PROPOSED HUGO WIND ENERGY FACILITY, NEAR DE DOORNS, WESTERN CAPE PROVINCE

VISUAL ASSESSMENT – INPUT FOR SCOPING REPORT

On behalf of:

ERM

Sustainability is our business

ERM
Building 27, Ground Floor
The Woodlands Office Park
Woodlands Drive
Woodmead, Sandton
2199

Produced by:

Lourens du Plessis (PrGISc) t/a LOGIS
PO Box 384, La Montagne, 0184
M: 082 922 9019 E: lourens@logis.co.za W: logis.co.za

- NOVEMBER 2023 -

TABLE OF CONTENTS

LIST OF TABLES

LIST OF MAPS

LIST OF FIGURES

DECLARATION

I, **Lourens du Plessis**, as an independent consultant compiled this Scoping Visual Impact Assessment and 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

To prepare this Report, LoGis utilised only the documents and information provided by ERM or any third parties directed to provide information and documents by ERM. 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 and its staff 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.

This assessment was undertaken during the planning stage of the project and is based on information available at that time. It is assumed that all information regarding the project details provided by ERM and the Applicant is correct and relevant to the proposed project. This Visual Impact Assessment and all associated mapping has been undertaken according to the worst-case scenario with the layout provided.

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 but no specific assessment protocol has been prescribed.

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

Quality of the above information bases are 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:
    - **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.

[1] Adapted from Oberholzer (2005).

- 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. EIA Requirements for Specialist Reports

As there is no specialist protocol available for visual impact assessments, this report has been compiled in accordance with the requirements of Appendix 6 of the 2014 NEMA EIA Regulations, as amended. This stipulates and prescribes the content of the Specialist Reports. Table 2 below details these requirements and refers the reader to relevant pages where specific information can be found for ease of reference:

Table 2: EIA Specialist requirements

EIA Regulations, 2014 Requirements, as amended	**Page Reference**
(a) Details of-	
(i) The specialist who prepared the report	Section 1.1
(ii) Expertise of that specialist to compile a specialist report including a CV	Section 1.1
(b) Declaration that the specialist is independent in a form as may be specified by the competent authority	Page iii
(c) An indication of the scope of, and purpose for which, the report was prepared	Section 3
(cA) an indication of the quality and age of base data used for the specialist report	Section 1.4

EIA Regulations, 2014 Requirements, as amended	Page Reference
(cB) a description of the existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change	Section 4. Cumulative impacts will be assessed during the EIR phase
(d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 1.7
(e) A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 1.7
(f) Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternative	Section 5. To be expanded upon during the EIR phase
(g) An identification of any areas to be avoided, including buffers	Section 6
(h) A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers	Section 6
(i) A description of any assumptions made and any uncertainties or gaps in knowledge	Section 1.2
(j) A description of the findings and potential implications of such findings on the impact of the proposed activity or activities	To be included in the EIR Phase
(k) Any mitigation measures for inclusion in the EMPr	To be included in the EIR Phase
(l) Any conditions for inclusion in the EA	To be included in the EIR Phase
(m)Any monitoring requirements for inclusion in the EMPr or EA	To be included in the EIR Phase
(n) A reasoned opinion-	
(i) Whether the proposed activity or portions thereof should be authorized	To be included in the EIR Phase
(iA) regarding the acceptability of the proposed activity	
(ii) If the opinion is that the proposed activity or portions thereof should be authorized, any avoidance, management and mitigation measures that should be included in the EMPr and where applicable, the closure plan	To be included in the EIR Phase
(o) A description of any consultation process that was undertaken during the course of preparing the specialist report	N/A
(p) A summary and copies of any comments received during any	N/A

EIA Regulations, 2014 Requirements, as amended	Page Reference
consultation process and where applicable all responses thereto	
(q) Any other information requested by the competent authority	N/A

1.7.Methodology

The scoping report 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 the Japan Aerospace Exploration Agency (JAXA), Earth Observation Research Centre, in the form of the ALOS Global Digital Surface Model "ALOS World 3D - 30m" (AW3D30) elevation model.

The approach utilised to identify potential issues related to the visual impact included the following activities:

- The creation of a detailed digital terrain model (DTM) of the potentially affected environment;
- The sourcing of relevant spatial data. This includes cadastral features, vegetation types, land use activities, topographical features, site placement, etc.;
- The identification of sensitive environments upon which the proposed facility could have a potential impact.
- The creation of viewshed analyses from the proposed project site in order to determine the visual exposure and the topography's potential to absorb the potential visual impact. The viewshed analyses take into account the dimensions of the proposed structures and activities.
- A site visit was undertaken on the 6th of September 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.

This report (scoping report) sets out to identify the possible visual impacts related to the proposed Hugo Wind Energy Facility (WEF).

2. PROJECT DESCRIPTION

The proposed Hugo WEF will comprise up to 48 turbines with a maximum output capacity of up to 360 MW. The WEF will be located on the following land parcels: RE 147; RE/172; 0/173; RE/174; and 9/148. The final design which will be requested for approval in the EA, will be determined based on the outcome of the specialist studies undertaken for the EIA phase of the development. The proposed turbine footprint and associated facility infrastructure will cover an area of up to 7900 ha, depending on the final design.

It is proposed that an on-site substation with a capacity up 132 kV with an up to 33 kV overhead / underground powerline will be installed. It is unknown at this stage how long the connection to the grid will be, or what route the cabling will be installed.

A summary of the details and dimensions of the planned infrastructure associated with the project is provided in Table 3.

Table 3: Details or dimensions of typical infrastructure for the Hugo WEF

WEF Technical Details Components	Description / Dimensions - Hugo
Maximum Generation Capacity	up to 360MW
Type of technology	Onshore Wind
Number of Turbines	Up to 48
WTG Hub Height from ground level	up to 150m
Blade Length	up to 100m
Rotor Diameter	up to 200m
Structure height (Tip Height)	up to 250m
Structure orientation	Wind regiment dependent
Operations and maintenance buildings (O&M building) with parking area	up to 1 HA
Site Access	Via the R318
Area occupied by inverter transformer stations/substations	up to 2.5 HA
Capacity of on-site substation	132/33kv
Battery Energy Storage System footprint	up to 5 HA
BESS type	Lithium-ion or Redox-flow technology, depending on the most feasible at the time of implementation
BESS Alternatives (site, technology, design and layout)	Same as above. See layout for design and position
Length of internal roads	TBD
Width of internal roads	Access roads to the site and between project components with a width of approximately 4.5 m and a servitude of 13.5 m.
Proximity to grid connection	TBD
Internal Cabling	Cabling between the turbines, to be laid underground where practical.
Height of fencing	TBD
Type of fencing	TBD

WEF Technical Details Components	Description / Dimensions - Hugo
Water supply, volumes required	±26500m³ for the construction, commissioning and test phase (±26 months), the majority being consumed during year-one of the construction. ±90m³/annum for the life-of-WEF (20-25 years)
Waste Management, waste volumes, and how will it be managed	To be determined at a later stage- either through Municipal channels or private
Details on where material and equipment will be sourced for construction	To be determined upon construction and latest market availability
Employment opportunities during construction and operations (maintenance) Skilled, semi-skilled, unskilled employees	Low skilled: up to (± 55%) Semi-skilled: up to (± 30%) Skilled: up to (± 15%)

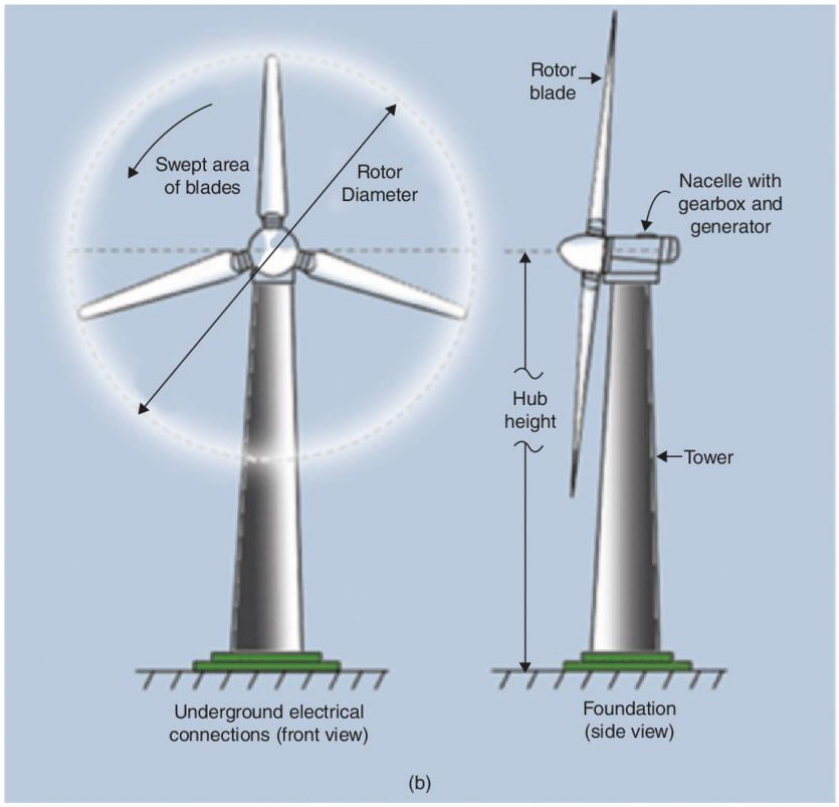


Figure 1: Illustration of the main components of a wind turbine[2]

[2] Illustration courtesy of Charlier, R & Thys, A. (2016). Wind Power—Aeole Turns Marine. 10.1002/9781119066354.ch7.

3. SCOPE OF WORK

The scope of the work includes a scoping level visual assessment of the issues related to the visual impact. The scoping phase is the process of determining the spatial and temporal boundaries (i.e. extent) and key issues to be addressed in an impact assessment.

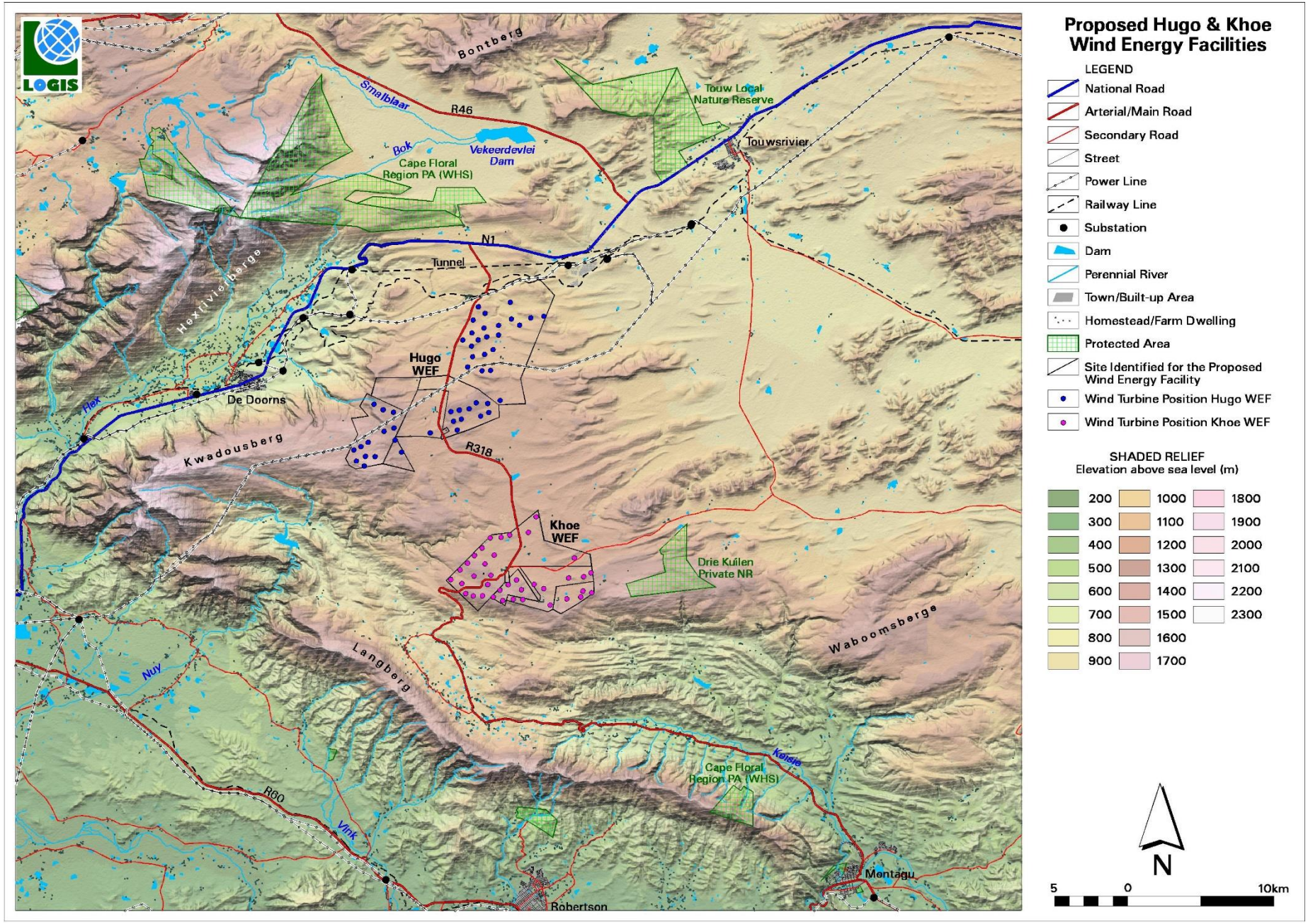
The main purpose is to focus the impact assessment on a manageable number of important questions on which decision-making is expected to focus and to ensure that only key issues are examined. Additionally, it is to inform the facility layout in order to avoid potential sensitive visual areas, if possible. The study area for the visual assessment includes a minimum 20km buffer zone (area of potential visual influence) from the Wind Energy Facility (WEF) footprint. The study area includes numerous mountain ranges, protected areas as well as existing high voltage powerlines and substations.

4. THE AFFECTED ENVIRONMENT

The proposed Hugo WEF and associated infrastructure is located approximately 16 km south west of the town of Touws Rivier and 30 km north east of Worcester within the Breede Valley Local Municipality and the Cape Winelands District Municipality within the Western Cape Province.

The study area occurs on land that ranges in elevation from approximately 200 metres above sea level (masl) in the south west at the base of the Langberg Mountain along drainage lines and in the west along the Hex River to 1800masl on the tops of mountain ranges such as Kwadousberg and Langberg. The site itself is located on land with an average elevation of 1500 masl. Numerous mountain ranges are located within the study area, namely the Hexrivierberge and Kwadousberg in the west, Langberg to the south, Waboomsberge to the south east and Bontberg to the north. Prominent water sources within the study area include the Nuy, Vink, Keisie, Hex Rivers. The Smalblaar and Bok rivers flow into the Verkeerdevlei Dam in the north. See **Map 1** for the shaded relief/topography map of the study area.

Figure 2: Undulating topography of the site



Map 1: Shaded relief map of the study area

Land cover consists primarily of low shrubland (fynbos) with scattered areas of bare rock and soil. The predominant land use is viticulture (vineyards) along the Hex River and areas to the south west and dryland and irrigated agriculture. Refer to Error! Reference source not found..

Figure 3: Viticulture in the study area and farmstead

Figure 4: Low shrub land (fynbos) vegetation

The study area is fairly populated with 44 people per km^2 within the local municipality. The most populated areas within the study area are the towns of De Doorns to the west, Touws Rivier to the north east and further afield, Robertson to the south. Outside of these areas, there are isolated homesteads scattered around the study area.

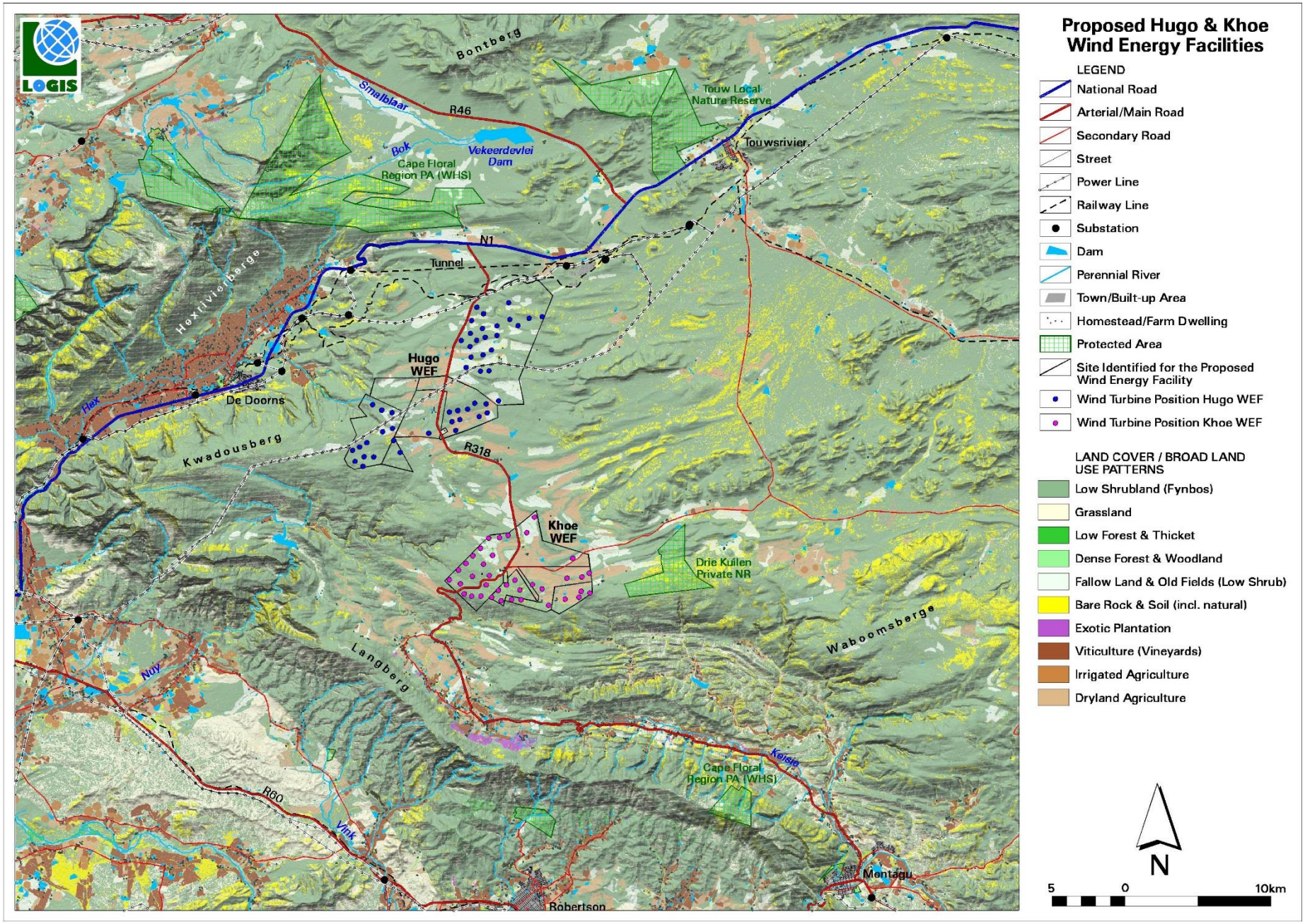
Figure 5: Example of homesteads found in the town of Touws Rivier

Access to the site is via the R318 which is off the N1 national road. The N1 is a main connector that runs from Cape Town, through Bloemfontein, Johannesburg and Polokwane to the border of Zimbabwe. The R318 travels through the Hugo WEF site and is a regional road that connects the N1 between De Doorns and Touws Rivier. The Rooihoogtepas is a scenic mountain pass located on the R318, just south of the proposed site. An old railway system that used to run from DeDoorn, via Touws Rivier to Beaufort West can be found to the north and east of the proposed site.

Figure 6: View of the site from the R318

Other industrial infrastructure within the study area includes limited existing high voltage powerlines located to the north of the site and traversing through the site. Numerous substations are located to the north of the proposed Hugo WEF site.

Figure 7: Existing power lines traversing the proposed Hugo site



Map 2: Land cover and broad land use patterns within the study area

There are three (3) protected areas within the study area, namely the Cape Floral Region Protected Area, Touw Local Nature Reserve and Drie Kuilen Private Nature Reserve. The Cape Floral Region is also a World Heritage Site as recognized by UNESCO. Drie Kuilen PNR offers a variety of activities such as game drives, hikes and overnight accommodation.

The greater environment with its wide open, undeveloped landscapes is considered to have a high visual quality.

This study area is a known as a tourist destination owing to its location within the Cape Winelands, the Cape Floral Region, and the town of Touws Rivier which is located on the Flowers Route.

5. VIEWSHED ANALYSIS- SCOPING LEVEL ASSESSMENT

5.1. Visual distance and observer proximity

Proximity offsets (the radial distance between the proposed development and the identified visual receptors) were determined based on the anticipated visual experience of the observer over varying distances. In general, the severity of the visual impact on visual receptors decreases with increased distance from the proposed infrastructure. Therefore, 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 the Hugo WEF. Proximity offsets for the proposed development footprint are thus established 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.

These proximity offsets are based on the anticipated visual experience of the observer over varying distances. The distances are adjusted upwards for larger facilities and downwards for smaller facilities (i.e. depending on the size and nature of the proposed infrastructure). This rationale was developed in the absence of any known and/or acceptable standards for South African WEFs. Therefore, for the purpose of this study, proximity offsets have been calculated from the expected boundary of the site, as indicated on **Map 3** and as follows:

- 0 – 5 km. Short distance view where the facility would dominate the frame of vision and constitute a very high visual prominence.
- 5 – 10 km. Short to medium distance view where the structures would be easily and comfortably visible and constitute a high to moderate visual prominence.
- 10 – 20 km. 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.
- 20 km. 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.

The figure below helps to place the above explanations in context, illustrating what scale a turbine structure will be perceived at different viewing distances.

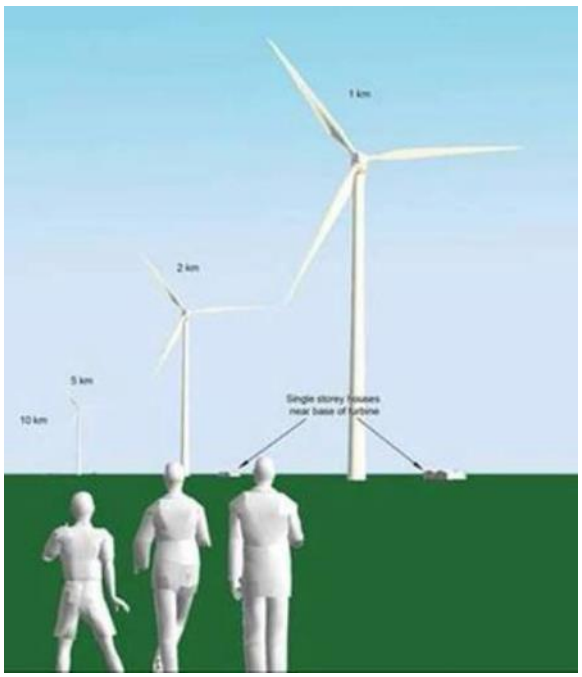


Figure 8: Visual experience of a wind turbine structure at a distance of 1 km, 2 km, 5 km and 10 km

5.2. Potential visual exposure

The result of the scoping viewshed analyses for the proposed Hugo WEF is shown on Error! Reference source not found.Error! Reference source not found. that follows.

The analysis has been undertaken from each proposed turbine position as indicated within the proposed development area of Hugo WEF in order to determine the general visual exposure (visibility) of the area under investigation. It is expected, from a visual impact perspective, that the wind turbines themselves would constitute the highest potential visual impact of the WEF, therefore, the viewshed analysis for the facility was undertaken at an offset of maximum 250m above average ground level (i.e. the approximate maximum blade tip height of the turbines).

The result of the viewshed analysis displays the potential areas of visual exposure. Land that is more elevated is typically more exposed to the proposed WEF, whilst lower lying areas such as valleys are shielded, or not as exposed.

It must be noted that the viewshed analysis does not include the effect of vegetation cover or existing structures on the exposure of the proposed wind turbines, therefore signifying a worst-case scenario.

Error! Reference source not found. indicates areas from which the proposed Hugo WEF could potentially be visible, as well as, proximity offsets (5km, 10km and 20km) from the proposed development area. Typically, structures of this height (i.e. 250m) may be visible from up to 20km away. In this respect, the anticipated Zone of Visual Influence for this facility as calculated from the development footprint (i.e. determined from the edge of the proposed development areas) has been indicated at 20km. The extent of visual exposure within this zone is expected to be very high.

The following is an overview of the findings of the viewshed of Hugo WEF only, based on the layout illustrated on the Map provided:

0 – 5km

The proposed facility will have a large core area of potential visual exposure on the project site itself, and within a 5km radius thereof.

Potential sensitive visual receptors within this visually exposed zone include residents of a few scattered homesteads/farmsteads. This zone also contains the R318, a regional road which traverses the proposed site as well as a portion of the N1 national road to the north. Observers travelling along these roads will similarly be exposed to the WEF infrastructure.

5 – 10km

Potential visual exposure is still fairly concentrated within this zone though it does become slightly more scattered (i.e. between 5 and 10km). Visually screened areas can be found to the north and south west and are associated with the lower lying non-perennial rivers and screening effects of the hilly topography.

Sensitive visual receptors comprise residents of De Doorns and a few homesteads/farmsteads scattered around the site. Additionally, potential sensitive visual receptors include observers travelling along the R318, N1 and other secondary roads. The eastern portion of the Cape Floral Region PA World Heritage Site may also potentially be impacted upon.

10 – 20km

In the longer distance (i.e. between 10 and 20km offset), the extent of potential visual exposure is somewhat reduced and scattered throughout this zone. Visually exposed areas tend to be concentrated to the east, south east and west. The Langberg mountain range visually screens the areas to the south.

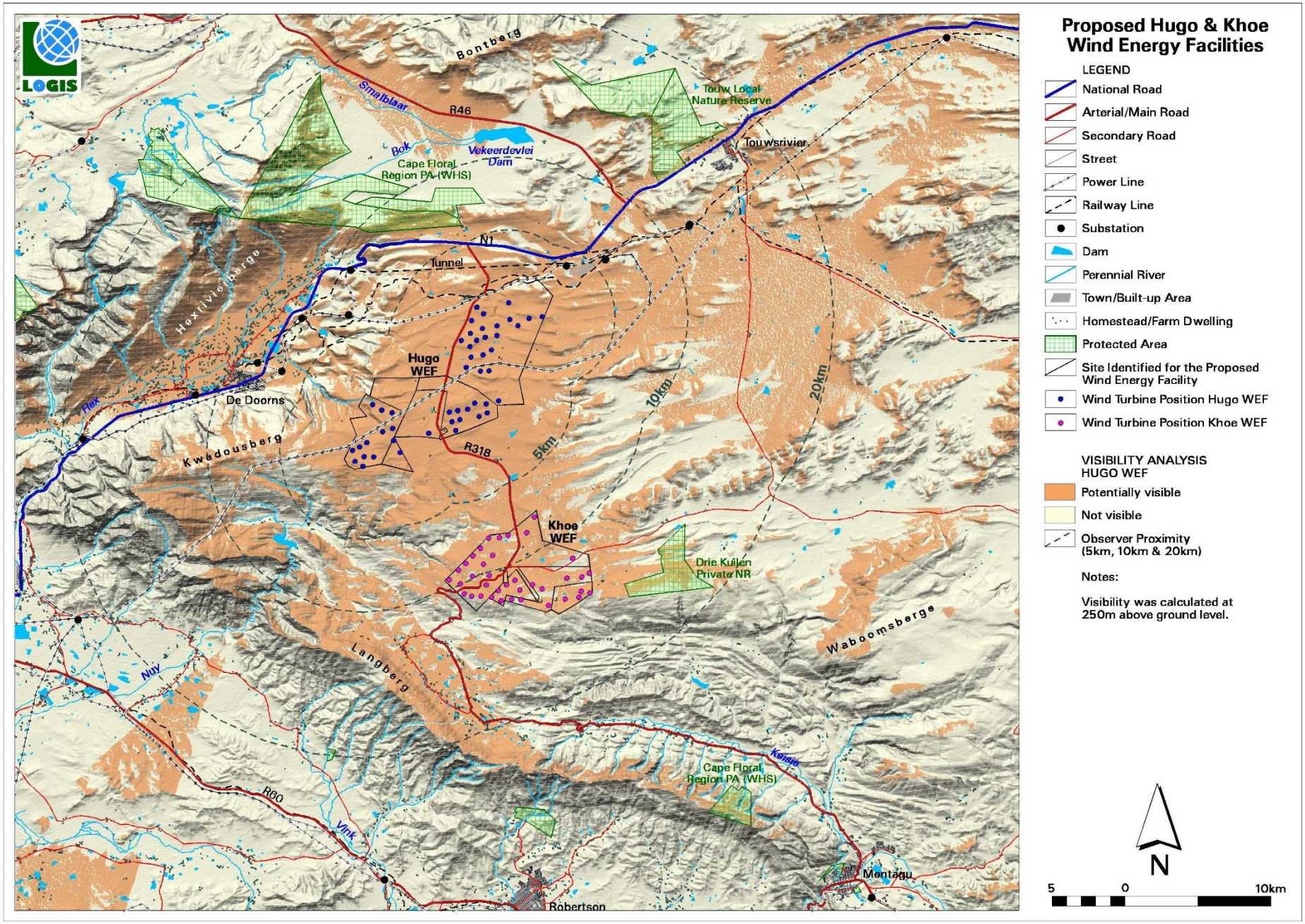
Sensitive visual receptors comprise residents of homesteads/farmsteads scattered throughout the area as well as portions of Touws Rivier. Additionally, potential sensitive visual receptors include observers travelling along the R318, R46 and N1, as well as, various secondary roads.

Cape Floral Region PA World Heritage Site, Touw Local NR and Drie Kuilen PNR may also be visually impacted upon by the proposed WEF.

> 20km

Beyond the 20 km offset from the proposed site, potential sensitive visual receptors are not likely to be visually exposed to the proposed facility, despite lying within the viewshed.

In general terms it is envisaged that the turbines associated with the proposed Hugo WEF, where visible from shorter distances (e.g. less than 5km and potentially up to 10km), and where sensitive visual receptors may find themselves within this zone, may constitute a high visual prominence, potentially resulting in a high to very high visual impact. This may include tourists visiting the region, observers travelling along the roads, as well as residents of the farm dwellings mentioned above.



Map 3: Potential visual exposure (visibility analysis) of the proposed Hugo WEF

6. SITE SENSITIVITY VERIFICATION

6.1. Sensitivities identified by the National Web-based Environmental Screening Tool

In accordance with GN 320 and GN 1150 (20 March 2020) of the NEMA EIA Regulations of 2014 (as amended), prior to commencing with a specialist assessment, a site sensitivity verification must be undertaken to confirm the current land use and environmental sensitivity of the proposed project areas as identified by the National Web-Based Environmental Screening Tool (i.e., Screening Tool).

The DFFE screening tool generated for Hugo WEF indicated that the site has a very high sensitivity for shadow flicker owing to the fact that the site is located near temporarily/permanently inhabited residence.

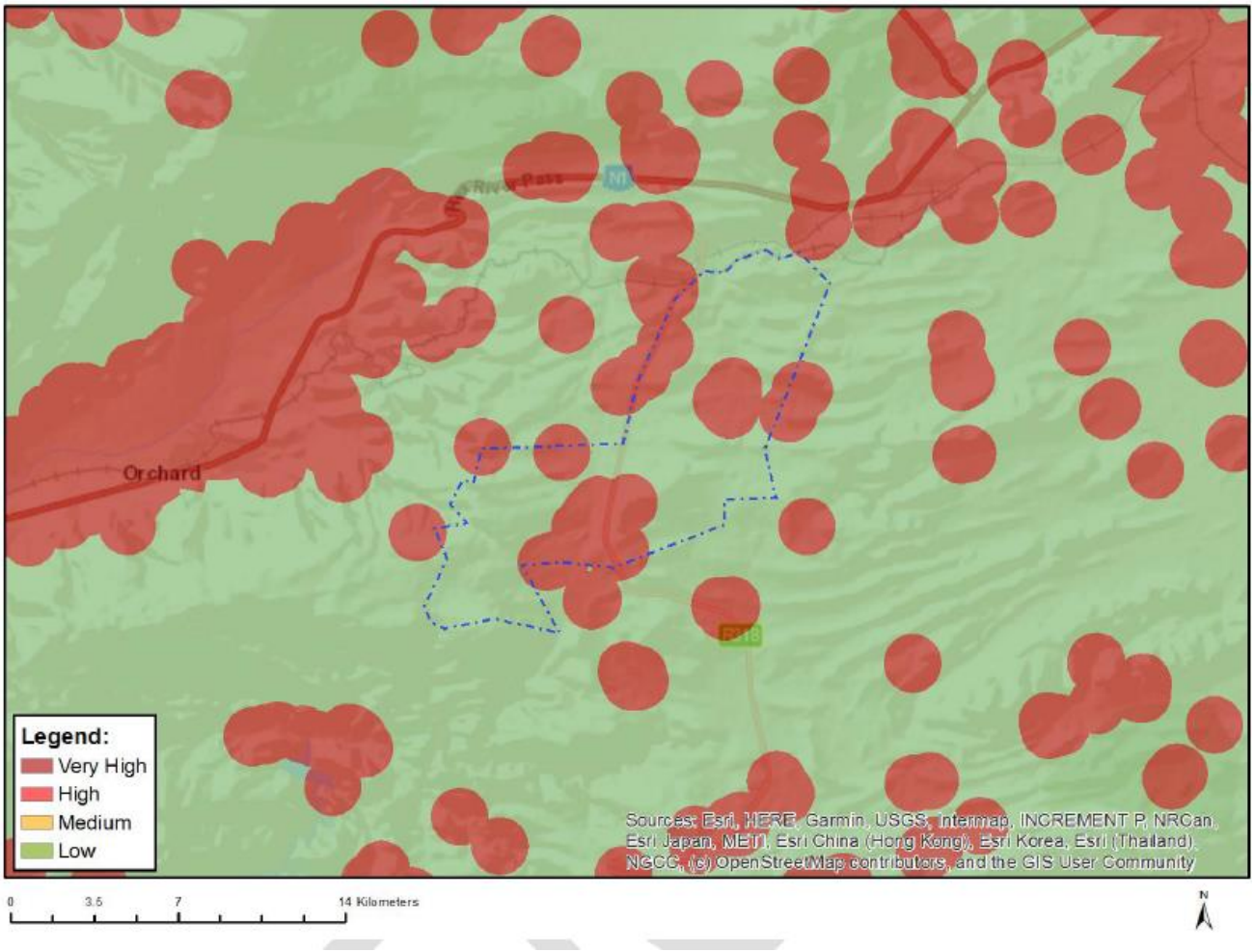


Figure 9: Relative flicker theme sensitivity based on the DFFE screening tool

Similarly, the DFFE screening tool generated for Hugo WEF indicated that the site has a very high sensitivity for landscape owing to the fact that the site is located on top of mountains and high ridges, slope of more than 1:4, Mountain catchment area, within 3 km of a nature reserve/protected area and within 250 m of a river.

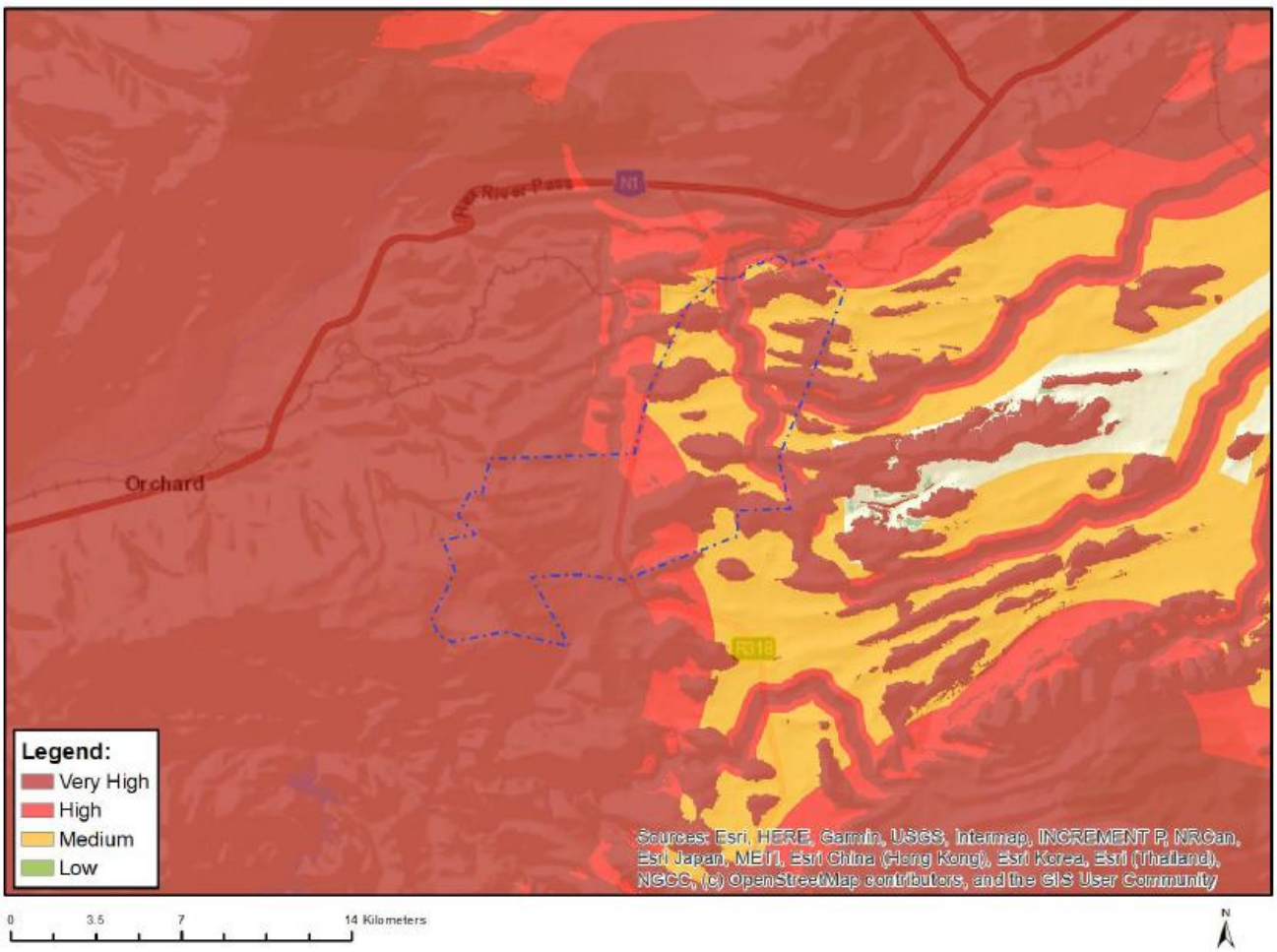


Figure 10: Relative landscape (wind) theme sensitivity as per the DFFE screening tool

6.2. Results

The criteria for the identification of visually sensitive areas (scenic resources) and potential sensitive visual receptors are as follows:

- **Proximity to roads-** To avoid encroachment of wind turbine structures to public roads (especially in natural, rural and scenic areas), thereby reducing the potential visual impact on road users and tourists.

    - Scenic routes- 1 km buffer
    - National roads - 500m buffer
    - Arterial and main roads – 350m buffer
    - Secondary roads – 150m buffer

Ten (10) turbines for Hugo WEF are located within the scenic roads buffer of the R318.

- **Proximity to inhabited residences (homesteads), settlements and towns**- reduce general observer proximity to wind turbine structures and avoid potential shadow flicker

issues, generally anticipated to occur at distances of less than 500m from built structures and 2km from towns.

- Wind turbines should not be placed within a 500m buffer zone from residences.

No turbines are located within 500 m from a homestead.

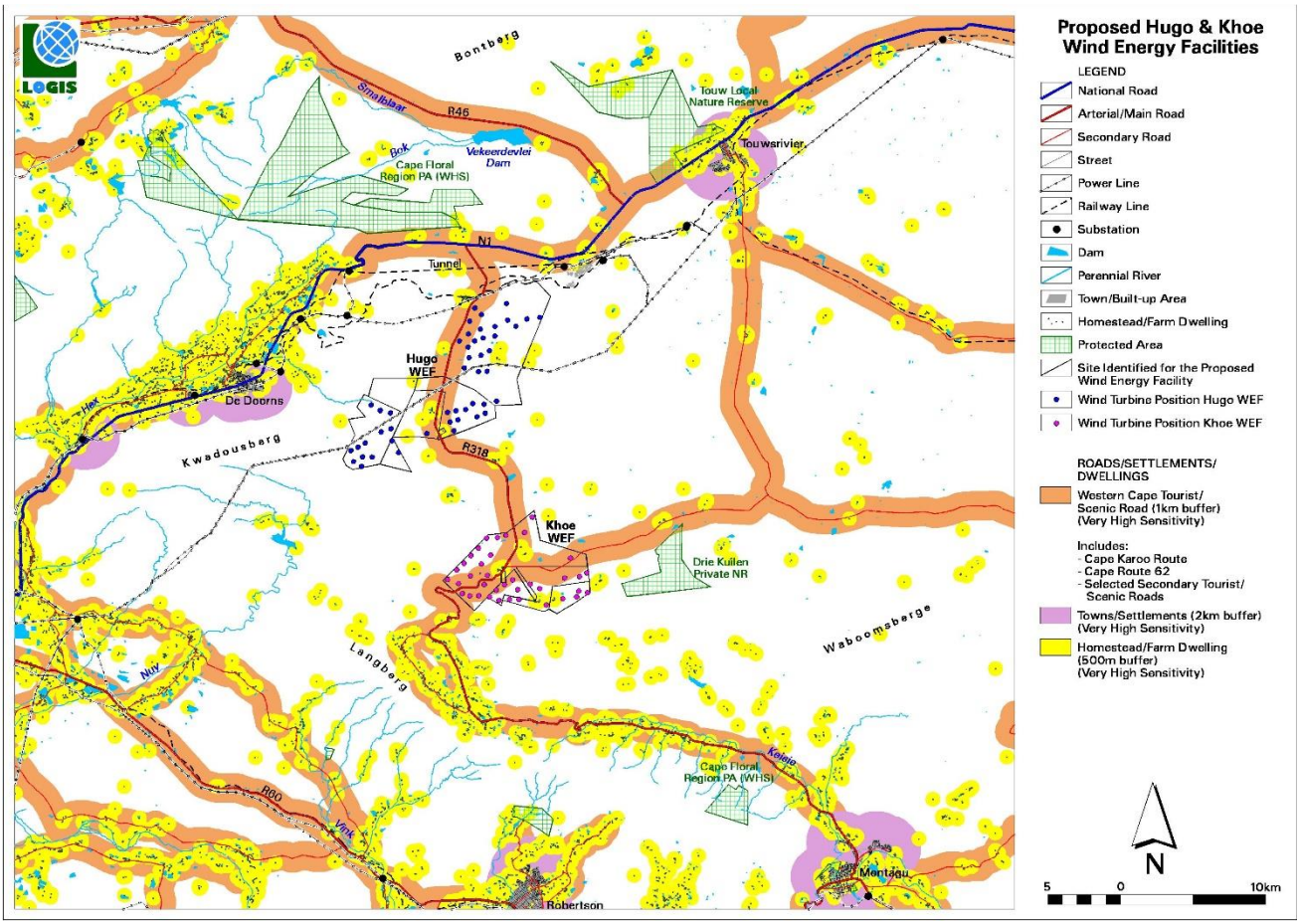


Figure 11: Proximity to scenic routes, towns/settlements and homesteads

- **Proximity to protected areas and tourist attractions (if present)-** The potential land use conflict between nature orientated tourism and the potential visual impacts associated with wind turbines may be mitigated to some degree by adhering to a minimum 1km (or other negotiated threshold) exclusion zone.

  - Wind turbines should not be placed within a 3km buffer zone from protected areas (nature reserves) or known tourist attractions.
  - Wind turbines should not be placed within a 5km buffer zone from protected areas (World Heritage sites).

No turbines are located within any buffers for the protected areas.

- **Proximity to dams/lakes and major rivers-** to minimize land use conflicts and potential visual impacts associated with wind turbines may be mitigated to some degree by adhering to a minimum 250 m (or other negotiated threshold) exclusion zone.

  - Wind turbines should not be placed within a 250 m buffer zone from any watercourse.

One turbine is located within the 250 m.

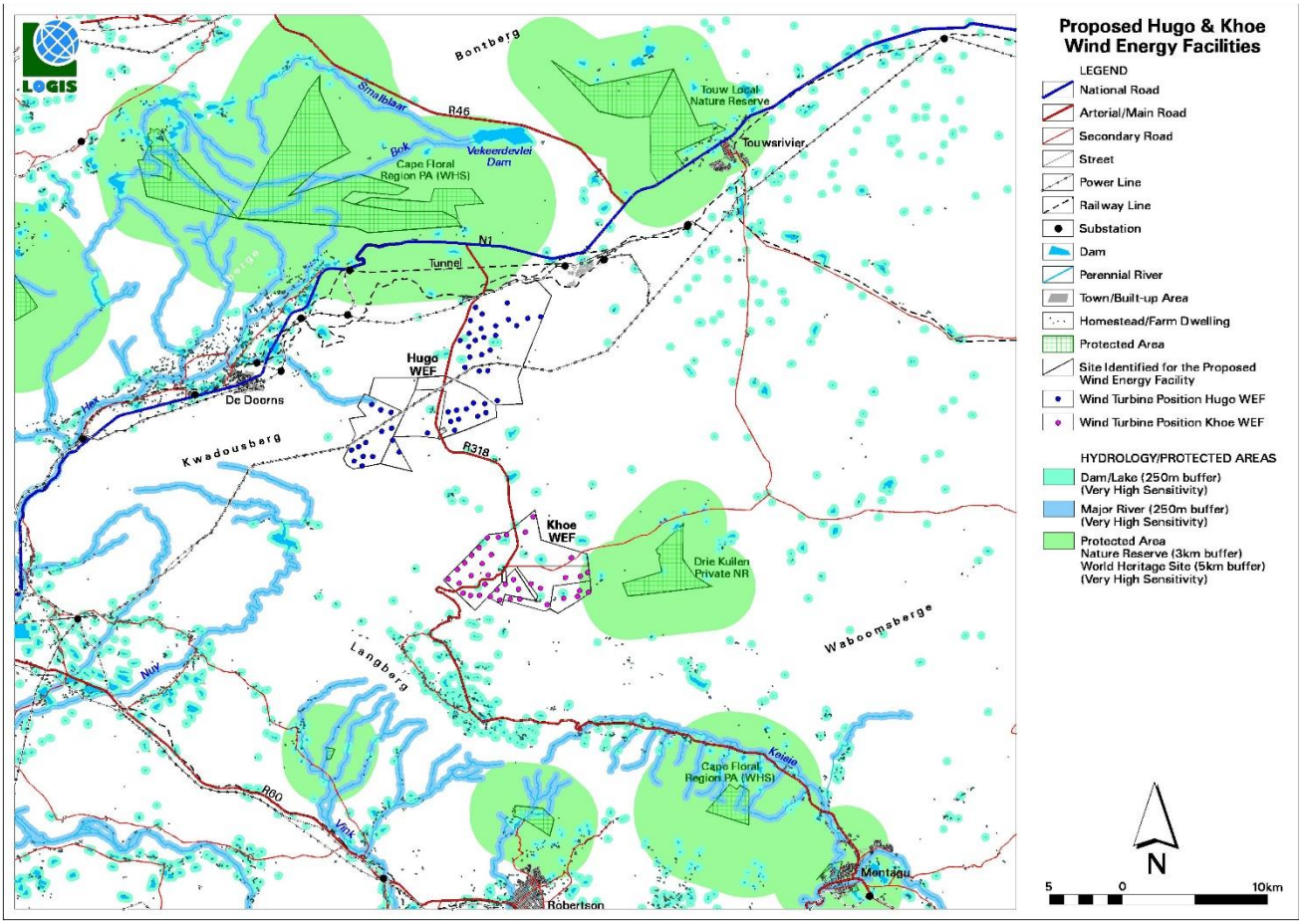


Figure 12: Proximity to watercourses and protected areas

- **Steep slopes, prominent hills, ridges and skylines**- Avoid the placement of wind turbines on these topographical units.
    - Elevated terrain (hills, ridges and mountains) are considered to be scenic topographical features, generally more exposed than areas with even or level slopes (e.g. plains).
    - The placement of turbines on these elevated topographical units will increase the visual exposure (visibility) and prominence of the structures within the landscape.

The construction of access roads along steeper and elevated slopes will be visually exposed due to the removal of vegetation cover, and may pose an aggravated visual impact due to the risk of erosion scarring.

No turbines are located on slopes of more than 1:4, however 14 turbines are located on mountains and tall hills.

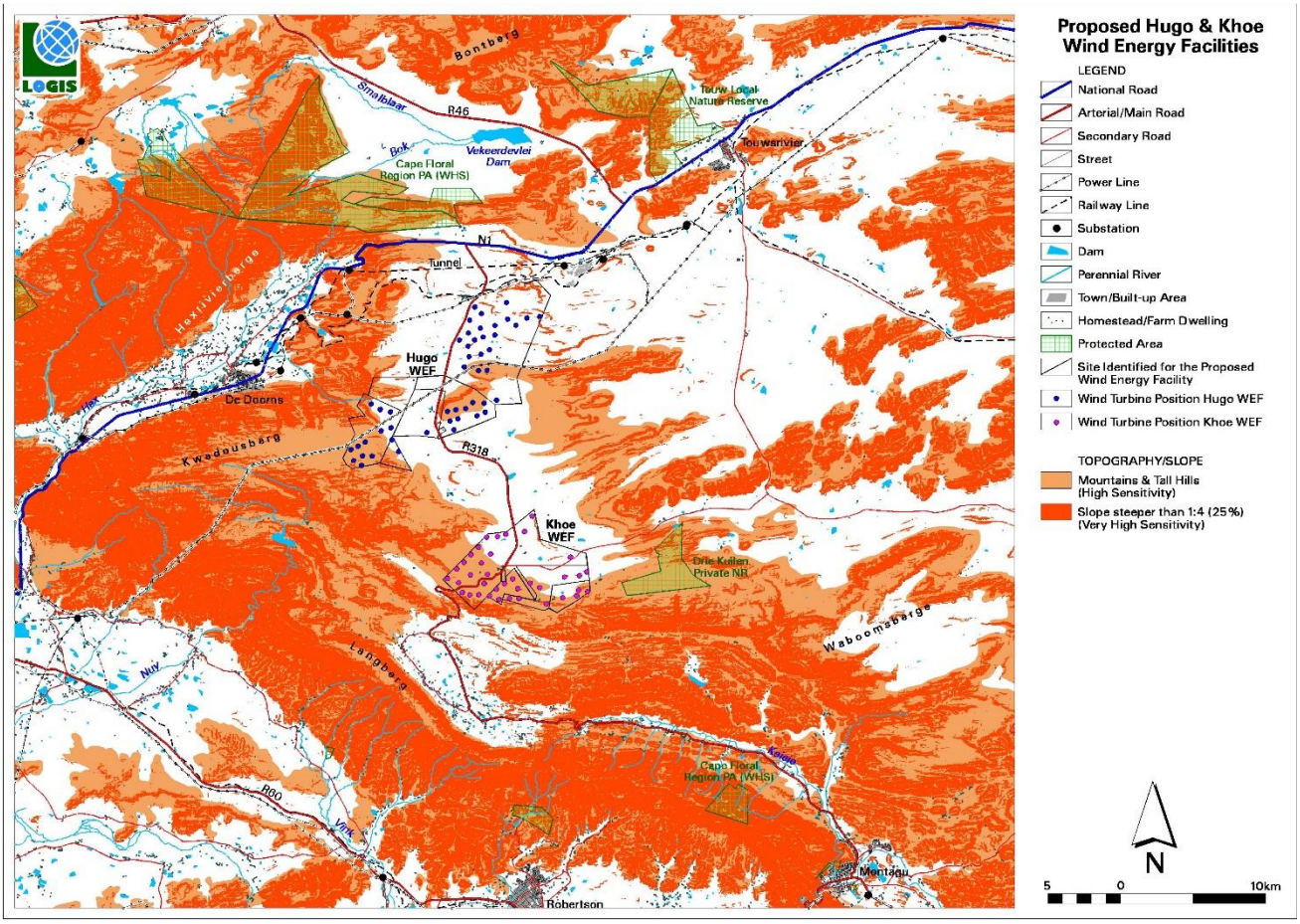


Figure 13: Proximity to steep slopes and mountains/ridges

In order to determine the overall visual sensitivity of the proposed sites in the absence of any mitigation, the matrix below was utilized.

Table 4: Matrix to determine overall visual sensitivity for the Hugo WEF

	Sensitive Receptor	Very High Sensitivity (4)	High Sensitivity (3)	Moderate Sensitivity (2)	Low Sensitivity (1)
1.	**Topographic features incl mountain ridges**	Within 500m	Within 500m - 1km	Within 1 - 2km	>2km
2.	**Steep slopes**	Slopes with more than 1:4	Slopes between 1:4 and 1:10	-	-

3.	**Major rivers, water bodies, perennial rivers and wetlands with scenic value**	Within 250 m	Within 250-500m	Within 500m – 1km	>1km
4.	**Coastal zone**	Within 1km	Within 1 - 2km	Within 2 – 4km	>4km
5.	**Protected area: National Parks**	Within 5km	Within 5 - 10km	Within 10 - 15km	>15km
6.	**Protected areas: Nature Reserves**	Within 3km	Within 3 – 5km	Within 5 – 10km	>10km
7.	**Private reserves and game farms**	Within 1.5km	Within 1.5 – 3km	Within 3 – 5km	>5km
8.	**Cultural landscape**	On the site itself	Within 500m	Within 500m – 1km	>1km
9.	**Heritage Sites Grades I, ii and iii**	On the site itself	Within 500m	Within 500m – 1km	>1km
10.	**Towns and Villages**	Within 2km	Within 2 – 4km	Within 4 – 6km	>6km
11.	**Home/farmsteads**	Within 5km	Within 5 - 10km	Within 10 - 20km	>20km
12.	**National Roads**	Within 1km	Within 1 - 2.5km	Within 2.5 - 5km	>5km
13.	**Provincial/arterial roads**	Within 500m	Within 500m - 1km	Within 1 - 3km	>3km
14.	**Scenic routes**	Within 1km	Within 1 - 2.5km	Within 2.5 - 5km	>5km
15.	**Passenger rail lines**	Within 500m	Within 500m – 1km	Within 1 – 3km	>3km
16.	**Located with Renewable energy development zone**	No	-	-	Yes –
17.	**VAC**	Low VAC	Moderate VAC	High VAC	Very High VAC
18.	**Shadow Flicker**	YES - Within 1.2km			No
19.	**Visual Quality**	Natural environment intact with no built infrastructure	Natural environment intact with limited built infrastructure	Natural environment somewhat intact with fair amount of built infrastructure	Built infrastructure is dominant with little to no natural environment remaining
20.	**Presence of existing infrastructure**	Absent	Very low densities	Present in moderate quantities	High densities
	Total	**High (53)**			

Overall visual sensitivity rating:

- Low (0 - 20)
- Moderate (21 - 40)
- High (41 - 60)
- Very High (61 – 80)

7. ANTICIPATED ISSUES RELATED TO VISUAL IMPACT

Anticipated issues related to the potential visual impact of the proposed **Hugo WEF** include the following:

- The visibility of the facility to, and potential visual impact on residents of dwellings within the study area, with specific reference to the residents in closer proximity to the proposed development.

» The visibility of the operational facility and ancillary infrastructure to, and potential visual impact on observers within the region.

» The visibility of the facility and ancillary infrastructure to, and potential visual impact on observers travelling along the main roads, as well as, secondary roads 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 construction of ancillary infrastructure (i.e. internal access roads, buildings, power line, etc.) on observers in close proximity to the facility.

- The potential visual impact of the facility on tourist routes/tourist destinations and protected areas (if present).

- The visual absorption capacity of the natural vegetation (if applicable).

» The potential cumulative visual impacts of the facility and ancillary infrastructure within the study area.

- The potential visual impact of operational, safety and security lighting of the facility at night on observers residing in close proximity of the facility.

» The potential visual impacts of shadow flicker on sensitive and potentially sensitive visual receptors in close proximity.

- Potential visual impacts associated with the construction phase.

- 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.

8. TERMS OF REFERENCE FOR THE ENVIRONMENTAL IMPACT ASSESSMENT PHASE

Following the establishment of the baseline information pertinent to the development in the Scoping Phase VIA (as undertaken in this report), the primary goal of the Environmental Impact Assessment (EIA) Phase VIA report will be to ensure that visual impacts are adequately assessed and considered so that the relevant authorities can decide if the proposed WEF has unreasonable or undue visual impacts. The secondary aim is to identify effective and practical mitigation measures, if possible.

Since the purpose of a VIA is not to predict whether specific individuals or entities will find this type of development (renewable wind energy facility) pleasing or not but instead to identify the important visual features of the surrounding landscape, especially the features and characteristics that contribute to scenic quality, as the basis for determining how and to what degree a particular project will impact on those scenic values. The study will include the following:

1. Refinement of the baseline study, description of the visual character of the sites and zone of visual influence, if required.
2. Adjust the list of identified visual impacts resulting from the proposed development (with consideration of any public and/or relevant authorities' comments), if required.
3. Assessment of visual impacts based on the following VIA rating criteria, namely:
    a. Quality of the affected environment (landscape) – the aesthetic excellence and significance of the visual resources and scenery;
    b. Viewer incidence, perception and sensitivity – the level of acceptable visual impact is influenced by the type of visual receptors.

c. Determine the Visual Absorption Capacity (VAC) – the capacity of the receiving environment to absorb the potential visual impact of the proposed development;
d. Refine the potential visual exposure (visibility) - the geographic area from which the project may be visible based on any layout changes undertaken between the Scoping and EIA Phase;
e. Shadow Flicker Assessment – based on any layout changes undertaken between the Scoping and EIA Phase, determine the affected zone caused when the shadow of an object repeatedly passes or pulsates over the same point in the landscape;
f. Determine the cumulative visual exposure - the combined or incremental effects resulting from changes caused by a proposed development in conjunction with other existing or proposed activities;
g. Visual Impact Index - the combined results of visual exposure, viewer incidence / perception and visual distance of the proposed facility. Values are assigned for each potential visual impact per data category and merged in order to calculate the visual impact index;

4. Assessment of the significance of the visual impacts, rated according to methodology outlined in Section **Error! Reference source not found.** above, which includes:
    a. Extent, duration, magnitude and probability to determine significance; and
    b. Significance considered with status (positive, negative or neutral) and reversibility (reversible, recoverable or irreversible) following decommissioning of the proposed facility.
5. Impacts will be rated before mitigation and after, assuming mitigation is possible.
6. Development of mitigation measures to reduce visual impacts and enhance any positive visual benefits, where possible.
7. Undertaking of photo simulations (in addition to the spatial analyses) in order to illustrate the potential visual impact of the proposed facility within the receiving environment.

The following methodology will be used to assess the impacts identified above during the environmental impact assessment phase:

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 - How far the visual impact is going to extend 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[3].

- (1) Very low: long distance
- (2) Low: Medium to longer distance
- (3) Medium: Regional, within the region
- (4) High: Local, within the local neighbourhoods
- (5) Very high: Site specific, within the site only

Duration - The timeframe over which the effects of the impact will be felt.

- (1) Very short: 0-1 years
- (2) Short: 2-5 years
- (3) Medium: 5-15 years
- (4) Long: >15 years
- (5) Permanent

Magnitude - The severity or size of the impact. This value is read off the Visual Impact Index maps.

- (0) None
- (2) Minor
- (4) Low

[3] Long distance = > 20km. Medium to longer distance = 10 – 20km. Short distance = 5 – 10km. Very short distance = < 5km (refer to Section **Error! Reference source not found.**).

- (6) Moderate
- (8) High
- (10) Very High

Probability - The likelihood of the impact actually occurring.
- (1) Very improbable: Less than 20% sure of the likelihood of an impact occurring
- (2) Improbable: 20-40% sure of the likelihood of an impact occurring
- (3) Probable: 40-60% sure of the likelihood of an impact occurring
- (4) Highly probable: 60-80% sure of the likelihood of that impact occurring
- (5) Definite: More than 80% sure of the likelihood of that impact occurring

Significance - The significance weighting for each potential visual impact (as calculated above) is as follows:
- (0-12) Negligible:
  Where the impact would have no direct influence on the decision to develop in the area. The impact would be of a very low order. In the case of negative impacts, almost no mitigation and or remedial activity would be needed, and any minor steps, which might be needed, would be easy, cheap, and simple.
- (13-30) Low:
  Where the impact would have a very limited direct influence on the decision to develop in the area. The impact would be of a low order and with little real effect. In the case of negative impacts, mitigation and / or remedial activity would be either easily achieved or little would be required, or both.
- (31-60) Moderate:
  Where the impact could influence the decision to develop in the area. The impact would be real but not substantial. In the case of negative impacts, mitigation and / or remedial activity would be both feasible and fairly easily possible.
- (61-80) High:
  Where the impact must have an influence on the decision to develop in the area. The impacts are of a substantial order. In the case of negative impacts, mitigation and / or remedial activity would be feasible but difficult, expensive, time-consuming or some combination of these.
- (81-100) Very High:
  Where the impact will definitely have an influence on the decision to develop in the area. The impacts are of the highest order possible. In the case of negative impacts, there would be no possible mitigation and / or remedial activity possible.

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**).

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

Table 5: Example of the impact table to be used during the assessment phase

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.

9. CONCLUSION AND RECOMMENDATIONS

The construction and operation of the proposed **Hugo WEF** will have a visual impact on potentially sensitive visual receptors especially within (but not restricted to) a 20km radius of the proposed project development site.

The greater environment with its wide open, undeveloped landscapes and a number of protected areas is considered to have a high visual quality.

Visual Absorption Capacity (VAC) of the receiving environment is deemed to be low owing to the low growing vegetation and the high contrast of the proposed wind turbines within the surrounding environment.

Homesteads and farmsteads, by virtue of their visually exposed nature, are considered to be sensitive visual receptors. Residential receptors in natural contexts are more sensitive than those in more built-up contexts, due to the absence of visual clutter in these undeveloped and undisturbed areas. Commuters and possible tourists using the main arterial and secondary roads may also be negatively impacted upon by the visual exposure to the proposed facilities, however, this intrusion would be fleeting.

The DFFE screening tool generated for the proposed Hugo WEF indicated that the Facility has an **overall very high sensitivity** owing to the fact that the site is located near top of mountains and high ridges, on slopes of more than 1:4, within 3 km of a nature reserve/protected area and within 250 m of a watercourse, as well as having a very high sensitivity for shadow flicker.

Based on the above findings, it can be found that the sensitivity of the visual environment for the proposed Hugo WEF is confirmed to be **high** due to:

- High potential for shadow flicker on residents located within 1 Km south of the proposed turbines
- Town dwellings located within 4-6km from the proposed site
- No turbines are located on slopes of more than 1:4
- Nature reserve located 5 km away
- Not located within a Renewable Energy Development Zone (REDZ)
- Low VAC of the receiving environment
- Limited built infrastructure

Turbines in the west and near the centre of the site appear to be located on the tops of mountains and tall hills which are marked as having a high sensitivity. This is generally not considered to be best practice and the placement of these turbines may need to be reconsidered. Similarly, turbines located within the 1 km buffer of the scenic roads and 500 m of homesteads should be reconsidered. The following is recommended:

- Detailed viewsheds and analysis of visual impacts is required in the EIA Phase of the project.
- Given their height, effective mitigation measures for the visual impact of the proposed wind turbines are not possible. However, impacts can be minimized to some extent in terms of where the turbines are positioned.
- Detailed mitigation measures for visual impacts as a result of associated infrastructure must be developed in the next phase of the EIA process.
- Potential relocation/repositioning of turbines located on ridges and within the identified buffers for scenic routes and homesteads.

10.REFERENCES

Council for Scientific and Industrial Research (CSIR), 2015. *The Strategic Environmental Assessment for wind and solar photovoltaic energy in South Africa.*

DEADP, Provincial Government of the Western Cape, 2011. Guideline on Generic Terms of Reference for EAPS and Project Schedules.

Oberholzer, B. (2005). Guideline for involving visual and aesthetic specialists in EIA processes: Edition 1.

DEA, 2021. *South African Renewable Energy EIA Application (REEA) Database.*

Charlier, R & Thys, A. 2016. *Wind Power—Aeole Turns Marine. 10.1002/9781119066354.ch7.*

Spies, A. 2017. *Karoo National Park: Park Management Plan for the period of 2017 – 2027.*