2.2.3. Potential visual impact on sensitive visual receptors within the region (5 – 10km radius)

The FE Kudu Wind Energy Facility could have a **high** visual impact (significance rating = 60) on residents of (or visitors to) homesteads and observers travelling along the roads within a 5 - 10km radius of the wind turbine structures.

Amongst others, residents of/visitors to:

- Kiewietskuil
- Lower Kiewietskuil
- Upper Kiewietskuil
- Vaalvlei
- Klipdrift
- Oorlogspoort

Observers travelling along the:

- Observers travelling along the R61 and secondary road located to the south west and west of the proposed WEF respectively

The following homesteads are provisionally included, due the presence of already authorised, in process or proposed WEFs on their properties and their assumed support for WEF 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)

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 table below illustrates this impact assessment.

Table 6: Visual impact of the proposed wind turbine structures within the region (5 – 10km)

Nature of Impact: 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	High **(60)**	High **(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 WEF infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain.		

8.2.2.4. Potential visual impact on sensitive visual receptors within the region (10 – 20km radius)

The FE Kudu Wind Energy Facility could have a **moderate** visual impact (significance rating = 48) on residents of (or visitors to) homesteads and observers travelling along the roads within a 10 - 20km radius of the wind turbine structures.

Amongst others, 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 WEFs on their properties and their assumed support for WEF developments within the region:

- Kraanvoelkuil (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. The table below illustrates this impact assessment.

Table 7: Visual impact of the proposed wind turbine structures within the region (10 – 20km)

Nature of Impact: 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	Moderate **(48)**	Moderate **(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 WEF infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain.		

8.2.2.5. Shadow flicker

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). De Gryse in Scenic Landscape Architecture (2006) found that "*most shadow impact is associated with 3-4 times the height of the object*".

Based on this research, an 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 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 WEF development.

The significance of shadow flicker is therefore anticipated to be **moderate,** when this structure is in use.

Table 8: Visual impact of shadow flicker on sensitive visual receptors in close proximity to the proposed WEF

Nature of Impact: Visual impact of shadow flicker on sensitive visual receptors in close proximity to the proposed WEF.		
	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	Moderate **(42)**	Moderate **(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.		

8.2.2.6. Potential visual impact of operational, safety and security lighting of the facility at night

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 WEF. 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. See diagram in **Figure 23** below.[11]

Figure 22: Aircraft warning lights fitted to the wind turbine hubs (Source:http://www.pinchercreekecho.com/2015/04/29/md-of-pincher-creek-takes-on-wind-turbine-lights)

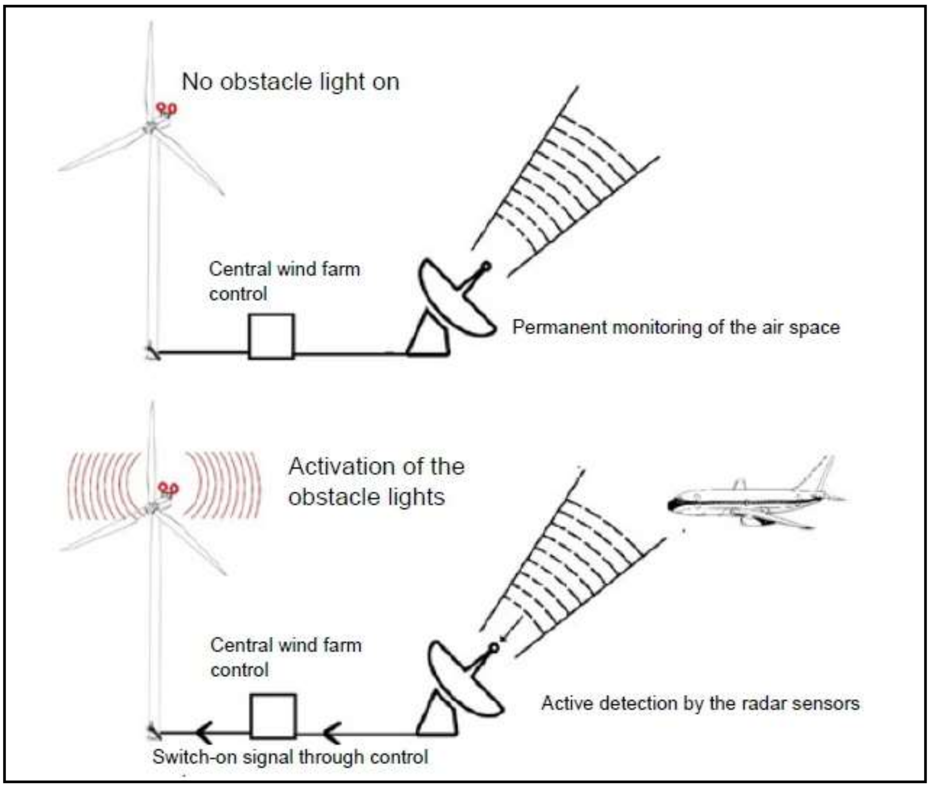


Figure 23: Diagram of the functional principle of the needs-based night lights.

Last is the potential lighting impact known as 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, contributes to the increase in sky glow.

This anticipated lighting impact is likely to be of **high** significance (rating = 60), and may be mitigated to **moderate** (rating = 45) especially within 0-5km and potentially up to 10km radius of the wind turbine structures.

Table 9: Impact table summarising the significance of visual impact of lighting at night on visual receptors in close to medium proximity (within 0-5km and potentially up to 10km) to the proposed WEF

[11] Source: Nordex Energy GmbH, 2019

Nature of Impact: 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	High **(60)**	Moderate **(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 CAA. ➢ Limit aircraft warning lights to the turbines on the perimeter according to CAA 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.		

8.2.2.7. Ancillary infrastructure

On-site ancillary infrastructure associated with the WEF includes a 132kV substation and collector substation, Battery Energy Storage System (BESS), underground cabling between the wind turbines, internal access roads, gate house, Operation and Maintenance buildings (including a control centre, offices, warehouses, workshop, canteen, visitors centre, staff lockers, etc.). No dedicated viewshed analyses have been generated for the ancillary infrastructure, as the range of visual exposure will fall within (and be overshadowed by) that of the turbines.

The anticipated visual impact resulting from this infrastructure is likely to be of **low** significance both before and after mitigation.

Table 10: Visual impact of the ancillary infrastructure

Nature of Impact: 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: 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 infrastructure. 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 ancillary infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain.		

8.3 Indirect Impact Assessment

The indirect visual impacts of the proposed FE Kudu Wind Energy Facility are assessed as follows:

8.3.1. Operational Phase

8.3.1.1. The potential impact on the sense of place of the region

Sense of place refers to a unique experience of an environment by a user, based on his or her cognitive experience of the place. Visual criteria, specifically the visual character of an area (informed by a combination of aspects such as topography, level of development, vegetation, noteworthy features, cultural / historical features, etc.), play a significant role.

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 currently has a rural, undeveloped character and a natural appearance. These generally undeveloped landscapes are considered to have a high visual quality. However, since the proposed FE Kudu Wind Energy Facility is located within the Beaufort West REDZ, it is expected that an accumulation of Renewable Energy Facilities (i.e. Wind and Solar) have already been and will continue to be constructed within the general region. This in turn will alter the unique experience of this environment by a user. It should be kept in mind that this alteration in the landscape 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 reduces the probability of this impact occurring.

Currently since none of the authorised developments in the region have been constructed, 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 **high** 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.

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 table below illustrates this impact assessment.

Table 11: The potential impact on the sense of place of the region

Nature of Impact: The potential impact on the sense of place of the region.		
	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	High **(60)**	Moderate **(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: 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 WEF infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain.		

8.4 Cumulative Impact Assessment

8.4.1. The potential cumulative visual impact of wind farms on the visual quality of the landscape

The cumulative visual impact of the proposed FE Kudu Wind Energy Facility, together with the other already authorised, in process and proposed WEFs within the study are (refer to **Section 5.2**) will primarily occur on the plains.

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 its location within the Beaufort West REDZ.

Table 12: The potential cumulative visual impact of wind farms on the visual quality of the landscape

Nature of Impact: 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	Moderate **(56)**	High **(64)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)

Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	
Mitigation measures: N.A.		
Residual impacts: The visual impact will be removed after decommissioning, provided the WEF infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain.		

8.5 The potential to mitigate visual impacts

The primary visual impact, namely the appearance of the WEF (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 not permissible as the CAA'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.

The overall potential for mitigation is therefore generally low or non-existent. The following mitigation is, however possible:

- It is recommended that vegetation cover (i.e. either natural or cultivated) be maintained in all areas outside of the actual development footprint (but still within the project site), both during construction and operation of the proposed WEF. This will minimise visual impact as a result of cleared areas and areas denuded of vegetation.

- Existing roads should be utilised wherever possible. New roads should be planned taking due cognisance of the topography to limit cut and fill requirements. Construction/upgrade of roads should be undertaken properly, with adequate drainage structures in place to forego potential erosion problems.

- In terms of onsite ancillary buildings and structures, it is recommended that it be planned so that the clearing of vegetation is minimised. This implies consolidating this infrastructure as much as possible and making use of already disturbed areas rather than undisturbed sites wherever possible.

- Install aircraft warning lights that only activate when the presence of an aircraft is detected, if permitted by the CAA, where deemed feasible.

- The Civil Aviation Authority (CAA) prescribes that aircraft warning lights be mounted on the turbines. However, it is possible to mount these lights on the turbines representing the outer perimeter of the facility. In this manner, fewer warning lights can be utilised to delineate the facility as one large obstruction, thereby lessening the potential visual impact.

- Mitigation of other lighting impacts includes the pro-active design, planning and specification lighting for the facility. The correct specification and placement of lighting and light fixtures for the proposed WEF and ancillary infrastructure will go far to contain rather than spread the light. Mitigation measures include the following:

    - Shielding the sources of light by physical barriers (walls, vegetation, or the structure itself);
    - Limiting mounting heights of lighting fixtures, or alternatively using foot-lights or bollard level lights;
    - Making use of minimum lumen or wattage in fixtures;
    - Making use of down-lighters, or shielded fixtures;
    - Making use of Low-Pressure Sodium lighting or other types of low impact lighting.

  - Making 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.

- Mitigation of visual impacts associated with the construction phase, albeit temporary, would entail proper planning, management and rehabilitation of the construction site. Recommended mitigation measures include the following:

  - Ensure that vegetation is not unnecessarily cleared or removed during the construction period.
  - Reduce the construction period through careful logistical planning and productive implementation of resources.
  - Plan the placement of laydown areas and any potential temporary construction camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever 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 regularly at licensed waste facilities.
  - Reduce and control construction dust through the use of approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent).
  - Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting.
  - Rehabilitate all disturbed areas, construction areas, roads, slopes etc. immediately after the completion of construction works. If necessary, an ecologist should be consulted to assist or give input into rehabilitation specifications.

- During operation, the maintenance of the turbines and ancillary structures and infrastructure must be undertaken to ensure that the facility does not degrade, therefore aggravating the visual impact.

- Roads must be maintained to forego erosion and to suppress dust, and rehabilitated areas must be monitored for rehabilitation failure. Remedial actions must be implemented as a when required.

- Once the facility has exhausted its life span, the main facility and all associated infrastructure not required for the post rehabilitation use of the site must be removed and all disturbed areas appropriately rehabilitated. An ecologist must be consulted to give input into rehabilitation specifications.

- All rehabilitated areas should be monitored for at least a year following decommissioning, and remedial actions implemented as and when required.

- Secondary (indirect) impacts anticipated as a result of the proposed WEF (i.e. visual character and sense of place) are not possible to mitigate. There is also no mitigation to ameliorate the negative visual impacts on roads frequented by tourists and which provides access to tourist destinations within the region.

Where sensitive visual receptors (as identified in **Section 5.6**) are likely to be affected and where valid objections (as determined by the visual specialist) are raised by these receptors during the application process, it is recommended that the developer investigate the receptor's willingness (and the viability) of screening of visual impacts at the receptor site prior to construction commencing[12]. This may entail the planting of natural vegetation, natural trees or the construction of screens in the pre-dominant direction of impact likely to be experienced by the principal receptor at the site. Ultimately, visual screening is most effective when placed at the receptor itself and should be considered in this context only.

[12] To this authors knowledge no objections pertaining to the visual impacts associated with the proposed development have been received.

Good practice requires that the mitigation of both primary and secondary visual impacts, as listed above, be implemented and maintained on an ongoing basis.

9. IMPACT STATEMENT

The findings of the Visual Impact Assessment undertaken for the proposed FE Kudu Wind Energy Facility is that the visual environment surrounding the site, especially within a 5-10km radius (and potentially up to 20km), will be visually impacted upon for the anticipated operational lifespan of the facility (i.e. 20 - 25 years).

The following is a summary of impacts remaining:

- Construction phase 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 is expected to have a **moderate** visual impact on observers/visitors residing at homesteads within a 5km radius of the wind turbine structures. No mitigation of this impact is possible.
- The operation of the FE Kudu Wind Energy Facility is expected to have a **moderate** visual impact on observers traveling along the public roads within a 5km radius of the wind turbine structures. No mitigation of this impact is possible.
- The operation of the FE Kudu Wind Energy Facility could have a **high** visual impact on sensitive visual receptors within the region (5 - 10km radius of the wind turbine structures). No mitigation of this impact is possible.
- The operation of the FE Kudu Wind Energy Facility could have a **moderate** visual impact on sensitive visual receptors within the region (10 - 20km radius of the wind turbine structures). No mitigation of this impact is possible.
- The significance of shadow flicker is anticipated to be **moderate**.
- The anticipated night-time lighting impact is likely to be of **high** significance and may be mitigated to **moderate**, provided that *needs-based aircraft warning lights* (if permitted by the CAA and deemed feasible), is installed.
- The anticipated visual impact resulting from ancillary infrastructure is likely to be of **low** significance both before and after mitigation.
- Currently since none of the authorised developments in the region have been constructed 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 **high** 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.
- The cumulative visual impact of the proposed FE Kudu Wind Energy Facility, its other associated WEF in the Cluster, and additional already authorised, in process and proposed WEFs within the study are is expected to be of **high** significance. In spite of this, the cumulative visual impact is still considered to be within acceptable limits, due to its location within the Beaufort West REDZ.

The anticipated visual impacts listed above (i.e. post mitigation impacts) range from **high** to **low** significance. Anticipated visual impacts on sensitive visual receptors in close proximity to the proposed facility remain high and are not possible to mitigate.

10.CONCLUSION AND RECOMMENDATIONS

The visual impact assessment (VIA) practitioner takes great care to ensure that all the spatial analyses and mapping is as accurate as possible. The intention is to quantify, using visibility analyses, proximity analyses, photo simulations and the identification of sensitive receptors, the potential visual impacts associated with the proposed **FE Kudu Wind Energy Facility**. These processes are deemed to be transparent and scientifically defensible when interrogated.

However, visual impact is ultimately a subjective concept. The *subjects* in this case are the residents of, and visitors to the region. The author has attempted to accurately capture the location of these *subjects* (i.e. sensitive visual receptors and areas of likely visual impact) to the best of his ability, drawing on years of experience as a VIA practitioner. The VIA further adopts a risk averse approach in so far as to assume that the perception of most (if not all) of the sensitive visual receptors (bar the landowners of the properties earmarked for the development), would be predominantly negative towards the development of a WEF in the region.

There are likely to be supporters of the FE Kudu Wind Energy Facility (as renewable energy generation is a global priority) amongst the population of the larger region, but they are normally expected to be indifferent to the construction of the WEF and not as vocal in their support for the wind farm as potential detractors thereof (should any be identified). To the knowledge of the author, no objections were raised.

However, it is expected that the construction and operation of the proposed FE Kudu Wind Energy Facility and its associated infrastructure, will have a **high visual impact on the study area**, especially within (but not restricted to) a 0 – 5km radius (and potentially up to a 10km radius) of the proposed facility. The visual impact will differ amongst places, depending on the distance from the facility, but will generally be restricted to the plains. Tourists travelling through the region and residents of homesteads will likely experience visual impacts where the wind turbine structures are visible.

Proposed, in process and authorised WEFs occurring in the study are as follows:

- Authorised Eskom Aberdeen Wind Farm (adjacent south of the site)
- Authorised Aberdeen 1, 2 and 3 Wind Farms (located south of the R61 and approximately 10 km south of the site)
- In process Kariega Wind Facility Cluster (adjacent west of the site)
- Proposed Tango Wind Energy Facility (located approximately 10km west of the site)

Once all these facilities are constructed it is expected that a cumulative visual impact of **high** significance will be experienced by sensitive receptors within the region (within 30km). However, it should be borne in mind, that 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. In light of this, the **potential cumulative visual impact is considered to be high but within acceptable limits**.

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. A number of mitigation measures have been proposed (**Section 8.5**The potential to mitigate visual impacts). The proposed mitigation measures will primarily be effective in terms of mitigating lighting and construction phase visual impacts.

Note: Regardless of whether or not mitigation measures will reduce the significance of the anticipated visual impacts, they are considered to be good practice and should all be implemented and maintained throughout the construction, operation and decommissioning phases of the proposed facility, should it be authorised.

The DFFE screening tool generated for the proposed FE Kudu Wind Facility indicated that the facility has a very high sensitivity owing to the fact that the site is located near a potential temporarily or permanently inhabited residence where shadow flicker may be an issue.

Based on the assessment, it can be found that the shadow flicker sensitivity for the proposed FE Kudu Wind Facility is **moderate** owing to the fact that the single homestead is located on properties involved in the development 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.

Similarly, 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

Refer to **Appendix 1** for the full site sensitivity verification report.

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 and tourists passing through or holidaying in the region.

According to the Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning (DEA&DP) Guideline for Involving Visual and Aesthetic Specialists in the EIA Process (Oberholzer, 2005), the criteria that determine whether or not a visual impact constitutes a potential fatal flaw are categorised as follows:

1. Non-compliance with Acts, Ordinances, By-laws and adopted policies relating to visual pollution, scenic routes, special areas or proclaimed heritage sites.
2. Non-compliance with conditions of existing Records of Decision.
3. Impacts that may be evaluated to be of high significance and that are considered by the majority of the stakeholders and decision-makers to be unacceptable.

In terms of the above and to the knowledge of the author the proposed development is compliant with all Acts, Ordinances, By-laws and adopted policies relating to visual pollution, scenic routes, special areas or proclaimed heritage sites, as well as, conditions of existing Records of Decisions.

Since no reported objections from stakeholders or decision-makers within the region have been communicated by the EAP to the author of this report, this assessment has adopted a risk averse approach by assuming that the perception of most (if not all) of the sensitive visual receptors (bar the landowners of the properties earmarked for the development), would be predominantly negative towards the development of a WEF in the region. While keeping in mind that there are also likely to be supporters of the FE Kudu Wind Energy Facility (as renewable energy generation is a global priority) amongst the population of the larger region, but they are largely expected to be indifferent to the construction of the WEF and not as vocal in their support for the wind farm as the detractors thereof.

Therefore, with the information available to the specialist at the time of writing this report, it cannot be empirically determined that the statistical majority of objecting stakeholders were exceeded. If evidence to the contrary surfaces during the progression of the development application, the specialist reserves the right to revise the statement below.

In spite of the predominantly high residual ratings (as assessed in **Section** Error! Reference source not found.) and the likelihood that the proposed development will be met with concern and objections from some of the affected sensitive receptors and landowners in the region, this report cannot categorically state that any of the above conditions were transgressed. As such these visual impacts are not considered to be fatal flaws for a development of this nature. It is, therefore, suggested that the proposed FE Kudu Wind Energy Facility as per the assessed layout be supported from a visual perspective, subject to the implementation of the suggested best practice mitigation measures, as provided in this report.

It should be noted that the results/deductions in this report are based solely from a visual perspective in relation to potential visual impacts and sensitive visual receptors and exclude any potential issues/comments/fatal flaws identified by other specialist studies.

11. MANAGEMENT PROGRAMME

The following management plan tables aim to summarise the key findings of the visual impact report and to suggest possible management actions in order to mitigate the potential visual impacts. Refer to the tables below.

Table 13: Management programme – Planning.

OBJECTIVE: The mitigation and possible negation of visual impacts associated with the planning of the Proposed FE Kudu Wind Energy Facility.

Project Component/s	The WEF and ancillary infrastructure (i.e. turbines, access roads, substations and workshop).	
Potential Impact	Primary visual impact of the facility due to the presence of the turbines and associated infrastructure as well as the visual impact of lighting at night.	
Activity/Risk Source	The viewing of the above mentioned by observers on or near the site (i.e. within 5-10km of the site) as well as within the region.	
Mitigation: Target/Objective	Optimal planning of infrastructure to minimise visual impact.	
Mitigation: Action/control	**Responsibility**	**Timeframe**
Retain and maintain natural and / or cultivated vegetation in all areas outside of the development footprint, but within the project site.	Project proponent/ design consultant/ Engineering, Procurement and Construction (EPC) contractor	Early in the planning phase.
Make use of existing roads wherever possible and plan the layout and construction of roads and infrastructure with due cognisance of the topography to limit cut and fill requirements.	Project proponent/ design consultant/ EPC contractor	Early in the planning phase.
Plan all roads, ancillary buildings and ancillary infrastructure in such a way that clearing of vegetation is minimised. Consolidate infrastructure and make use of already disturbed sites rather than undisturbed areas.	Project proponent/ design consultant/ EPC contractor	Early in the planning phase.
Consult a lighting engineer in the design and planning of lighting to ensure the correct specification and placement of lighting and light fixtures for the WEF and the ancillary infrastructure. The following is recommended: o Install aircraft warning lights that only activate when an aircraft is detected (CAA regulations/conditions permitting, where deemed feasible). o Limit aircraft warning lights for the proposed WEF to the turbines on the perimeter, thereby reducing the overall requirement (CAA regulations/conditions permitting).	Project proponent/ design consultant/ EPC contractor	Early in the planning phase.

○ Shield the sources of light by physical barriers (walls, vegetation, or the structure itself); ○ Limit mounting heights of fixtures, or use foot-lights or bollard lights; ○ Make use of minimum lumen or wattage in fixtures; ○ Making use of down-lighters or shielded fixtures; ○ Make use of Low-Pressure Sodium lighting or other low impact lighting. ○ Make use of motion detectors on security lighting, so allowing the site to remain in darkness until lighting is required for security or maintenance purposes.		

Performance Indicator	Minimal exposure (limited or no complaints from I&APs) of ancillary infrastructure and lighting at night to observers on or near the site (i.e. within 5-10km) and within the region.
Monitoring	Not applicable.

Table 14: Management programme – Construction.

OBJECTIVE: The mitigation and possible negation of visual impacts associated with the construction of the Proposed FE Kudu Wind Energy Facility.

Project Component/s	Construction site and activities
Potential Impact	Visual impact of general construction activities, and the potential scarring of the landscape due to vegetation clearing and resulting erosion.
Activity/Risk Source	The viewing of the above mentioned by observers on or near the site.
Mitigation: Target/Objective	Minimal visual intrusion by construction activities and intact vegetation cover outside of immediate construction work areas.

Mitigation: Action/control	**Responsibility**	**Timeframe**
Ensure that vegetation is not unnecessarily cleared or removed during the construction period.	Project proponent/ EPC contractor	Early in the construction phase.
Reduce the construction period through careful logistical planning and productive implementation of resources.	Project proponent/ EPC contractor	Early in the construction phase.
Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible.	Project proponent/ EPC contractor	Early in and throughout the construction phase.
Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.	Project proponent/ EPC contractor	Throughout the construction phase.
Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.	Project proponent/ EPC contractor	Throughout the construction phase.
Reduce and control construction dust through the use of approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent).	Project proponent/ EPC contractor	Throughout the construction phase.
Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting.	Project proponent/ EPC contractor	Throughout the construction phase.
Rehabilitate all disturbed areas, construction areas, servitudes etc. immediately after the completion of construction works. If necessary, an ecologist should be consulted	Project proponent/ EPC contractor	Throughout and at the end of the construction phase.

to assist or give input into rehabilitation specifications.		
Performance Indicator	Vegetation cover on and in the vicinity of the site is intact (i.e. full cover as per natural vegetation within the environment) with no evidence of degradation or erosion.	
Monitoring	Monitoring of vegetation clearing during construction (by contractor as part of the construction contract). Monitoring of rehabilitated areas quarterly for at least a year following the end of construction (by contractor as part of construction contract).	

Table 15: Management programme – Operation.

OBJECTIVE: The mitigation and possible negation of visual impacts associated with the operation of the Proposed FE Kudu Wind Energy Facility.		
Project Component/s	The WEF and ancillary infrastructure (i.e. turbines, access roads, substations and workshop).	
Potential Impact	Visual impact of facility degradation (including operational wind turbines) and vegetation rehabilitation failure.	
Activity/Risk Source	The viewing of the above mentioned by observers on or near the site.	
Mitigation: Target/Objective	Well maintained and neat facility.	
Mitigation: Action/control	**Responsibility**	**Timeframe**
Maintain the general appearance of the facility as a whole, including the turbines, servitudes and the ancillary buildings.	Project proponent/ operator	Throughout the operation phase.
Maintain roads and servitudes to forego erosion and to suppress dust.	Project proponent/ operator	Throughout the operation phase.
Monitor rehabilitated areas, and implement remedial action as and when required.	Project proponent/ operator	Throughout the operation phase.
Performance Indicator	Well maintained and neat facility with intact vegetation on and in the vicinity of the facility.	
Monitoring	Monitoring of the entire site on an ongoing basis (by operator).	

Table 16: Management programme – Decommissioning.

OBJECTIVE: The mitigation and possible negation of visual impacts associated with the decommissioning of the Proposed FE Kudu Wind Energy Facility.		
Project Component/s	The WEF and ancillary infrastructure (i.e. turbines, access roads, substations and workshop).	
Potential Impact	Visual impact of residual visual scarring and vegetation rehabilitation failure.	
Activity/Risk Source	The viewing of the above mentioned by observers on or near the site.	
Mitigation: Target/Objective	Only the infrastructure required for post decommissioning use of the site retained and rehabilitated vegetation in all disturbed areas.	
Mitigation: Action/control	**Responsibility**	**Timeframe**
Remove infrastructure not required for the post-decommissioning use of the site. This may include the turbines, substations, ancillary buildings, masts etc.	Project proponent/ operator	During the decommissioning phase.
Rehabilitate access roads and servitudes not required for the post-decommissioning use of the site. If necessary, an ecologist should be consulted to give input into rehabilitation specifications.	Project proponent/ operator	During the decommissioning phase.
Monitor rehabilitated areas quarterly for at least a year following decommissioning, and implement remedial action as and when required.	Project proponent/ operator	Post decommissioning.

Performance Indicator	Vegetation cover on and in the vicinity of the site is intact (i.e. full cover as per natural vegetation within the environment) with no evidence of degradation or erosion.
Monitoring	Monitoring of rehabilitated areas quarterly for at least a year following decommissioning.

12.REFERENCES / DATA SOURCES

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13.APPENDIX 1: SITE SENSIVITY VERIFICATION REPORT