VISUAL IMPACT ASSESSMENT

Prepared by: Henry Holland

Date: 26 January 2016

Curriculum Vitae – Henry Holland

Profession: GIS Consultant
Date of Birth: 26 December 1968

BIOGRAPHICAL SKETCH

Henry has been doing GIS related work since 1992 when he started his M.Sc. in Geology. Since finishing his Masters he worked in Angola establishing a GIS department for a diamond exploration company, after which he worked on a freelance basis for eight years doing GIS related work and computer programming. In 2005 he established the Mapthis Trust which provides geospatial services for a range of environmental and geological companies and projects. Henry has been involved in Visual Impact Assessments (VIAs) since 1997.

TERTIARY EDUCATION

1996	M. Sc. Geology/GIS	Rhodes University
1986	B.Sc. Hons	UOFS

KEY EXPERIENCE

The table below presents an abridged list of Henry's project experience relevant to this proposal:

Completion Date	Project description	Role	Client
2015	OTGC Oil Storage Terminal BA – Visual Impact	Author	CSIR
2014	Mainstream Dealesville Solar Plants VIA, Freestate Province	Author	CSIR
2014	Mulilo Solar Plants VIA, Northern Cape	Author	CSIR
2014	Frontier SRMOP EIA	Author	CSIR
2013	Ishwati Emoyeni Wind Energy Facility VIA, Western Cape	Author	CSIR
2013	Venter Fert Composting and Fertiliser Plant	Author	Public Process Consultants
2013	Kipeto Power Line, Kenya	Author	Kipeto Energy Ltd.
2012	Ngqura Manganese Export Facility VIA, Coega, Eastern Cape	Author	CSIR
2012	Toliara Sands Mining Project VIA, Toliara, Madagascar	Author	CES
2012	Mkuze Biofuel Power Plant VIA, Mkuze, KwaZulu-Natal	Author	CSIR
2012	Vleesbaai WEF VIA, Western Cape	Author	CSIR
2012	Saldanha Desalination Plant VIA, Saldanha Bay, Western Cape	Author	CSIR
2012	Mossel Bay WEF, Western Cape	Author	CES
2012	Keimoes Solar Energy Facility, NC	Author	CSIR
2012	Douglas Solar Energy Facility, NC	Author	CSIR
2012	Richards Bay WEF VIA, KZN	Author	CES
2012	Hluhluwe WEF VIA, KZN	Author	CES
2012	Plan8 Grahamstown Wind Farm VIA, Eastern Cape	Author	CES
2012	Kipeto Wind Farm VIA, Kenya	Author	Galetech Energy Developments Ltd.
2011	Coega IDZ Zone 12 Wind Farm	Author	CSIR
2011	Haverfontein Wind Farm, Mpumalanga	Author	CES
2011	Middleton Wind Farm, Cookhouse	Author	CES
2011	Broadlands PV Plant, Humansdorp	Author	CSIR

Completion Date	Project description	Role	Client
2011	Ubuntu Wind Farm, Jeffrey's Bay	Author	CSIR
2011	Lushington Park Wind Farm, East London	Author	CES
2011	Chaba Wind Farm, Komga	Author	CES
2010	Thomas River Wind Farm and PV Park VIA, Stutterheim	Author	CES
2010	Eskom Power Line VIA, Kouga	Author	CES
2010	Laguna Bay Resort VIA	Author	CES
2010	Kouga Wind Farm VIA	Author	Arcus GIBB
2010	Electrawinds Coega Wind Farm VIA	Author	CSIR
2010	Innowind Coega Wind Farm VIA	Author	CES
2010	Jeffrey's Bay Wind Farm VIA, Jeffrey's Bay	Author	CSIR
2010	Cookhouse Wind Farm VIA, Cookhouse	Author	CES
2009	Waainek Wind Farm VIA, Grahamstown	Author	CES
2009	Coega Wind Turbine BA (Visual Input)	Author	CSIR
2009	Sierra Leone Ethanol Plant VIA	Author	CSIR
2009	NamWater Desalination Plant VIA, Swakopmund, Namibia	Author	CSIR
2009	Nooitgedagt/Coega Water Supply VIA, Motherwell	Author	SRK
2009	CDM Brewery VIA, Nampula, Mozambique	Author	CES
2009	TankaTara Preliminary Visibility Analysis, Addo	Author	CES
2008	Kouga Wind Energy Project VIA, Jeffreys Bay	Author	CSIR
2008	Aston Bay VIA	Author	CES
2008	NPA Boundary Wall VIA, Port Elizabeth	Author	CSIR
2008	Elitheni Coal Mining VIA, Indwe	Author	Savannah Environmental (PTY) Ltd.
2008	Coegakamma Chicken Broiler Housing VIA	Author	Public Process Consultants
2008	Amanzi Country Lifestyle Estate VIA, Uitenhage	Author	Public Process Consultants
2008	Coegakammaskloof Chicken Broiler Housing VIA	Author	Public Process Consultants
2008	Ngqura Manganese Terminal Pre-Feasibility VIA	Specialist Input	CSIR
2007	Visual Impact Assessment for Stuytlerville Bulk Water Supply, Baviaanskloof	Author	Anton Bok and Associates
2007	Elitheni Coal Mining Scoping VIA	Author	Savannah Environmental (PTY) Ltd.
2007	Kouga Wind Farm and Pump Station VIA	Author	CSIR
2007	Boschfontein Chicken Broiler Housing VIA	Author	Public Process Consultants

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe my qualifications, my experience, and me, and that I am available to work on this project.

_____ Date: 26/02/16

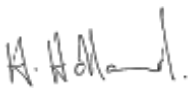
[Signature of staff member and authorized representative of the firm] Day/Month/Year

Full name of staff member: Henry Holland

SPECIALIST DECLARATION

I, Henry Holland, as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- have and will not have no vested interest in the proposed activity proceeding;
- have disclosed, to the applicant, EAP and competent authority, any material information that have 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 NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2010 (specifically in terms of regulation 17 of GN No. R. 543) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- have ensured that the names of all interested and affected parties that participated in terms of the specialist input/study were recorded in the register of interested and affected parties who participated in the public participation process;
- have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not; and
- am aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

Signature of the specialist: 

Name of company: ……

Professional Registration: ……

Date: 26 January 2016

ABBREVIATIONS AND ACRONYMS:

AMSL	Above mean sea level
DEM	Digital elevation model
DTM	Digital terrain model
EIA	Environmental Impact Assessment
EWEA	European Wind Energy Assocation
GIS	Geographic Information System
GLVIA	Guideline for Involving and Aesthetic Specialists in EIA Processes
IDP	Integrated development plan
IUCN	International Union for Conservation of Nature
I&APs	Interested and Affected Parties
REDZ	Renewable Energy Development Zone
SANBI	South African National Biodiversity Institute
SDF	Spatial Development Framework
STEP	Subtropical Thicket Ecosystem Project
ToR	Terms of Reference
VIA	Visual Impact Assessment
WEF	Wind energy facility
WPDA	World Database on Protected Areas
ZTV	Zone of Theoretical Visibility
ZVI	Zone of Visual Influence

Cumulative viewshed	A viewshed which indicates in some way how much of a development is visible from a particular viewpoint. In a raster based cumulative viewshed each pixel value will indicate how many points within the development area are visible. A power line development could, for example, use pylons as points to generate a cumulative viewshed for the development. Each pixel value in the viewshed will be a count (accumulation) of the number of pylons that will potentially be visible from that pixel.
Digital Elevation Model (DEM)	A digital or computer representation of the topography of an area.
Landscape baseline	A description of the existing elements, features, characteristics, character, quality and extent of the landscape (GLVIA 2002).
Landscape character	The distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, and how this is perceived by people. It reflects particular combinations of geology, landform, soils, vegetation, land use and human settlement. It creates the particular sense of place of different areas of the landscape (GLVIA, 2002).
Landscape character sensitivity	This provides an indication of the ability of a landscape to absorb change from the proposed development without changing character. A pristine landscape prized for its natural beauty, or a landscape of high cultural value will have high sensitivity to changes brought about by new developments.
Landscape impacts	Change in the elements, characteristics, character and qualities of the landscape as the result of development (GLVIA, 2002). These effects can be positive or negative, and result from removal of existing landscape elements, addition of new elements, or the alteration of existing elements.
Nature-based tourism	Tourism that involves travelling to relatively undisturbed natural areas with the specific objective of studying, admiring and enjoying the scenery, fauna and flora, either directly or in conjunction with activities such as trekking, canoeing, mountain biking, hunting and fishing (Turpie et al. 2005)

Principal representative viewpoints	Principal representative viewpoints are identified during the visual baseline desk study and field survey. They should be representative of the visual amenity of the area and include walking public footpaths and visiting areas of open public access. A comprehensive photographic record of these points supports the visual impact assessment (GLVIA, 2002)
Receptor	An element or assemblage of elements that will be directly or indirectly affected by the proposed development.
Sense of place	That distinctive quality that makes a particular place memorable to the visitor, which can be interpreted in terms of the visual character of the landscape. The unique quality or character of a place, whether natural, rural or urban. Relates to uniqueness, distinctiveness or strong identity (Oberholzer 2005).
Viewer sensitivity	The assessment of the receptivity of viewer groups to the visible landscape elements and visual character and their perception of visual quality and value. The sensitivity of viewer groups depends on their activity and awareness within the affected landscape, their preferences, preconceptions and their opinions.
Viewshed	A viewshed is an area of land, water, and other environmental elements that is visible from a fixed vantage point. In digital imaging, a viewshed is a binary raster indicating the visibility of a viewpoint for an area of interest. A pixel with a value of unity indicates that the viewpoint is visible from that pixel, while a value of zero indicates that the viewpoint is not visible from the pixel.
Visibility of Project	The geographic area from which the project will be visible, or view catchment area. (The actual zone of visual influence of the project may be smaller because of screening by existing trees and buildings). This also relates to the number of receptors affected (Oberholzer 2005)
Visual baseline	A description of the extent and nature of existing views of the site from representative viewpoints, and the nature and characteristics of the visual amenity of the potentially sensitive visual receptors (GLVIA, 2002)
Visual exposure	Visual exposure refers to the relative visibility of a project or feature in the landscape (Oberholzer, 2005). Exposure and visual impact tend to diminish exponentially with distance.
Visual impact	Changes to the visual character of available views resulting from the development that include: obstruction of existing views; removal of screening elements thereby exposing viewers to unsightly views; the introduction of new elements into the viewshed experienced by visual receptors and intrusion of foreign elements into the viewshed of landscape features thereby detracting from the visual amenity of the area.
Visual impact assessment	A specialist study to determine the visual effects of a proposed development on the surrounding environment. The primary goal of this specialist study is to identify potential risk sources resulting from the project that may impact on the visual environment of the study area, and to assess their significance. These impacts include landscape impacts and visual impacts.
Visual intrusion	Visual intrusion indicates the level of compatibility or congruence of the project with the particular qualities of the area – its 'sense of place'. This is related to the idea of context and maintaining the integrity of the landscape (Oberholzer 2005).
Visual receptors	Visual receptors include viewer groups such as the local community, residents, workers, the broader public and visitors to the area, as well as public or community areas from which the development is visible.
Visual resource	Visual resource is an encompassing term relating to the visible landscape and its recognisable elements which, through their coexistence, result in a particular landscape and visual character
Zone of visual influence (ZVI)	The extent of the area from which the most elevated structures of the proposed development could be seen and may be considered to be of interest (see visual envelope or viewshed).
Zone of Theoretical Visibility (ZVT)	The area over which a development can theoretically be seen (also known as a Zone of Visual Influence, visual envelope and viewshed). (horner + mclennan and Envision 2006)

EXECUTIVE SUMMARY

The visual specialist study of the Inyanda-Roodeplaat Wind Energy Facility near Uitenhage, Eastern Cape, was conducted by Henry Holland.

The landscape character of the region is highly sensitive to the proposed wind energy facility (WEF) due to the value put on the sense of remote wilderness by visitors to the Groendal Nature Reserve. Scenic views of the mountain ranges containing few man-made structures are found in the reserve as well as in the landscape surrounding the reserve.

The following sensitive visual receptors will potentially be affected by the introduction of a wind energy facility into the landscape:

- Residents and viewpoints on surrounding farms are highly sensitive since they have an active interest in the landscape that surrounds them;
- Visitors and viewpoints in the Groendal Nature Reserve are highly sensitive visual receptors since they are there to appreciate the landscape;
- Visitors and viewpoints on surrounding game farms are highly sensitive visual receptors since scenic views contribute to the sense of place of the region; and
- Motorists using the R75 can be highly sensitive visual receptors since they include tourists on their way to/from in-land attractions.

Visual exposure to the WEF will be high for farms immediately adjacent to the proposed facility, such as Mannetjie NR243 game farm, farms south of the facility along the Kwazunga River and for ridges and peaks in the adjacent Groendal Nature Reserve (on either side of the facility).

Visual exposure to the 132 kV transmission line will be high for viewers and viewpoints within 1 km of all powerline route options. This will include several farm steads and buildings on farms along the route including the farmstead on the game farm at Mannetjie NR 243 for the preferred route and Option 1. Viewpoints on Steenbok Vlakte game farm will also be highly exposed to Option 1. Farmsteads, buildings and viewpoints on Adolps Poort West, Toverklip and Schuilpatdop game farms will be highly exposed to a transmission line along Option 2. Motorists using the R75 will be highly exposed to transmission lines along any of the routes. Visual exposure to transmission lines along any of the routes will be low for visual receptors in Groendal Nature Reserve.

Visual receptors on farms and game farms surrounding the WEF will experience high visual intrusion on their existing views from wind turbines at the proposed site, and from transmission lines along any of the routes if the receptors are highly exposed to them. Visual receptors in Groendal Nature Reserve will experience high visual intrusion on existing views from wind turbines on the proposed site, but low visual intrusion from transmission lines along any of the proposed routes since views will be downwards and power lines will be against a dark or mottled vegetation background.

The significance of visual intrusion of construction activities associated with wind turbines on existing views of sensitive visual receptors will be very high negative before mitigation and medium negative if mitigation measures can be successfully implemented. Access roads to wind turbines should be very carefully planned in order to minimize road cuttings where high slopes require them and to eliminate them from highly visible areas.

The significance of visual intrusion of construction activities associated with overhead transmission lines on existing views of sensitive visual receptors is low negative before and after mitigation.

The significance of the impact of a wind energy facility on a landscape valued for its sense of remote wilderness and scenic views is very high negative. There are no mitigation measures to lower the impact.

The significance of visual intrusion of highly visible wind turbines on the existing views of sensitive visual receptors is very high negative and mitigation measures are unlikely to reduce the impact.

The significance of intrusion of obstruction lights associated with a wind energy facility on the nightscape of the surrounding region is very high and since the lights are required by law mitigation cannot lower the impact.

The significance of intrusion of transmission lines on the existing views of sensitive visual receptors is very high negative. Mitigation measures can lower the visual intrusion of the power line for some sensitive visual receptors but not for all and the significance will be very high after mitigation.

The significance of visual intrusion of decommissioning activities associated with the WEF and transmission lines will be the same as for construction activities.

The significance of cumulative visual impacts will be low due to the distances between the proposed site and the nearest other wind energy projects (Innowind Grassridge at 43 km and Ukomeleza at 38 km).

Powerline Route Option 2 is preferred as the least impactful of the options in terms of visual impact but the significance of visual intrusion on existing views of sensitive visual receptors is still very high for this route.

The very high significance rating for the potential visual and landscape impacts identified in this report indicates that the proposed site for the Inyanda Roodeplaat WEF is not ideal in terms of landscape and visual considerations.

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Visual Impact Assessment

1.1 INTRODUCTION

This report presents the visual specialist study prepared by Henry Holland as part of the Environmental Impact Assessment (EIA) for the Inyanda-Roodeplaat Wind Energy Facility (WEF) north-east of Uitenhage, Eastern Cape.

1.1.1 Scope of work and terms of references

The scope of work for the Inyanda-Roodeplaat WEF visual impact assessment includes the following:

- A description of the approach and methodology used in the assessment;
- A short description of the proposed facility with emphasis on the components that are likely to affect sensitive visual receptors;
- A brief description of the existing landscape and its sensitivity to the proposed development;
- Identification of sensitive visual receptors in the surrounding landscape and their potential sensitivity to the proposed development;
- Identification of visual issues and impacts that are likely to arise due to the proposed development;
- Mitigation measures that can be implemented to reduce, enhance or avoid potential visual impacts identified in the course of the study.

The terms of reference for the Visual Impact Assessment are as follows:

- Review detailed information relating to the project description and precisely define the environmental risks to the landscape and the risks to sensitive viewers, as well as the consequences thereto.
- Conduct a site visit and undertake a Photographic Survey of the surrounding region from which the landscape and visual baselines can be prepared.
- Compile a baseline description of the visual character/baseline and the landscape of the affected area.
- Undertake data preparation and the visibility analysis, which includes the calculation of viewsheds for various elements of the proposed development. Identify principal viewpoints and sensitive visual receptors.
- Identify and rate potential direct, indirect and cumulative impacts on the landscape and on sensitive viewers/receptors for the construction, operation and decommissioning phases of the proposed project. Study the cumulative impacts of the project by considering the impacts of existing industries within the area, together with the impact of the proposed project.
- Provide input to the Environmental Management Programme (EMPr), including mitigation and monitoring requirements to ensure that the visual impacts on the principal viewpoints and sensitive viewsheds are mitigated.

1.1.2 Study Approach

This Visual Impact Assessment (VIA) is based on guidelines for visual assessment specialist studies as set out by South Africa's Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) (Oberholzer 2005) as well as guidelines provided by the Landscape Institute of the UK (GLVIA 2002).

A visibility analysis was conducted for the region surrounding the proposed development site (within 20 km) and components of the development relevant to assessment of the potential visual impact to identify key representative viewpoints and sensitive visual receptors. A site visit and photographic survey of this region followed (12 June 2015) to establish a baseline for visual resources to compare the proposed developments against. Spatial development frameworks (SDF) and integrated development plans (IDP) for the relevant municipalities were studied to align the visual impact assessment with municipal objectives in terms of landscape and visual resources.

1.1.3 Information Sources

The Visual Impact Assessment is based on the following information:

- Documentation supplied by the Applicant and SRK.
- Digital topocadastral data at 1:50 000 scale from the National Geo-spatial Information database[1]
- National land cover data set (SANBI 2009).
- Google Earth software and data.
- Eskom SPOT Building Count data set of (de la Rey 2008).
- Garmin map data (2013) for 'points of interest' layer.
- Spatial development framework (SDF) documents for the Eastern Cape Province, Sarah Baartman District Municipality (DM) (formerly Cacadu DM), Sundays River Valley Local Municipality (LM) and Baviaans LM.

1.1.4 Assumptions and Limitations

1.1.4.1 Assumptions

Mitigation Measures

Mitigation measures in this report will assume that construction activities are managed and performed in such a way as to minimise its impact on the receiving environment.

The following assumptions, in particular, apply since they are relevant to minimising visual impact during the construction phase:

- The contractor will maintain good housekeeping on site to avoid litter and minimise waste;
- Project developers will demarcate construction boundaries and minimise areas of surface disturbance;
- Vegetation and ground disturbance will be minimised and advantage taken of existing clearings;

[1] http://www.ngi.gov.za

- Construction of new roads will be minimised and existing roads will be used where possible;
- Topsoil from the site will be stripped, stockpiled, and stabilised before excavating earth for the construction of the facility;
- Vegetation matter from vegetation removal will be mulched and spread over fresh soil disturbances to aid in rehabilitation process;
- Plans will be in place to control and minimise erosion risks;
- Plans will be in place to minimise fire hazards and dust generation; and
- Plans will be in place to rehabilitate cleared areas as soon as possible.

Further, night lighting of buildings and substation will minimize light pollution such as glare and light spill (light trespass) by:

- Using light fixtures that shield the light and focus illumination on the ground (or only where light is required);
- Using minimum lamp wattage within safety/security requirements;
- Avoiding elevated lights within safety/security requirements;
- Where possible, using timer switches or motion detectors to control lighting in areas that are not occupied continuously (if permissible and in line with minimum security requirements); and
- Switching off lights when not in use in line with safety and security.

Cumulative Impacts

Most Renewable Energy projects currently in progress or authorised in the region are more than 40 km from the proposed site[2]. The Innowind Grassridge Wind Farm is 43 km from the nearest turbine position of the Inyanda-Roodeplaat layout near Coega, and is the only wind farm that has been built in this region to date. It contains 20 wind turbines. A wind farm adjacent to the Grassridge wind farm has been authorised but construction has not yet started. This wind farm (Ukomeleza Wind Power) will be approximately 38 km from the Inyanda-Roodeplaat site.

1.1.4.2 Limitations

Spatial Data Accuracy

Spatial data used for visibility analysis originate from various sources and scales. Inaccuracy and errors are therefore inevitable. Where relevant these will be highlighted in the report. Every effort was made to minimize their effect.

Viewshed calculations

Calculation of the viewsheds does not take into account the potential screening effect of vegetation and buildings. Natural vegetation in the region will provide little screening opportunities for the proposed development, although most farmsteads are surrounded by high exotic trees which may limit views of the WEF. Neighbouring buildings in urban/built-up areas may also limit views from these areas. Viewsheds do not take these aspects into account.

[2] Renewable Energy data for South Africa available here: https://redzs.csir.co.za/

Viewsheds are calculated using a digital elevation model (DEM) which is derived from contour lines with a 5 m vertical distance between contours. The DEM has a pixel resolution of 20 m x 20 m and covers a 40 km x 40 km area. The study area for this assessment covers a region within 20 km of the proposed development.

Simulated views and Photomontages

In this report a simulated view will be defined as a view generated by using 3D computer software using an elevation model and aerial photography. A photomontage is a landscape photograph onto which images of the wind turbines are placed using software which maintains the accurate spatial positions of the turbines and their scale in relation to their distance from the point at which the photograph was taken. The photomontage images used in this report were compiled using landscape photographs taken specifically for this purpose. Simulated views were produced using 3D modelling software (Visual Nature Studio (VNS) 3 from 3D Nature -http:/3dnature.com/), and a digital elevation model (DEM) interpolated from contours as discussed in Viewshed Calculation above. The accuracy of presenting a wind farm as a photomontage is limited to permutations of several variables including DEM resolution and derivation methodology, ability of 3D software to accurately model the landscape, as well as photomontage processing.

1.2 PROJECT DESCRIPTION: VISUAL IMPACT ASSESSMENT

1.2.1 Construction/Decommissioning Phase

All components of the proposed WEF are likely to cause some visual impact during the construction and decommissioning phases as the region is remote and the increase in traffic and workers is likely to be noticed. Construction of very tall structures against the skyline is likely to be highly visible for long distances. Large vehicles and construction equipment will be introduced into a relatively quiet rural landscape. Soil and rock will be exposed where vegetation is cleared for roads and structures in potentially highly visible areas. Construction activities along the overhead power line route will also affect visual receptors in the region. Construction activities and camps will move with the section of the line that is being constructed, which means that the high visual exposure region of the construction of the line and the visual receptors potentially affected by the activity will also move.

It should be noted that construction and decommissioning phases are temporary and are unlikely to last more than two years (with construction of the highly visible components taking less time). Certain construction activities are however likely to cause long term to permanent changes to the visual landscape. These include road cuttings and other areas cleared of vegetation and levelled where slopes are steep. Rehabilitation of these areas is unlikely to completely restore the landscape to its current state and vegetation recovery will take a long time.

1.2.2 Operational Phase

The following components of the wind energy facility are relevant to the visual impact assessment and are likely to be responsible for most visual issues:

- The wind energy facility will consist of 55 wind turbines each up to 150 metres high as measured to the tip of a rotor blade (the tower is 85 m high (hub height) and a rotor blade is up to 60 m long);
- Single storey buildings to house control instrumentation and store maintenance equipment will be required, as well as an on-site substation (132 kV);
- Internal access roads to each turbine – 6 m wide;
- 132 kV overhead transmission lines from the on-site substation to the substation near the R75 to connect the WEF to the Eskom grid. Three alternative routes are proposed, the preferred route is approximately 35 km long, Option 1 approximately 42 km and Option 2 approximately 45 km. Power line towers will be between 24 m and 28 m high.

Table **Error! No text of specified style in document.**-1 Heights of components relevant to potential visual impact.

Component	Height (m)
Wind Turbine (Rotor Tip)	150
Buildings	5
On-site Substation	28
132 kV Overhead Transmission Line	28

Potentially the most intrusive components of the proposed development, the wind turbines are the biggest concern in terms of visual and landscape impact. The hub height will be up to 100 m high and the rotor tip height (the top of the highest blade when it is vertical) will be up to 165 m. Wind turbines tend to be placed on or near to ridges in elevated positions. They are light grey to white and also tend to be exposed above the skyline for most viewers. The moving parts (rotor) are large and draw attention to themselves because of their movement. Wind farms or wind energy facilities are not yet common in South African landscapes (although that is changing now and in future they will be very familiar sights in some regions of the country).

The other major component that is likely to cause concern in terms of visual impact is the overhead transmission lines which connects the WEF with the Eskom grid. Power lines are very familiar features of most South African landscapes but they have a negative effect on the aesthetics of most landscapes and scenic views. 132 kV power lines have towers of up to 28 m high and the shortest proposed route is 35 km long through a region with few, if any, high voltage transmission lines.

Internal access roads will be required during construction for hauling turbine components and cranes to specific sites. They will also be required as long term access for operational and maintenance needs over the lifetime of the WEF, and eventually they will be used during the decommissioning phase or during upgrading of the facility when larger turbines are installed. The terrain on which the WEF will be installed is highly variable and it is likely that steep slopes will be encountered when constructing these roads. Road cuttings are therefore likely and these will potentially be highly visible in the landscape as they will contrast sharply with the non-weathered rock and vegetation of their surroundings. They are also likely to be permanent changes to the landscape.

Wind turbines are tall structures and are required by law to be lit at night as they represent a hazard to aircraft[3]. Not all turbines will necessarily have a light (it depends on the layout of the WEF) but it is likely that at least 24 turbines will have a navigation/obstruction light mounted on their hubs or

[3] http://209.203.9.244/lexisnexis/lnb.asp?/jilc/ubxe/jp5yc/kp5yc/n7c8c/zbd8c#5

nacelles. Obstruction lighting consists of medium intensity aviation red flashing lights (2000 candela). The lights are unlikely to add to sky glow at night but they will potentially affect sensitive visual receptors and will introduce lights into an area with very few existing lights. The fact that the lights are flashing and not constant is also likely to attract attention to them.

The potential visual intrusion of on-site buildings and substation are likely to be much less than the other aspects of the WEF as discussed above and their contribution to the visual and landscape impacts are expected to be minimal due to their size and height compared to the other components.

1.3 DESCRIPTION OF THE AFFECTED ENVIRONMENT: VISUAL IMPACT ASSESSMENT

The topography of the study area is dominated by the Groot Winterhoek and Elands Mountains. The proposed site for the development is located in the Groot Winterhoek Mountains at heights of between 800 and 1000 m. Valleys are deeply incised by a large network of rivers of which the Sand, Elands, Swartkop and Kariega Rivers are the most prominent in the study area (Figure 1-1[4] and Figure 1-2). The Sand, Elands and Swartkop Rivers drain towards the south, while the Kariega River is a tributary of the Sondags River to the north. The mountain ranges are roughly parallel to each other and are part of the Cape Fold Mountains. Rivers tend to form a trellis pattern between these mountain ranges.

[4] All maps in the report duplicated in the Maps section at the end of the report on A3 Landscape format.

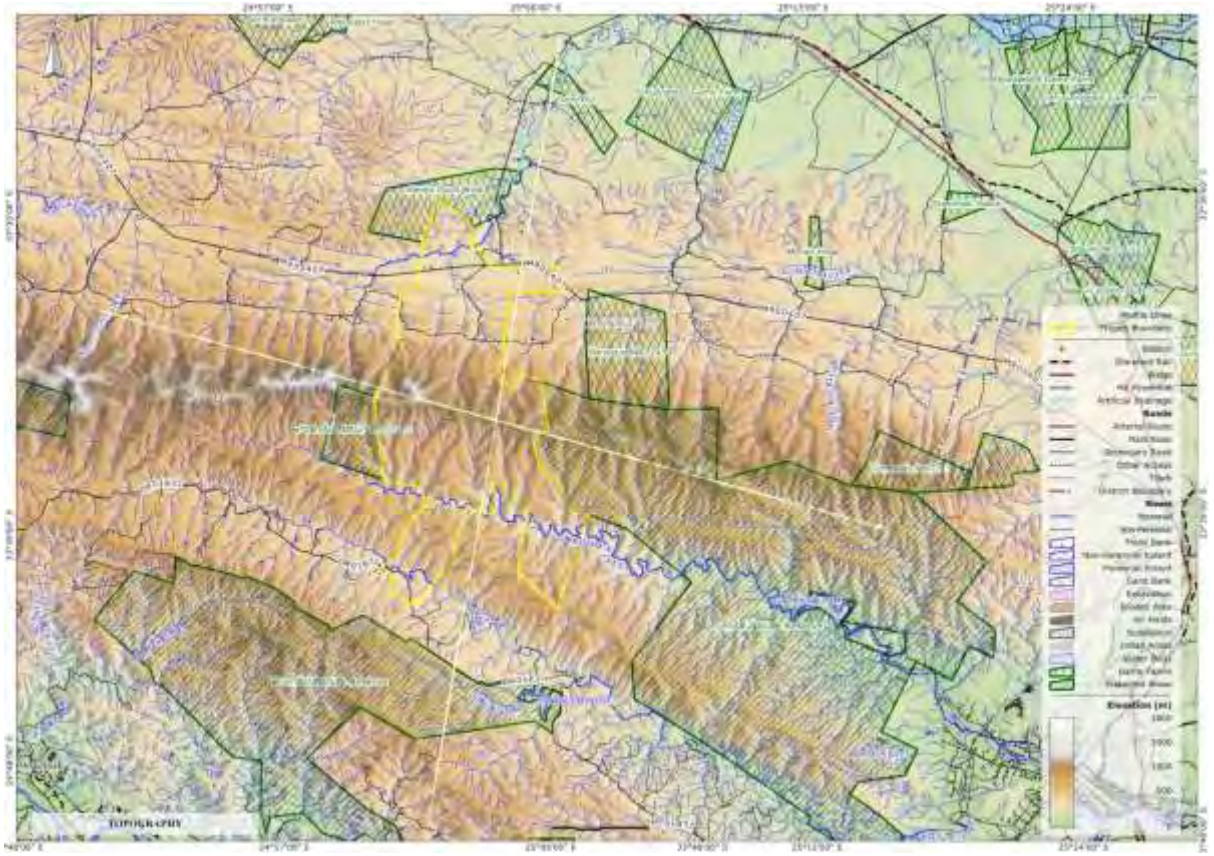


Figure **Error! No text of specified style in document.**-1 Topographic map of the region surrounding the proposed WEF.

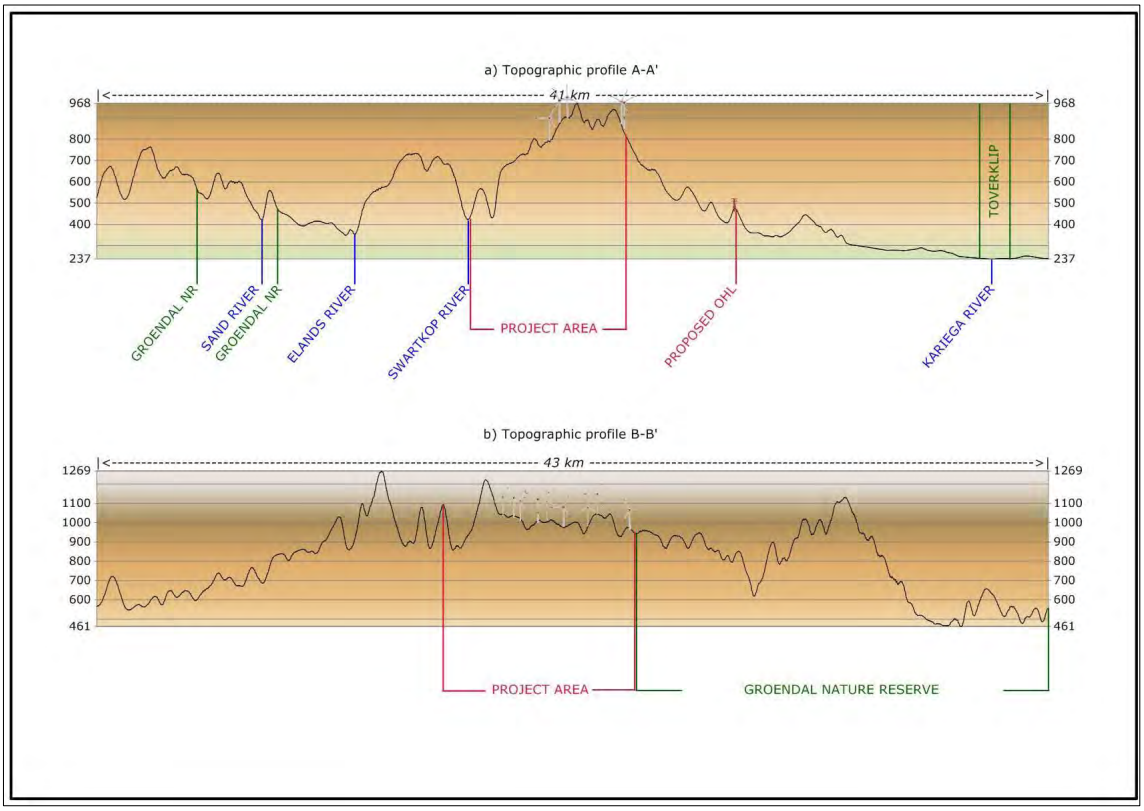


Figure **Error! No text of specified style in document.**-2 Topographic profiles along lines shown on the topographic map.

The mountains are underlain by quartzitic sandstone layers of the Peninsula Formation which belongs to the Table Mountain Group (Figure 1-3). Quartzite is a hard erosion resistant rock formed by metamorphism of silica rich sands and sandstone layers. The proposed site is located on rocks from this stratigraphic unit. Fractures and joints in the quartzitic layers were exploited by rivers and streams over geological time, and softer rock units rich in shales below the Peninsula Formation were preferentially eroded to form deep valleys.

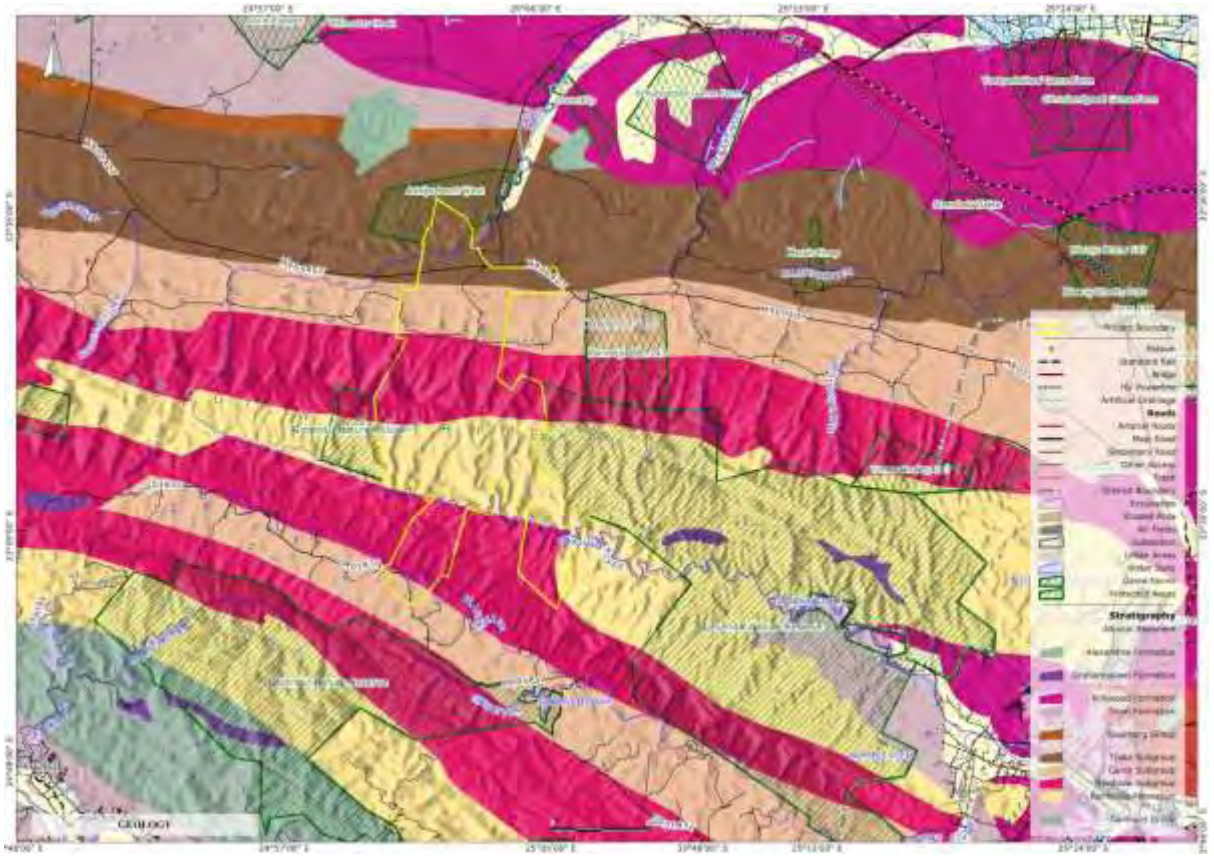


Figure **Error! No text of specified style in document.**-3 Simplified geology of the region proposed for the development.

The study area is mostly covered in natural vegetation according to the Land Cover dataset of 2009, but the Biodiversity Sector Plan for the Sundays River Valley Municipality indicates that much of this natural vegetation north of the study site has been degraded to some degree by over-grazing, intensive agriculture and/or invasion of alien plants (Vromans et al. 2012) (Figure 1-4). The Elands River floodplain south of the study area is under irrigated cultivation.

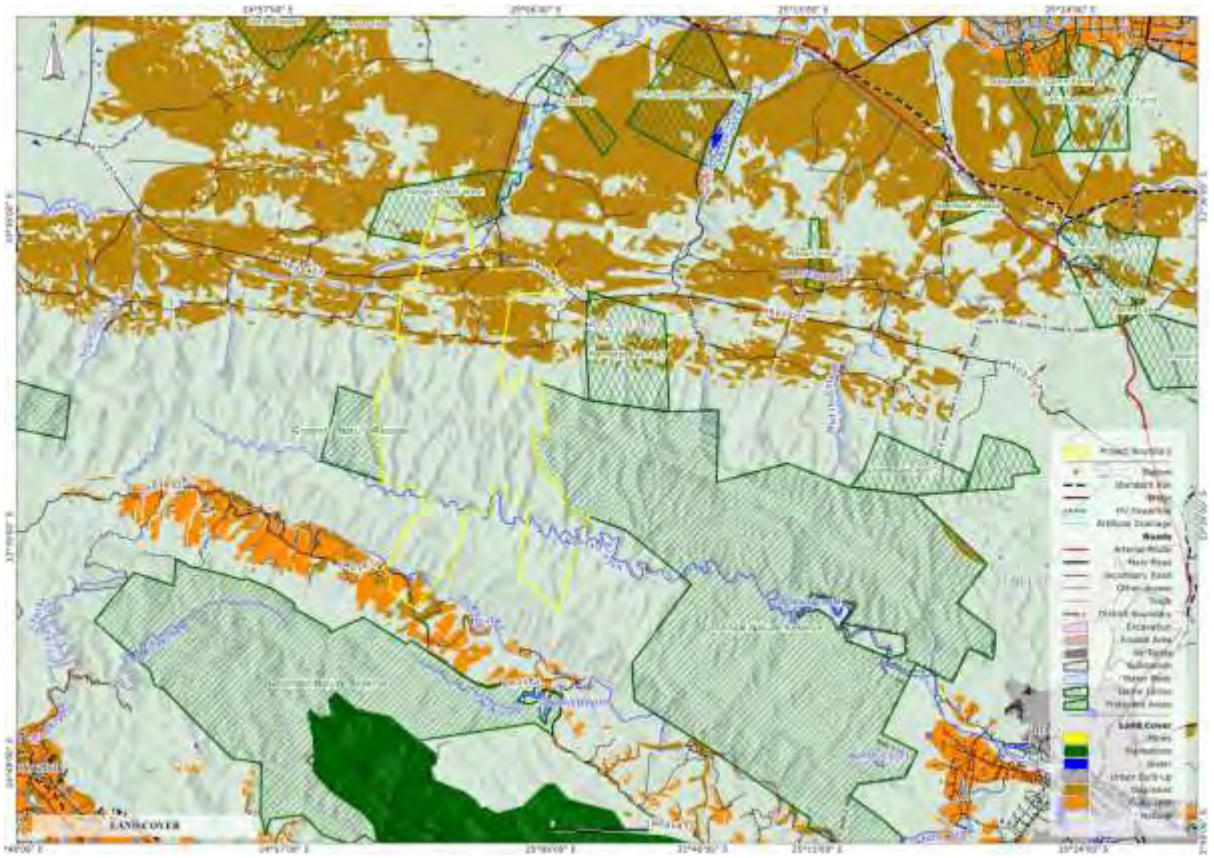


Figure **Error! No text of specified style in document.**-4 Land cover (combination National Land Cover 2009 and that of the Biodiversity Sector Plan for the Sundays River Valley Municipality 2012) of the region surrounding the proposed development site.

There are three settlements in the surrounding landscape, all more than 20 km from the proposed development (Figure 1-5). Kirkwood in the north-east is a commercial centre for agricultural communities in the Sundays River valley and is a major node in the municipality. Uitenhage is a major town in the south-east with commercial and industrial services which forms part of the Nelson Mandela Bay Metropolitan Municipality. Patensie, south-west of the proposed WEF site, is an agricultural service centre for communities farming along the Gamtoos River in the Kouga Municipality. The Elands River floodplain just south of the proposed WEF site is under intensive irrigated cultivation and is relatively densely populated with small farm properties. Farms north of the proposed site are larger and were traditionally used for stock farming such as sheep and cattle. These have mostly been, or are in the process of being, converted to game farms[5] which offer hunting safaris or, less often, eco-tourism opportunities and photographic safaris (Cacadu DM 2009).

The Groendal Nature Reserve (formerly the Groendal Wilderness Area) covers a large part of region surrounding the proposed site. The proposed WEF will be bordered on two sides by sections of the reserve along the Groot Wintershoek Mountains. The Baviaanskloof Nature Reserve is less than 20 km west of the proposed project boundary along the same mountain range (although it is more than 20 km from the nearest wind turbine position on the most recent wind farm layout). Groendal and Baviaanskloof are both provincial nature reserves, and the Baviaanskloof Nature Reserve is a World Heritage Site. It is clear from the map that these areas along the mountain range are very sparsely

[5] The database on game farms in the region is out of date and it is most likely that there are currently more game farms than is indicated on the maps in this report (based on Google Earth data).

populated. Both reserves are known and marketed for their remote wilderness character and scenic views. Activities promoted in the reserves include hiking, mountain climbing, wildlife photography and scenic drives. The Addo Elephant National Park is more than 20 km north of the proposed project boundary and more than 30 km north of the nearest wind turbine position.

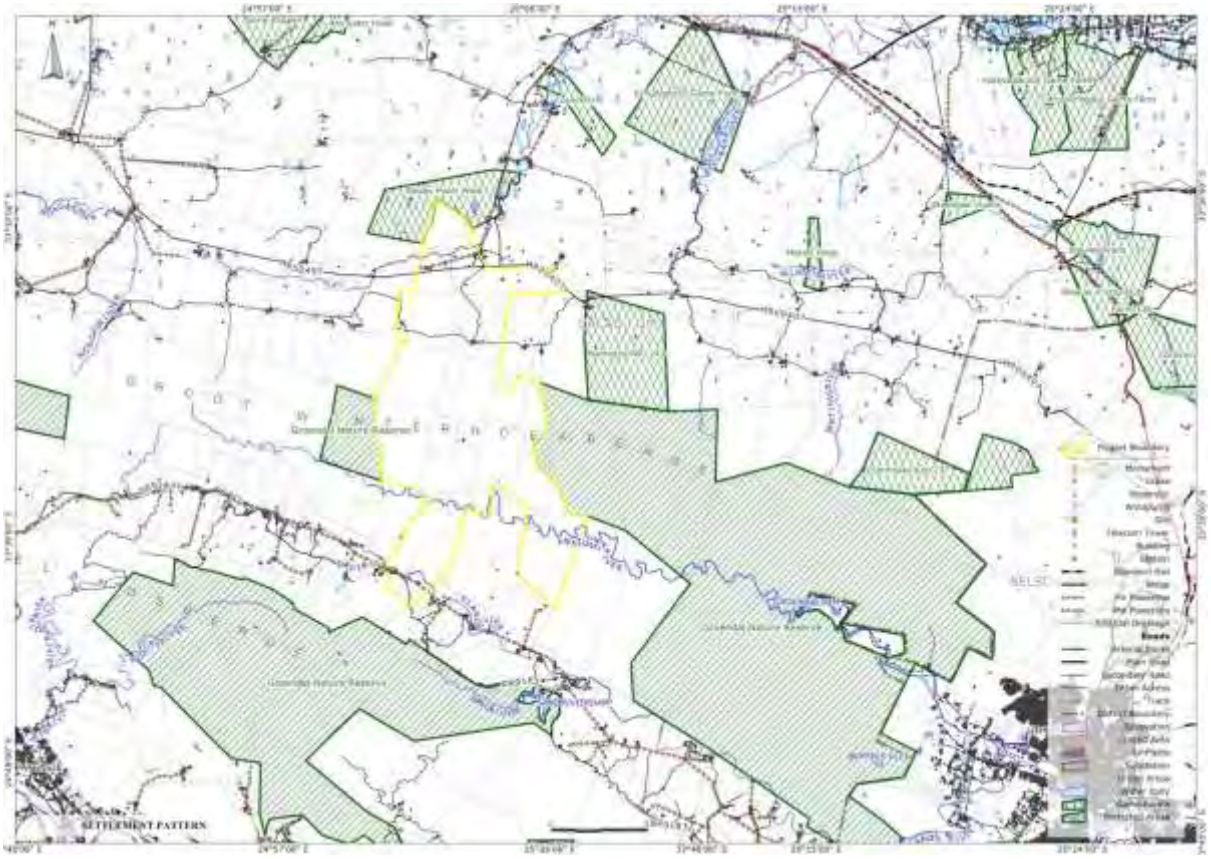


Figure **Error! No text of specified style in document.**-5 Settlement patterns and man-made structures in the region surrounding the proposed development.

The R75 is a major road connecting Uitenhage and Port Elizabeth with Middelburg, Cradock and other settlements in the interior. It is a major route for freight logistics and provides access to tourist destinations in the Karoo (the Cacadu SDF recognises the R75 as a Tourism Route(Cacadu DM 2013)). It passes approximately 20 km north-east of the proposed site. The MR00407 and DR01831 are unpaved/gravel roads providing farming communities between the mountain ranges with access to the R75 and Uitenhage.

The R75 also provides a corridor for high voltage power lines and a railway line. There are a number of small substations along the route. The proposed 132 kV overhead line for the WEF will connect to the grid at one of the substations near the R75.

The close proximity of the Groendal and Baviaanskloof Nature Reserves to the proposed wind energy facility and the value put on their sense of remote wilderness with scenic views indicate that the landscape character is **highly sensitive** to the proposed development. It is clear from the settlement pattern along the mountain ranges that there are very few man-made structures and buildings that currently detract from the sense of place of these reserves.

1.4 IDENTIFICATION OF KEY ISSUES AND POTENTIAL IMPACTS

1.4.1 Key Issues Identified During the Scoping Phase

Interested and Affected Parties (I&APs) foresee the following potential key issues:

- Visual and aesthetic impacts, impact on the sense of place of the region and specifically on scenic views in the Groendal Nature Reserve that will potentially be affected by wind turbines;
- The potential visual impact and impact on sense of place of the 132 kV overhead lines from the proposed WEF to their connection to the Eskom grid; and
- Visual intrusion of wind turbines on the existing views of hikers, nature lovers and birders.

1.4.2 Identification of Potential Impacts

Features at risk of impact in a visual impact assessment are the landscape and sensitive visual receptors in the landscape.

1.4.2.1 Landscape

A landscape impact occurs when a development alters the existing landscape character. If the landscape character is highly sensitive to the development type then the intensity of the impact will be high. A high intensity landscape impact will be highly significant if the landscape character type is scarce as well as highly valued by the community (local, regional, national and international). Vistas of natural landscapes uninterrupted by man-made structures and activities are a limited resource that is recognised by most communities as worth protecting. The IUCN protected area management category V, for instance, refers to Landscape/seascape conservation and its primary objective is '*to protect and sustain important landscapes/seascapes and the associated nature conservation and other values created by interactions with humans through traditional management practices*'[6]. The landscape impact does not depend only on the existing sensitive visual receptors since it can also affect future visual receptors and communities beyond the local or regional context. The landscape to which the proposed WEF will be introduced is **highly sensitive** to the development as discussed in section 1.3 above.

1.4.2.2 Sensitive Visual Receptors

Residents and viewpoints on surrounding farms

Farmsteads and viewpoints on surrounding farms can potentially have views on the proposed WEF and/or overhead transmission lines. Existing views towards the proposed WEF site can potentially be scenic and highly valued by residents since the site is elevated and located on a mountain range. Residents are **highly sensitive** visual receptors since they have an active interest in the landscape that surrounds them.

[6]http://www.iucn.org/about/work/programmes/gpap_home/gpap_quality/gpap_pacategories/gpap_category5/

Visitors and viewpoints in Protected Areas

Groendal and Baviaanskloof Nature Reserves are known and marketed for their scenic views of wilderness and remote landscapes. Trails and hiking are promoted for scenic views among other things. International tourists are regular visitors to the reserves at least in part due to the scenic views and sense of remoteness. Baviaanskloof Nature Reserve is more than 20 km from the proposed site and although some ridges in the reserve (including Cockscomb) fall within the viewshed, wind turbines are unlikely to be noticed from the reserve. The longer hiking trails in Groendal Nature Reserve are likely to bring sensitive visual receptors into close proximity to the proposed WEF and hikers will have clear views of wind turbines from ridges just east of the site. These visitors and viewpoints are therefore **highly sensitive** visual receptors (Oberholzer 2005).

Visitors and viewpoints on surrounding game farms

Most farms in the region, particularly north of the proposed WEF site, are converting or have been converted to game farms where hunting safaris have become the main source of income. The natural vegetation has been degraded to some degree in much of this region due to previous farming practices, but rehabilitation and protection of the natural environment is now in the interest of the community. Existing views from viewpoints on game farms towards the proposed site are potentially highly valued for their scenic qualities. These visual receptors are **highly sensitive** since scenic views contribute to the sense of place.

Residents of towns in the surrounding region

Kirkwood, Uitenhage and Patensie are more than 30 km from the nearest wind turbine and most views from these towns will include many other man-made structures – views will tend to be complex with highly contrasting elements. Visual receptors in urbanised areas are **moderately** sensitive to changes in the surrounding landscape.

Motorists

DR01831 and MR00407 are unpaved/gravel roads but they provide residents of farms, as well as visitors to game farms and nature reserves, access to towns, particularly Uitenhage and Port Elizabeth. It is likely that motorists using the two gravel roads are mainly residents on farms. The R75 is a major arterial route connecting PE with the interior. Motorists pass through a region and tend to have their attention focused on the road, but residents and tourists, particularly as passengers, will have an interest in the surrounding landscape. The gravel roads are unlikely to be driven at a fast speed and views from the roads can potentially be highly valued as they pass through scenic landscape. Some motorists will therefore be **highly** sensitive visual receptors.

1.4.2.3 Construction Phase

- Potential visual intrusion of construction activities associated with wind turbines on existing views of sensitive visual receptors in the surrounding landscape
- Potential visual intrusion of construction activities associated with overhead transmission lines on existing views of sensitive visual receptors in the surrounding landscape

1.4.2.4 Operational Phase

- Potential impact of a wind energy facility on a landscape valued for its sense of remote wilderness and its scenic views
- Potential visual intrusion of highly visible wind turbines on the existing views of sensitive visual receptors in the surrounding landscape
- Potential visual intrusion of high voltage overhead transmission lines on the existing views of sensitive visual receptors in the surrounding landscape
- Potential intrusion of obstruction lights associated with a wind energy facility on the nightscape of the surrounding region

1.4.2.5 Decommissioning Phase

- Potential visual intrusion of decommissioning activities associated with a wind energy facility on the existing views of sensitive visual receptors in the surrounding landscape
- Potential visual intrusion of decommissioning activities associated with overhead transmission lines on the existing views of sensitive visual receptors in the surrounding landscape

1.4.2.6 Cumulative impacts

- Potential cumulative visual impact of wind energy facilities on existing views of sensitive visual receptors in the region

1.5 PERMIT REQUIREMENTS, LEGISLATION AND GUIDELINES

There are no permit requirements for wind energy facilities in terms of visual or landscape impacts.

1.5.1 Legislation

The following legislation and local and district municipal plans are applicable to the proposed project:

- The National Environmental Management Act (NEMA) and the Regulations in terms of Chapter 5 of NEMA. (Act No.107 of 1998);
- The Protected Areas Act (PAA) (Act 57 of 2003, Section 17) which refers to the conservation and protection of natural landscapes;

1.5.2 Development Frameworks and Guidelines

Cacadu SDF (Cacadu DM 2013) and (Cacadu DM 2009)

The region in which the proposed wind farm will be built is recognised in the SDF as having '*rich tourism potential – not fully utilised.*'

Sundays River Valley SDF (SRV LM 2011)

Under Protection and Enhancement of the Environment a '*development should not be permitted if it will…cause unacceptable visual damage*' and under Conservation Land Use Policy the following guidelines apply:

- Development should not be permitted in the sensitive landscape area unless it is compatible with the conserving and the enhancing of the areas landscape character.
- Proposed developments located outside and in close proximity to conservation concerns and areas should be carefully considered not to detract from the conservation worthiness and visual impacts with respect to existing conservation areas.

Baviaans SDF (Baviaans LM 2015)

Alternative energy production is mentioned under Spatial goal 3: Sustainable Resource Use:

'*Green energy production developments (Solar and wind) are supported in principle provided that any negative impacts on the tourism and agricultural economy are avoided. These developments, particularly wind energy production facilities, have a high visual impact on the surrounding area and should be located away from existing and future tourism focus area*'.

Strategic Initiative to Introduce Commercial Land Based Wind Energy Development to the Western Cape (PGWC and CNdV Africa 2006)

The initiative provides guidelines for the placement of wind energy facilities in the Western Cape and is provided for reference. Among the guidelines are setback distances which are useful when siting a WEF. The following setback distances are potentially relevant to this study:

Table **Error! No text of specified style in document.**-2 Setback distance guidelines (PGWC and CNdV Africa 2006)

Features	Setback Distance	Notes
Local Roads	500 m	To be mapped at project level and reviewed if it has high scenic value
Provincial Tourist Routes	4 km	Statutory scenic drives
Local Tourist Routes	2.5 km	Assumption made for local importance. Can be reduced
National Parks + Provincial Nature Reserves	2 km	Should be eliminated at regional level
Mountain Catchments	500 m	To be captured at local level
Protected Natural Environment	2 km	Should be eliminated at regional level
Private Nature Reserves	500 m	Can be negotiated at local level
Distance from Ridge Lines		Major ridgelines eliminated at regional level, local level to identify ridgelines / skyline issues.

1.6 ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

1.6.1 Visual Impact Concepts and Assessment Criteria

The assessment of potential impacts for the wind energy facility is conducted in the following steps:

- Identification of visual impact criteria (key theoretical concepts);
- Conducting a visibility analysis; and
- Assessment of impacts of the project on the landscape and on receptors (viewers) taking into consideration factors such as viewer sensitivity, visual exposure and visual intrusion.

The potential visual impact is assessed using a number of criteria which provide the means to measure the intensity of the visual impact. The intensity and other criteria such as spatial extent and duration of the impact are then used to determine its potential significance (Oberholzer, 2005). The visibility of the project is an indication of where in the region the development will potentially be visible from. The rating is based on viewshed area size and is an indication of how much of a region will potentially be visually affected by the development. A high visibility rating does not necessarily signify a high visual impact, although it can if the region is densely populated with sensitive visual receptors. Viewer (or visual receptor) sensitivity is a measure of how sensitive potential viewers of the development are to changes in their views. Visual receptors are identified by looking at the viewshed of the proposed development, and include scenic viewpoints, residents, motorists and recreational users of facilities within the viewshed. Their distance from the development (visual exposure) and the composition of their existing views (visual intrusion) will determine impact intensity.

1.6.1.1 Visibility Ratings

Visibility is the geographic area from which the project will be visible, or view catchment area. The actual zone of visual influence of the project is likely to be smaller because of screening by existing trees and buildings. The number of visual receptors in the viewshed has an influence on the visibility rating (Oberholzer, 2005).

- *High* - visible from a large area (e.g. several square kilometres).
- *Moderate* – visible from an intermediate area (e.g. several hectares).
- *Low* – visible from a small area around the project site.

Table **Error! No text of specified style in document.**-3 Viewshed sizes and number of buildings in viewsheds per component

Component	Viewshed Size (km^2)	Number of Buildings in Viewshed
Wind Turbines (20 km distance)	143	934
OHL Preferred Route (10 km distance)	116	847
OHL Route Option 1 (10 km distance)	106	769
OHL Route Option 2 (10 km distance)	159	907

Wind Turbines

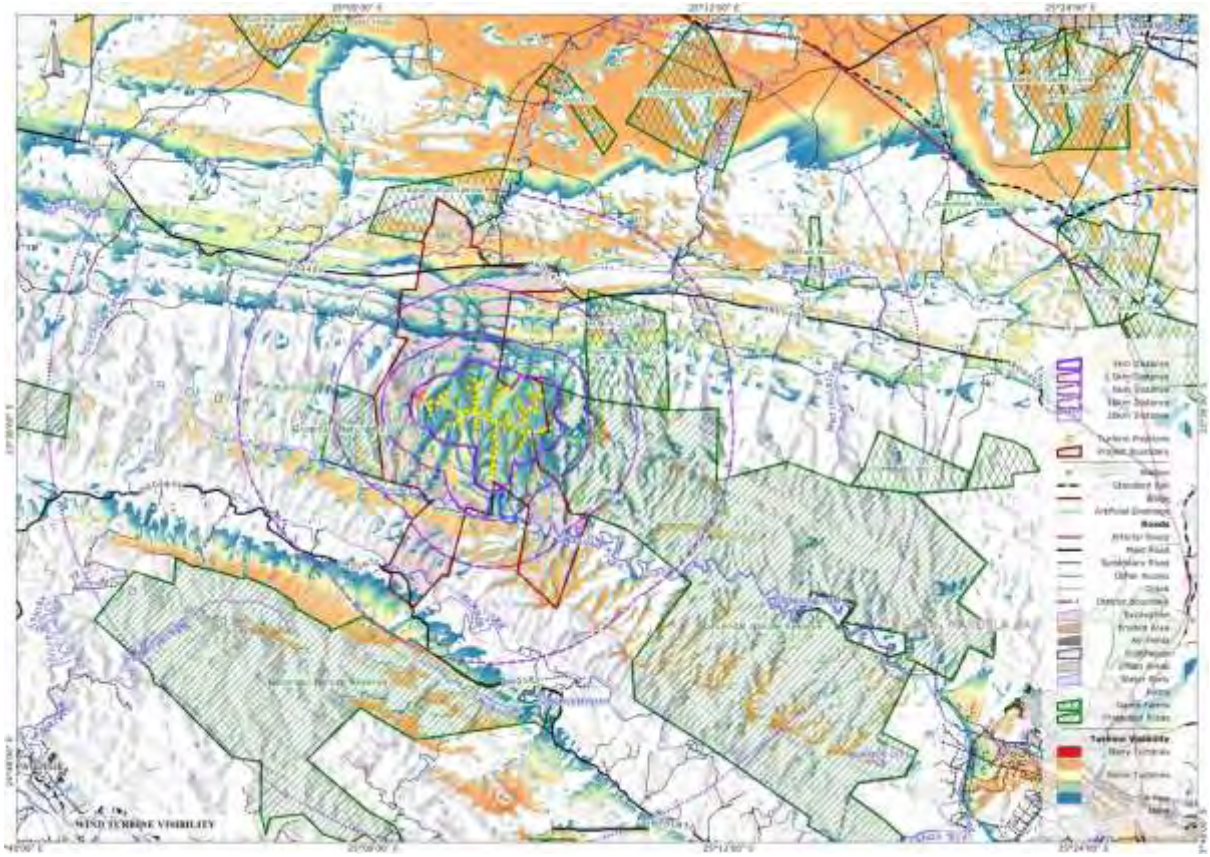


Figure **Error! No text of specified style in document.**-6 Cumulative Viewshed of wind turbines

Wind turbines will potentially be **highly** visible in the surrounding region in terms of viewshed area although topographic screening is significant particularly in the valleys just north and south of the site (Figure 1-6). Visibility in the Groendal Nature Reserve is also limited by the highly variable topography. Viewers further away (particularly to the north) are more likely to be in the viewshed than those in closer proximity – this region includes several game farms. Scenic viewpoints are often in elevated positions and topographically higher points are more likely to be in the viewshed. Sections of the R72 are in the viewshed.

Preferred Overhead Transmission Line Route

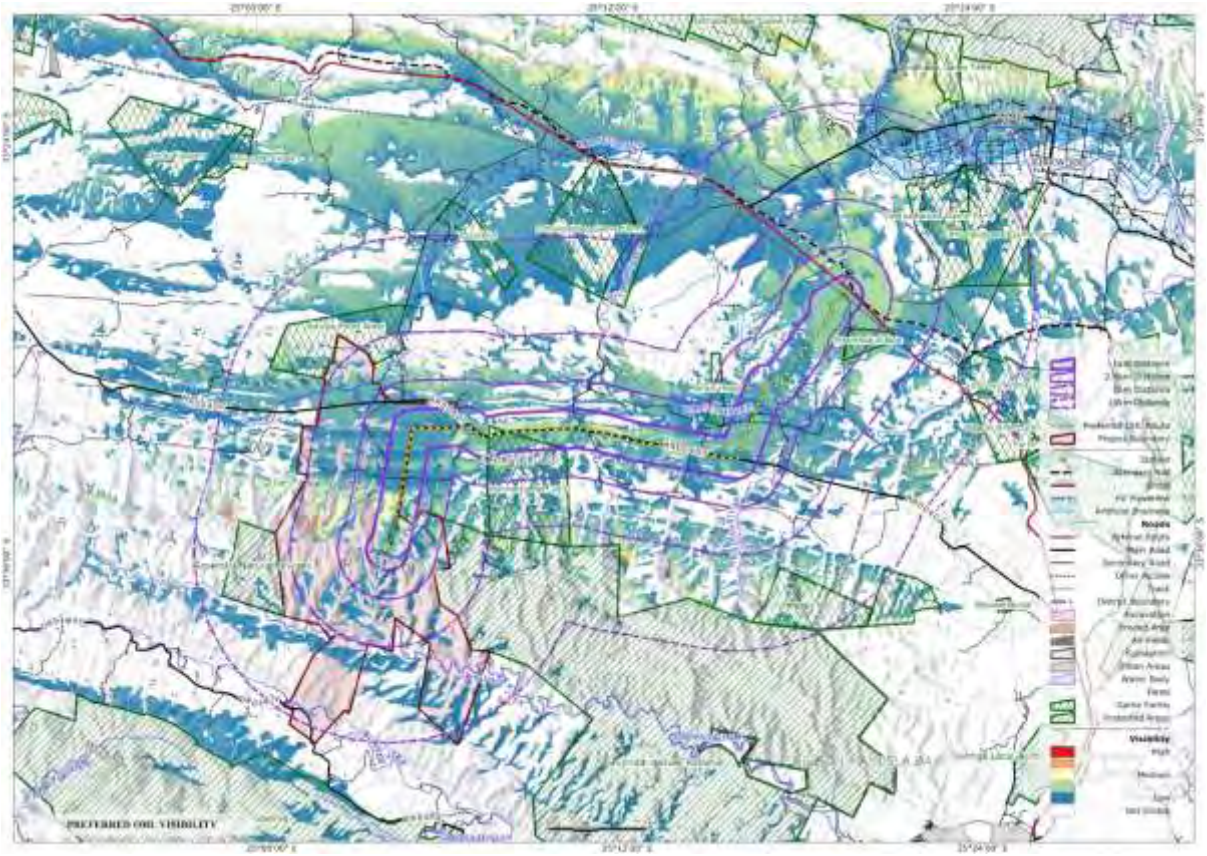


Figure **Error! No text of specified style in document.**-7 Cumulative viewshed of a high voltage transmission line along the preferred route.

A transmission line along this route will have **high** visibility due to the height of the towers and the length of the development (Figure 1-7). Most of the Groendal Nature Reserve is outside the viewshed and only views from top most peaks and ridges will be affected. Viewpoints on some of the peaks of the Groot Winterhoek Mountains will potentially see large sections of the power line along this route. Most of the viewshed lies north of the mountains on flatter terrain. Game farms and other farms in the area will potentially have views of the power line. Motorists using the R75 will pass through the viewshed for sections of the road.

Overhead Transmission Line Route Option 1

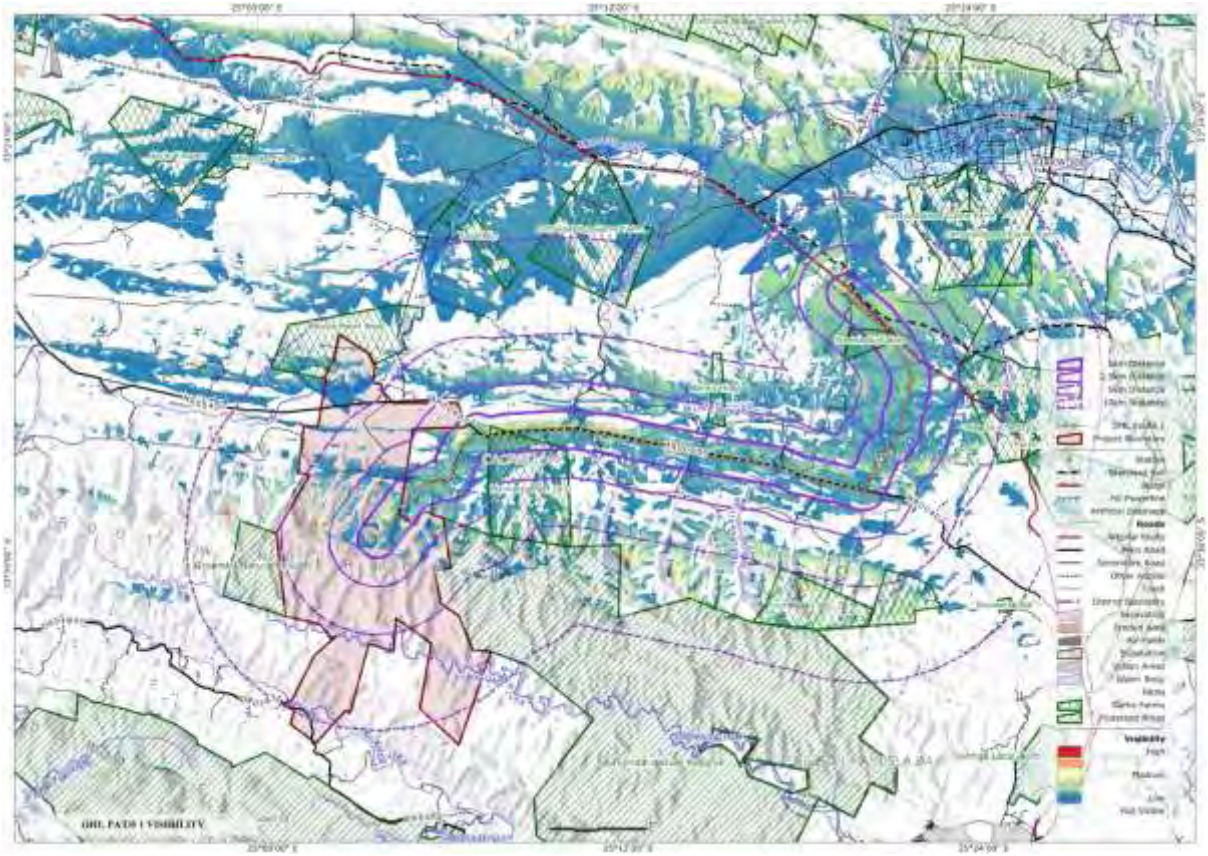


Figure **Error! No text of specified style in document.**-8 Cumulative viewshed of a high voltage transmission line along route option 1.

Visibility for a transmission line along route Option 1 will be **high** due to the length of the route and the height of the towers (Figure 1-8). The viewshed is very limited in the Groendal Nature Reserve and visual receptors in the Reserve will only occasionally have views of the transmission line. Areas south of the reserve and proposed WEF site are unlikely to see the transmission line. The viewshed is mostly located north of the mountains. Farms and game farms in this region will potentially have views of the transmission line. Motorists driving along the R75 will potentially have views of the power line for large sections of the road.

Overhead Transmission Line Route Option 2

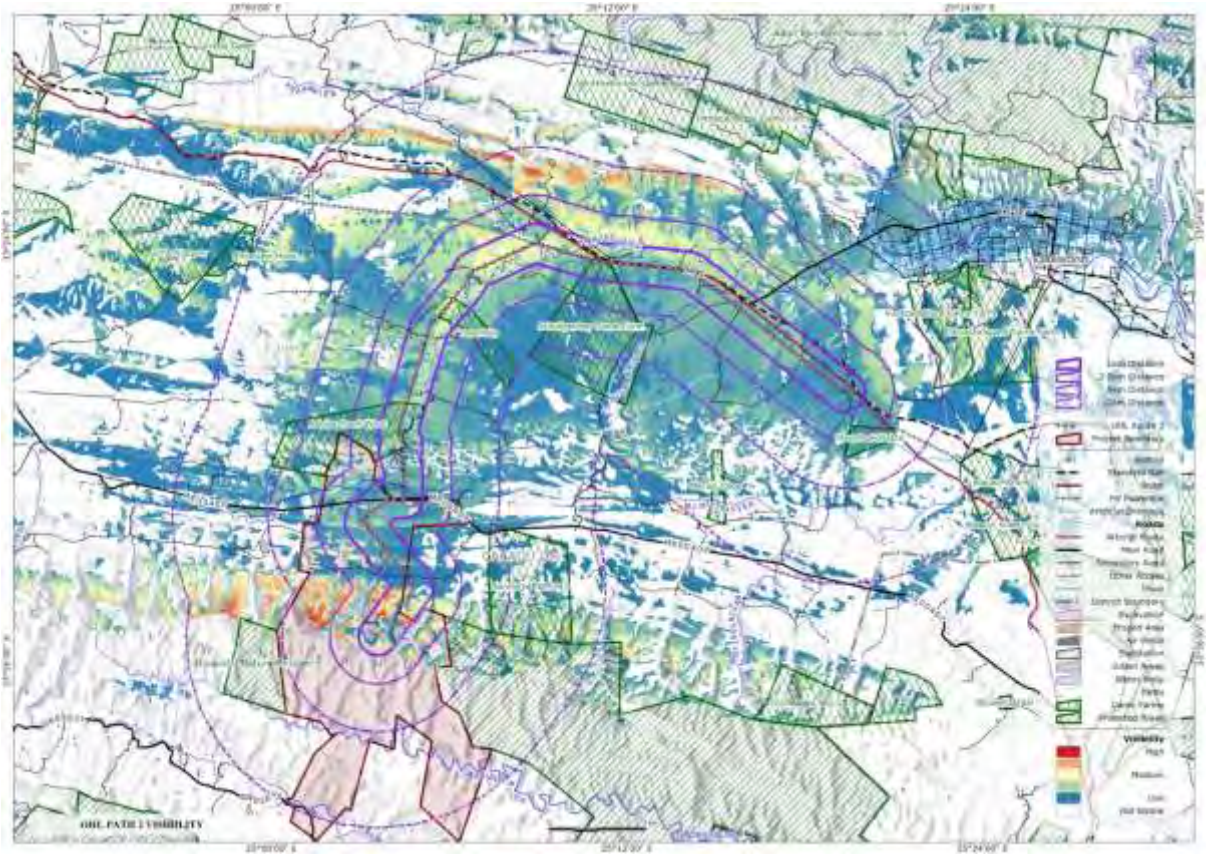


Figure **Error! No text of specified style in document.**-9 Cumulative viewshed of a high voltage transmission line along route option 2.

Visibility for a transmission line along route Option 2 will potentially be **high** due to the length of the route and the height of the towers (Figure 1-9). The viewshed is limited to the northernmost ridges of the Groendal Nature Reserve east of the proposed route. Most of the viewshed is located north of the Mountains. Game farms and farms in this region will potentially have views of the proposed transmission line. Visual receptors just north of the R75 will potentially be able to see most of the transmission line. Large sections of the R75 within 10 km of the route are within the viewshed.

1.6.1.2 Visual Exposure

Visual exposure refers to the relative visibility of a project or feature in the landscape (Oberholzer 2005). Exposure and visual impact tend to diminish exponentially with distance since the observed element comprises a smaller part of the view. Visual exposure is classified as follows:

- *High* – dominant or clearly noticeable;
- *Moderate* – recognisable to the viewer; and
- *Low* – not particularly noticeable to the viewer

Table **Error! No text of specified style in document.**-4 provides an indication of the number of visual receptors that will potentially be affected by the proposed development. Buildings are used as a

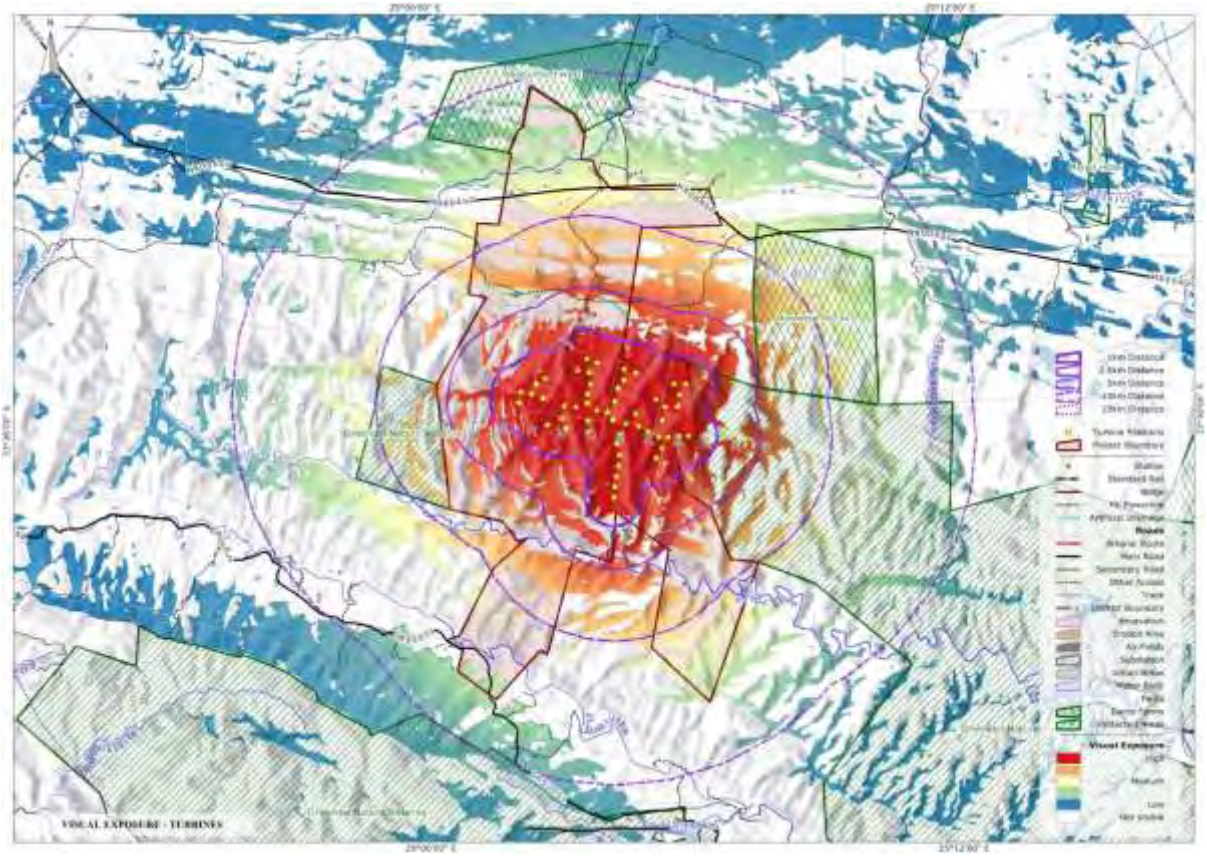
proxy for sensitive visual receptors. It should be noted however that these buildings are not necessarily residences and that the screening effect of vegetation and adjacent buildings is not taken into consideration. Many farmsteads are surrounded by high trees and residents are unlikely to have clear views from them.

Table **Error! No text of specified style in document.**-4 Visual exposure ratings and number of buildings within the viewshed.

Component	Low	Medium	High
Wind Turbines	881 (94%)	34 (4%)	19 (2%)
OHL Preferred Route	742 (88%)	44 (5%)	61 (7%)
OHL Route Option 1	683 (89%)	14 (2%)	72 (9%)
OHL Route Option 2	677 (75%)	107 (12%)	123 (13%)

Wind Turbines

Figure **Error! No text of specified style in document.**-10 Visual exposure to wind turbines.



Potential visual exposure ratings for sensitive visual receptors in the surrounding region are as follows (Figure 1-10, Figure 1-11):

- Visual exposure will be **high** for farms immediately adjacent to the proposed facility, including the game farm at Mannetjie NR. 243. The facility will be highly exposed to farms just south of the proposed facility along the Swartkops/Kwazunga River. Visual receptors on the Adolps Poort West game farm will potentially experience moderate to low visual exposure to the facility.
- It will also be **high** for ridges and peaks in the adjacent Groendal Nature Reserve (on both sides of the proposed facility).
- Motorists using the MR00407 will experience **moderate to low** visual exposure for sections of this road in the viewshed since the road is more than 5 km from the nearest wind turbine position. Motorists driving along the DR01831 will experience low visual exposure since the road is more than 7.5km from the nearest wind turbine position. The R75 is more than 20 km from the proposed WEF site and motorists will experience low visual exposure when in the view envelope.
- Towns are more than 30 km from the nearest wind turbine and visual receptors will experience **low** visual exposure to the WEF if they have a view of it.

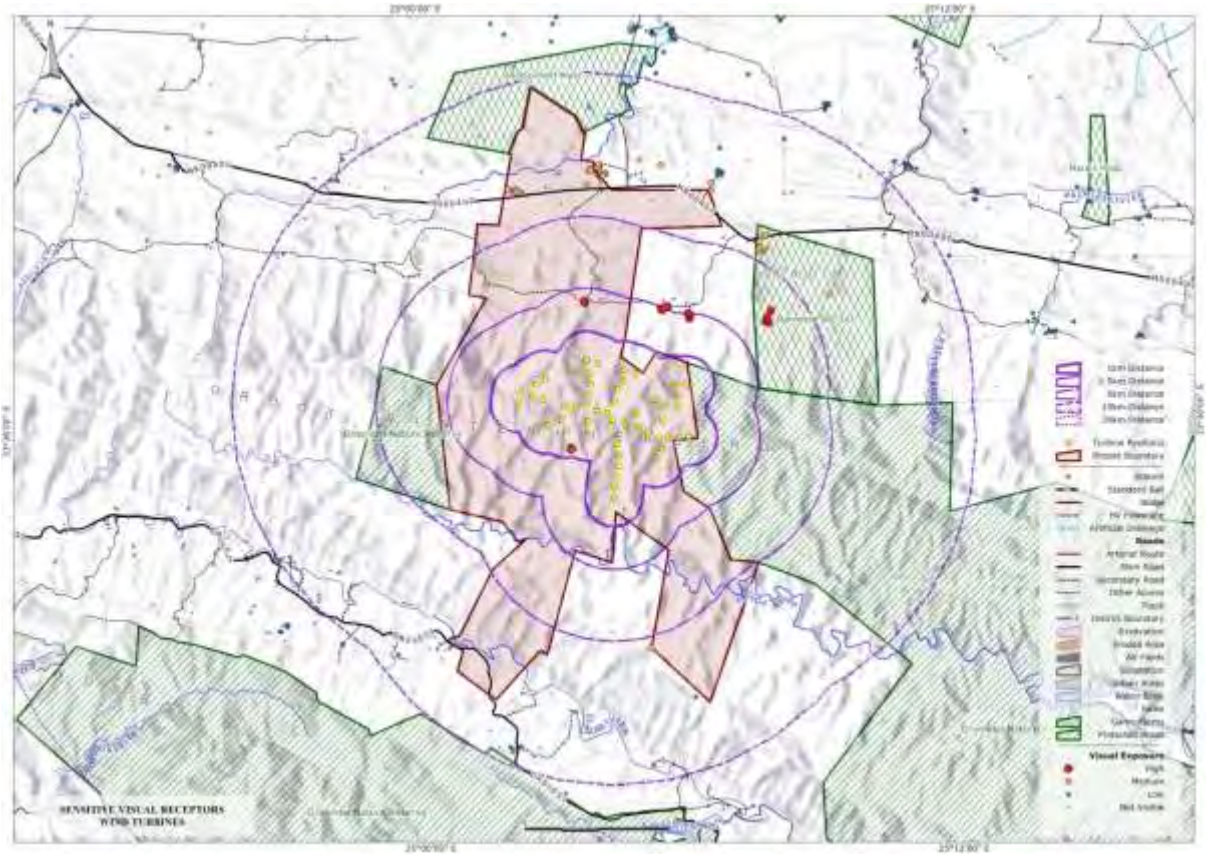


Figure **Error! No text of specified style in document.**-11 Visual exposure of sensitive visual receptors

Preferred Overhead Transmission Line Route

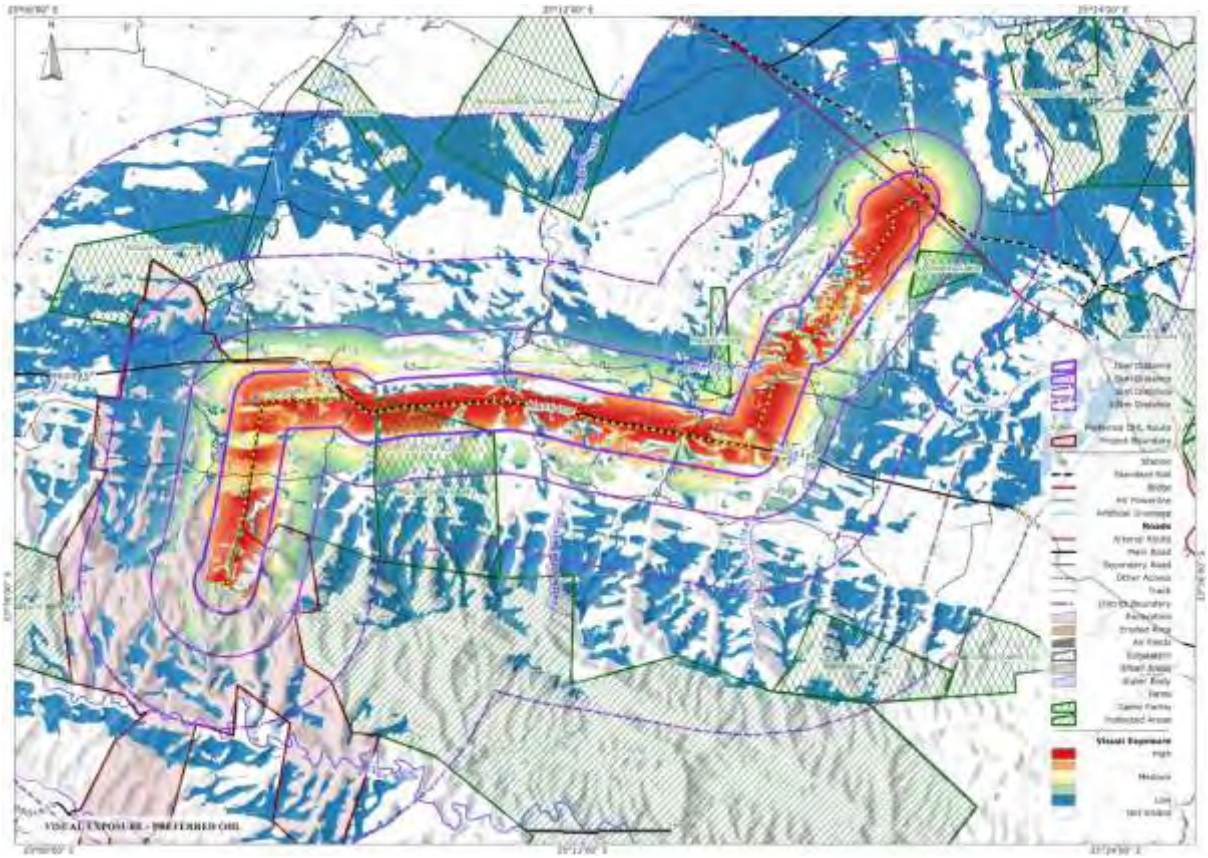


Figure **Error! No text of specified style in document.**-12 Potential visual exposure to proposed transmission line along preferred route.

Potential visual exposure for sensitive visual receptors to an overhead transmission line along the preferred route will be (Figure 1-12, Figure 1-13):

- **High** for viewers and viewpoints within 1 km of the route. These include several farmsteads and farm buildings along the route as well as the farmstead on the game farm at Mannetjie NR 243;
- **Low** for visual receptors in Groendal Nature Reserve on either side of the proposed WEF site since the reserve is more than 2.5 km from the route;
- **High** for motorists driving along the MR00407 for a 17 km (about 13 minutes at 80 km/h) section where the route is adjacent to the road;
- **High** for a 2 km section of the R75 which will take motorists approximately 70 seconds at 100 km/h to traverse; and
- **Low** for towns in the region since they are more than 10 km from the route.

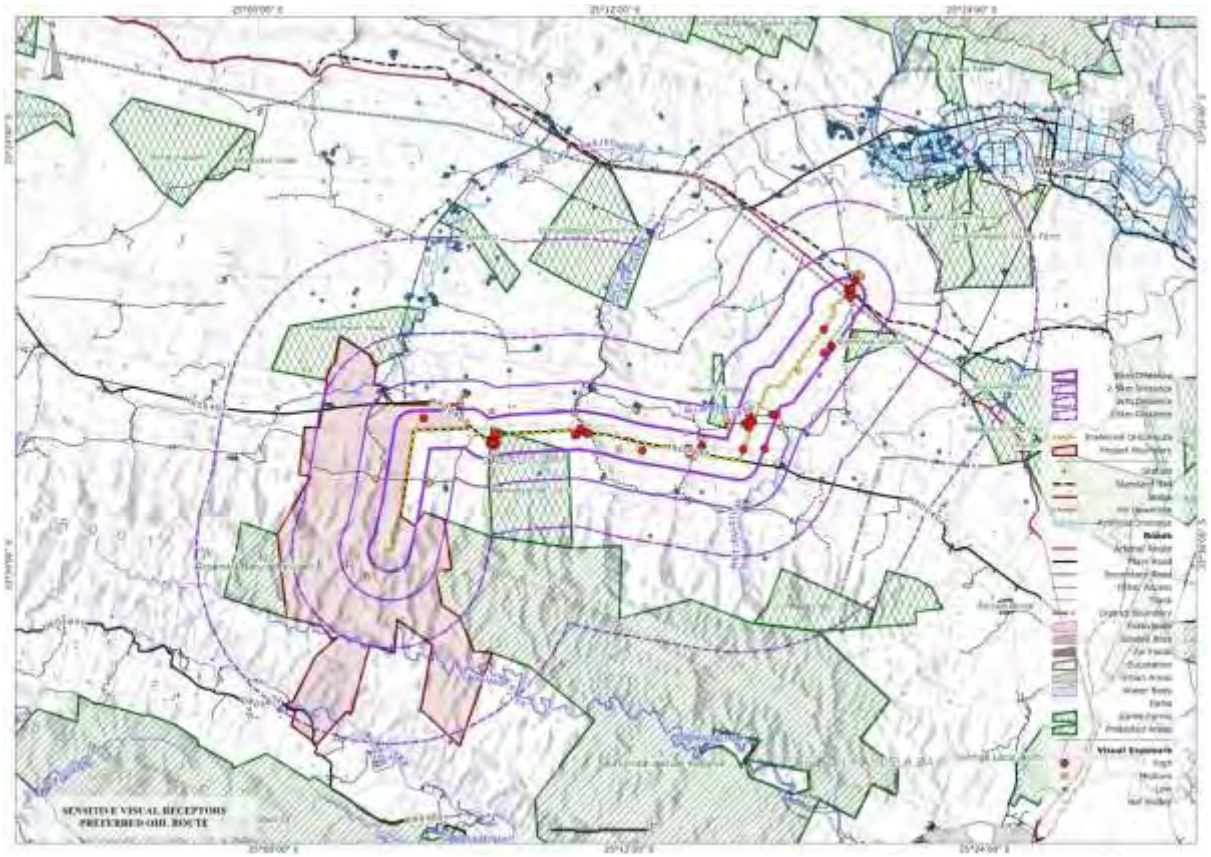


Figure **Error! No text of specified style in document.**-13 Potential visual exposure of sensitive visual receptors to OHL transmission lines along preferred route.

Overhead Transmission Line Route Option 1

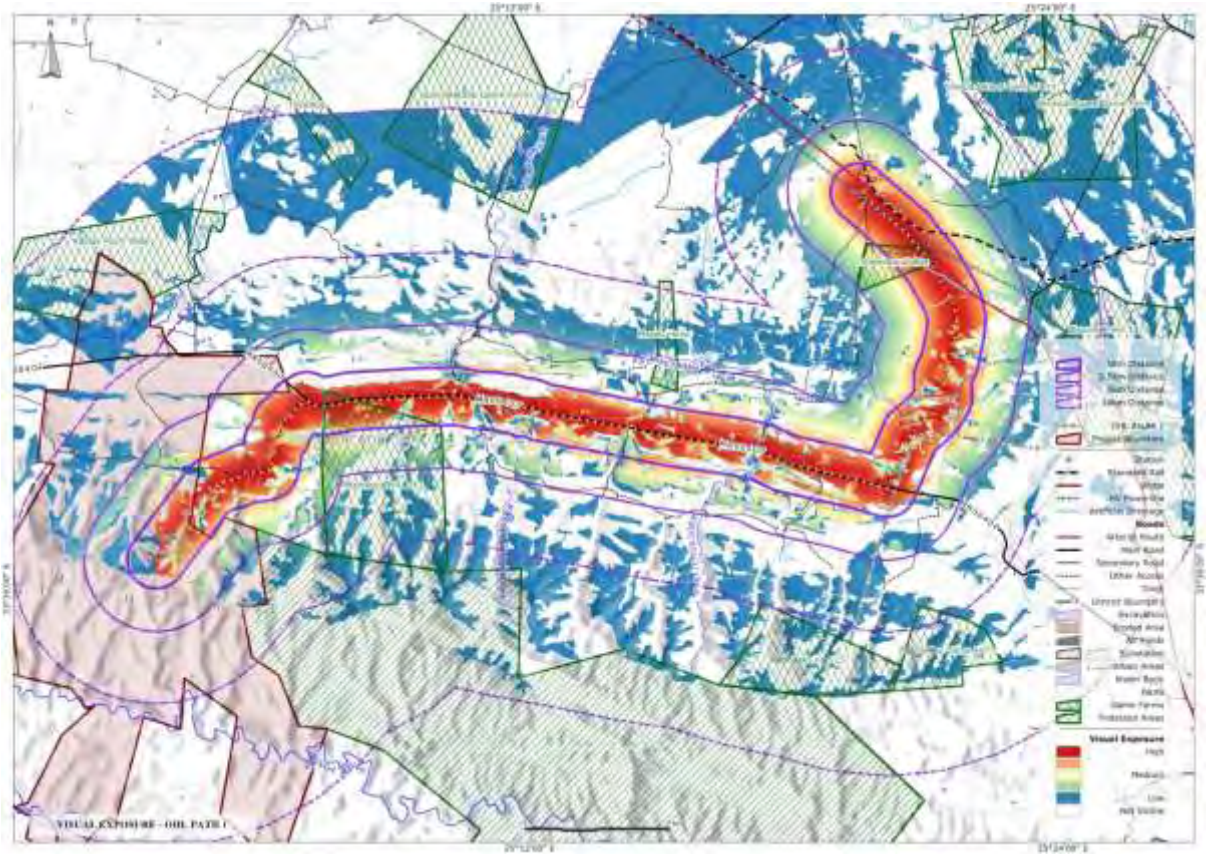


Figure **Error! No text of specified style in document.**-14 Visual exposure for an overhead transmission line along route Option 1.

Potential visual exposure for sensitive visual receptors to an overhead transmission line along the route Option 1 will be (Figure 1-14, Figure 1-15):

- **High** for viewers and viewpoints within 1 km of the route. These include several farmsteads and farm buildings along the route as well as the farmstead on the game farm at Mannetjie NR 243 and any viewpoints on Steenbok Vlakte game farm;
- **Low** for visual receptors in Groendal Nature Reserve on either side of the proposed WEF site since the reserve is more than 2 km from the route;
- **High** for motorists driving along the MR00407 for a 23 km (about 17 minutes at 80 km/h) section where the route is adjacent to the road;
- **High** for a 7 km section of the R75 which will take motorists approximately 4 minutes at 100 km/h to traverse; and
- **Low** for towns in the region since they are more than 10 km from the route.

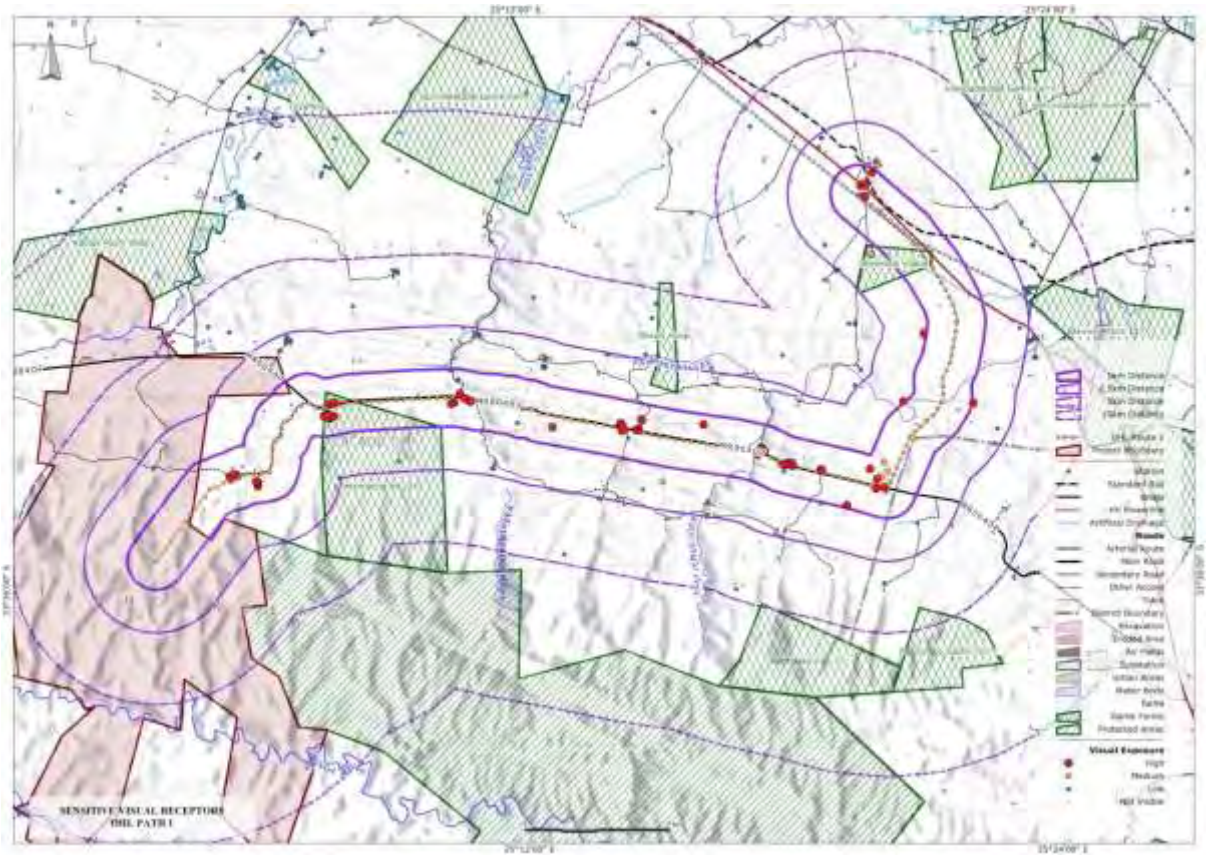


Figure **Error! No text of specified style in document.**-15 Visual exposure of sensitive visual receptors to a 132 kV transmission line along route Option 1.

Overhead Transmission Line Route Option 1

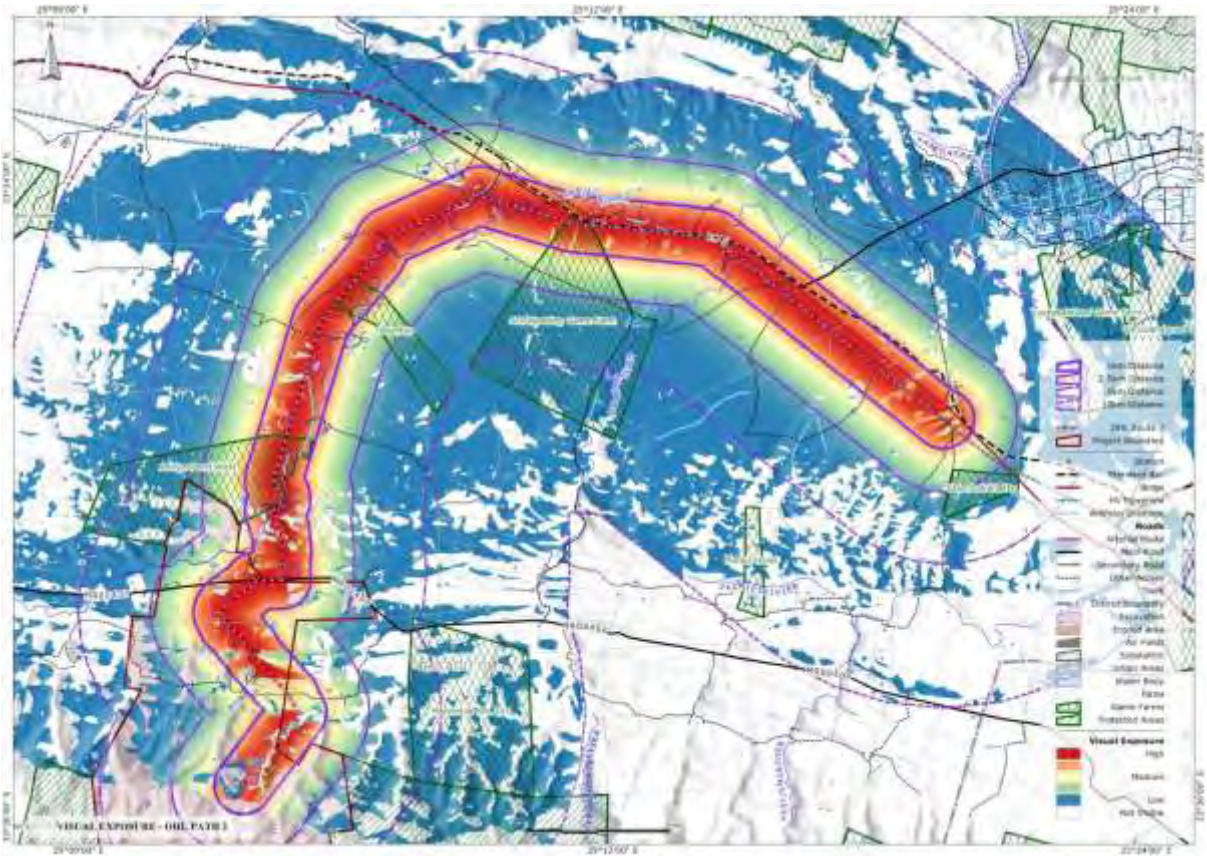


Figure **Error! No text of specified style in document.**-16 Visual exposure to a 132 kV transmission line along route Option 2.

Potential visual exposure for sensitive visual receptors to an overhead transmission line along the route Option 2 will be (Figure 1-16, Figure 1-17):

- **High** for viewers and viewpoints within 1 km of the route. These include several farmsteads and farm buildings along the route.
- **High** for farmsteads, buildings and viewpoints on Adolps Poort West, Toverklip and Schuilpatdop game farms;
- **Low** for visual receptors in Groendal Nature Reserve on either side of the proposed WEF site since the reserve is more than 2 km from the route;
- **High** for motorists driving along the MR00407 for a 4 km (about 3 minutes at 80 km/h) section where the route is adjacent to the road;
- **High** for a 20 km section of the R75 which will take motorists approximately 12 minutes at 100 km/h to traverse; and
- **Low** for towns in the region since they are more than 10 km from the route.

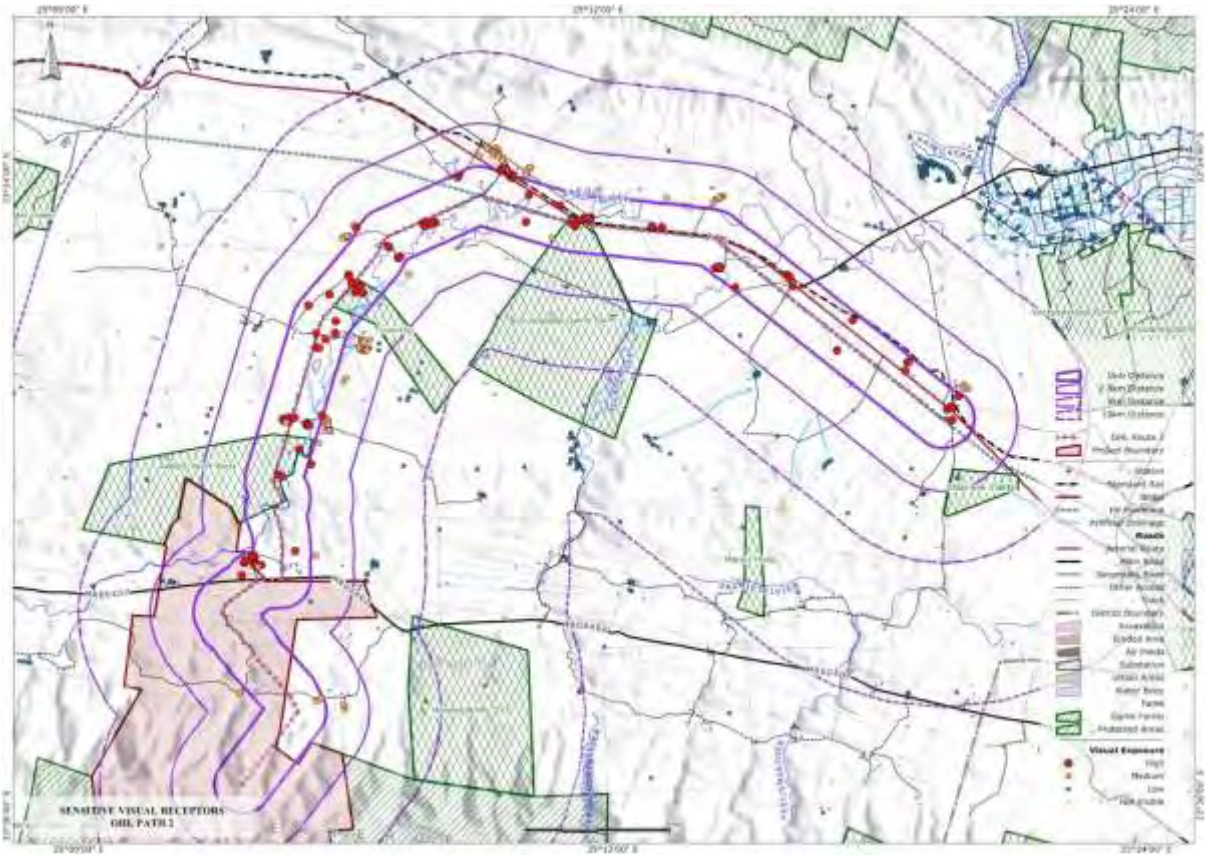


Figure **Error! No text of specified style in document.**-17 Visual exposure of sensitive visual receptors to a 132 kV transmission line along route Option 2.

1.6.1.3 Visual Intrusion

Visual intrusion indicates the level of compatibility or congruence of the project with the particular qualities of the area – its *sense of place*. This is related to the idea of context and maintaining the integrity of the landscape (Oberholzer, 2005). It can be ranked as follows:

- *High* – results in a noticeable change or is discordant with the surroundings;
- *Moderate* – partially fits into the surroundings, but is clearly noticeable; and
- *Low* – minimal change or blends in well with the surroundings.

Photographic Survey

Site from which landscape photographs were taken are shown in Figure 1-18. The discussion below refers to photo sites on the map.

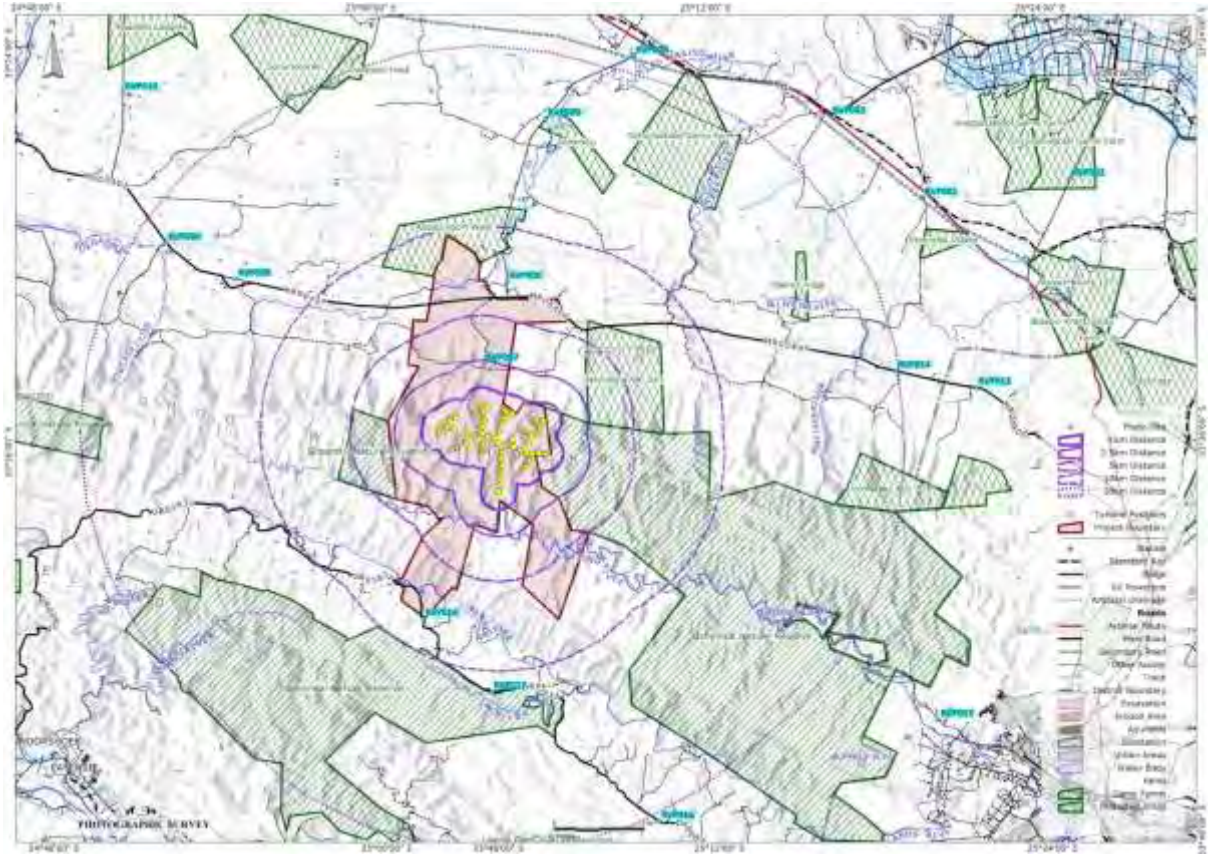


Figure **Error! No text of specified style in document.**-18 Sites from which photos were taken as part of the photographic survey.

The region between the mountain range (Groot Winterhoek Mountains) and the R75 is relatively sparsely populated and has a rural sense of place (Figure 1-19). Views towards the mountains may include structures associated with a rural agricultural landscape such as farmsteads, farm buildings, roads, fences and telephone poles/lines (Figure 1-21, Figure 1-28). The vegetation is natural although clearly affected by grazing in places (Figure 1-22), including vegetation on game farms. Erosion

scarring is occasionally visible. The mountains provide a backdrop to scenic views although private access tracks/roads are visible against the mountains in places. The substations and transmission lines next to the R75 are likely to feature in some views of the mountains from the region north of the R75 (Figure 1-29). Even though power lines and substations are relatively common elements of rural landscapes in South Africa these detract from scenic views of the mountains.

The region between the MR00407 and the mountains is more isolated due to the topography (Figure 1-23), and kloofs into the mountains provide a sense of remoteness (Figure 1-24), although the roads on the slopes and tops of the mountains are more clearly visible from here (Figure 1-25). There are a few eco-tourism ventures and game farms in this region with trails into the mountains and it is possible that views with scenic value will be affected by the tall wind turbines. Viewpoints within the game farm on Mannetjie NR. 243 are particularly vulnerable due to their proximity to the site and the extent of the wind turbine viewshed on this farm. Existing, scenic mountain views are likely to include very few man made elements, and nothing on the scale of wind turbines. Further west along the road the landscape opens up more and the sense of remoteness diminishes. Farmsteads and structures are more common, although views of the mountain range are still scenic and no large man-made structures (other than the road) are visible (Figure 1-26, Figure 1-27). The potential for scenic views is also likely to be reduced by the 132 kV overhead lines connecting the WEF with the Eskom grid (Figure 1-30, Figure 1-31).

The Groendal Nature Reserve provides access to scenic views of mountains with very few man-made elements. Some of the hikes (e.g. five day hike) take the visitor within 2 km of the proposed WEF site along mountain ridges.

The Kwazunga River Valley south of the proposed site has very limited access and most of it lies outside the wind turbine viewshed. The valley has a strong sense of wilderness and remoteness and very few if any man-made structures are visible from the valley (Figure 1-33). There are several trails into the mountains which are in the viewshed. Sensitive visual receptors (viewers and viewpoints) along these will be affected by the WEF.

The Elands River Valley is less isolated and much of the valley is used for crop farming. The valley is mostly outside the viewshed but the ridge between the Elands and Kwazunga Rivers is likely to provide views of wind turbines. There are numerous trails along this ridge and sensitive visual receptors are likely to be affected by a WEF at the proposed site. The gravel road providing access to the Elands River Valley passes through wind turbine the viewshed in places. Scenic mountain views from this road and the hills to the south are likely to be affected by the proposed WEF since there are no similar structures in them (Figure 1-34).

Figure **Error! No text of specified style in document.**-19 View south from the R75 (photo site RVP003) towards the Groot Winterhoek Mountains.

Figure **Error! No text of specified style in document.**-20 View south from photo site RVP004 towards the Groot Winterhoek Mountains.

Figure **Error! No text of specified style in document.**-21View south-east from photo site RVP005 across Toverklip Game Farm.

Figure **Error! No text of specified style in document.**-22 View south-west from photo site RVP005 towards the Groot Winterhoek Mountains.

Figure **Error! No text of specified style in document.**-23 View west from photo site RVP006. The region between the ridge on the right and the mountains on the left is more isolated from the region further north and has a sense of remoteness.

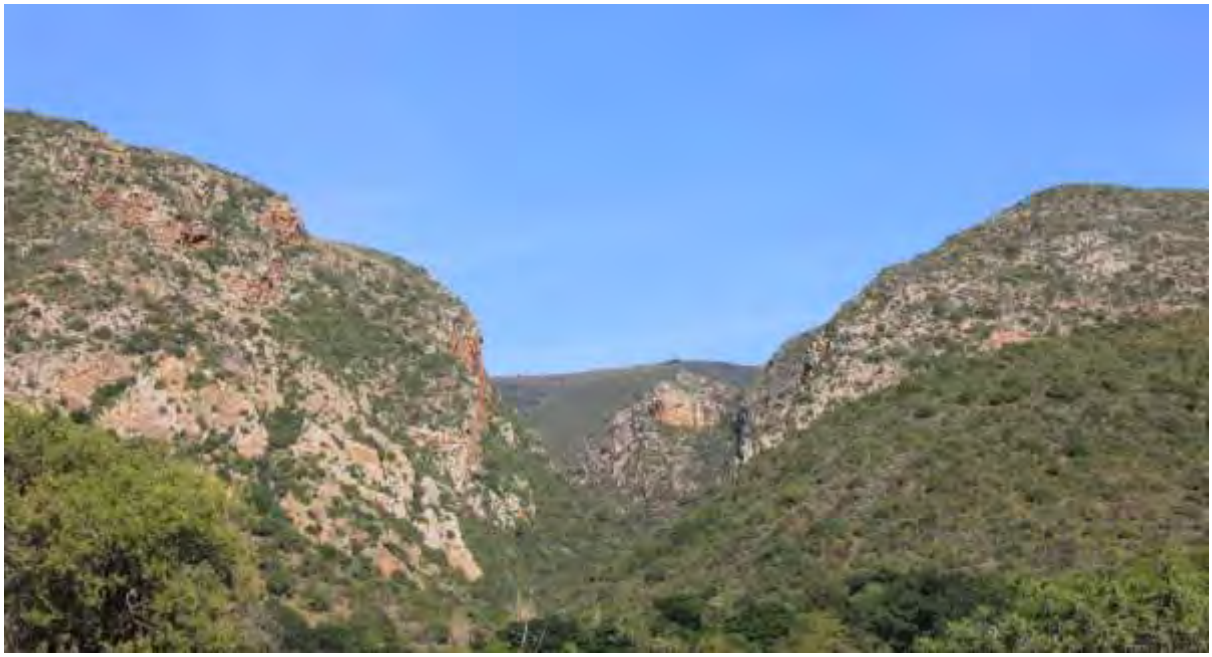


Figure **Error! No text of specified style in document.**-24 View from photo site RVP007 showing a kloof into the Groot Winterhoek Mountains.

Figure **Error! No text of specified style in document.**-25 View from photo site RVP006 showing road cuttings against the slopes of the Groot Winterhoek Mountains in the background.

Figure **Error! No text of specified style in document.**-26Farm buildings and structures adjacent to the MR00407 between photo sites RVP008 and RVP009.

Figure **Error! No text of specified style in document.**-27 View east from photo site RVP009. Farm in previous figure visible in middle ground.

Figure **Error! No text of specified style in document.**-28 View east from photo site RVP010 showing typical farmstead and buildings in the landscape.

Figure **Error! No text of specified style in document.**-29 Small substation with overhead power lines and pylons against the mountain backdrop (RVP011).

Figure **Error! No text of specified style in document.**-30 View west from photo site RVP013 along the MR00407 gravel road.

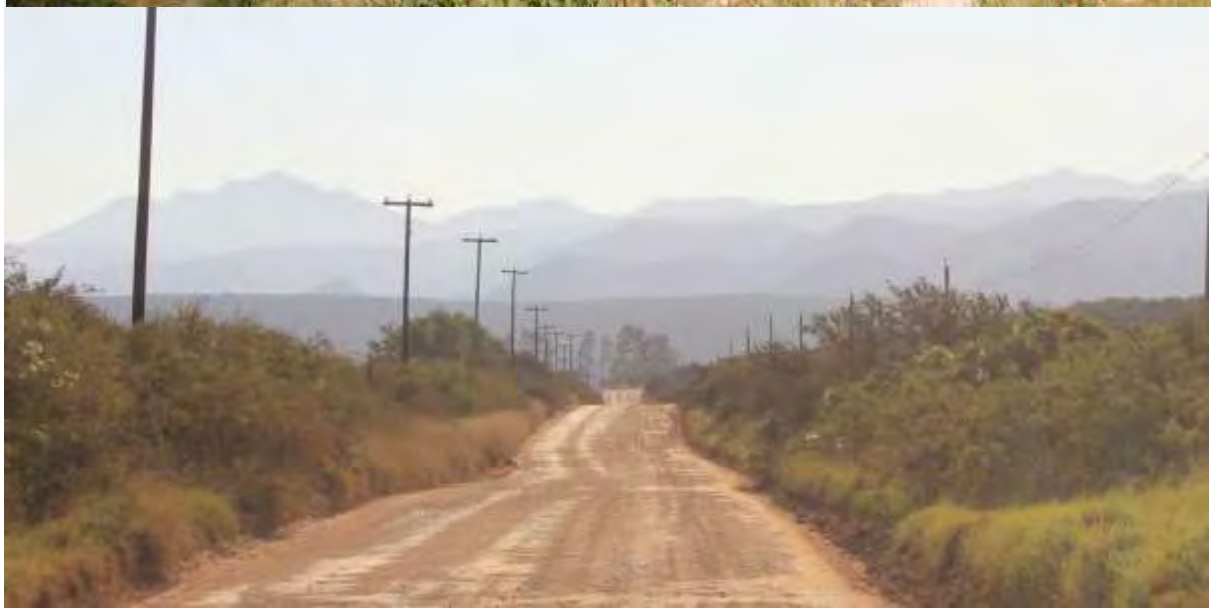


Figure **Error! No text of specified style in document.**-34 View north-east from photo site RVP018 south of the proposed WEF.

WIND ENERGY FACILITY

Surrounding farms and game farms

Figure 1-35 provides an idea of the extent of the WEF across the Groot Winterhoek Mountains. The viewpoint (RVP001) is 32 km from the proposed WEF site. Photomontages in Figure 1-37 and Figure 1-38 provide further aid in assessing the potential visual intrusion of the proposed WEF on views in the surrounding landscape.

It is clear from these and the photographic survey discussed above that the proposed WEF will intrude highly on existing views in the surrounding landscape. There are no other similar structures in the landscape. Existing views range from typical rural (e.g. north of the ridge adjacent to the MR00407) to remote wilderness (e.g. south of the ridge and along the ridges adjacent to the Kwazunga River). The wind turbines will result in a noticeable change in many of these views and are likely to be seen by many affected visual receptors as discordant with the surroundings. A **high** visual intrusion is predicted for sensitive visual receptors on surrounding farms and game farms.

Figure **Error! No text of specified style in document.**-35 Photomontage of wind turbines on Groot Winterhoek Mountains from photo site RVP001 approximately 30 km away.

Groendal Nature Reserve

The region of the reserve adjacent to the proposed WEF site is very remote and access is limited to multiple-day hikes. Viewpoints along the high ridges are likely to include very few man-made structures. Existing scenic views of the Groot Winterhoek Mountains from these viewpoints towards the west will be noticeably changed since these are currently without (or at most very distant) man-made objects in them. The wind turbines are very likely to be seen as discordant with the surroundings by visitors to the reserve. A **high** visual intrusion is therefore expected for sensitive visual receptors in the Groendal Nature Reserve.

Motorists

Motorists driving along the R75 are likely to have numerous large man-made structures in their views, including transmission power lines, substations, buildings and railway lines. However, mountain views from the road are scenic and wind turbines on the mountains will be clearly noticeable. Views along the R75 will therefore be **moderately** intruded upon by wind turbines on the mountains. Motorists using other access roads in the region (e.g. MR00470 or DR0183) will experience similar high visual intrusion to other sensitive visual receptors in the region depending on their proximity to the proposed site.

132 kV POWER LINE – PREFERRED ROUTE

Surrounding farms and game farms

This route follows the MR00470 gravel road for a third of its length. This part of the road is isolated from the surrounding region by high ridges adjacent to the road on both sides. The introduction of transmission lines along this section will reduce its prevailing sense of remoteness and, due to the length of the line and the height of the towers, will potentially intrude on existing scenic views containing few man-made structures (Figure 1-30, Figure 1-31). Visual intrusion will therefore be **high** for sensitive visual receptors in the region that are highly exposed to the proposed power line.

Groendal Nature Reserve

Visual intrusion on views from the nature reserve will be **low** since the route is more than 2.5 km from the reserve and views will be downwards with the power line and pylons against a mottled or dark background.

Motorists

Existing views from the R75 contain large scale structures such as transmission lines, substations and railway lines (Figure 1-19, Figure 1-36). The introduction of a transmission line along the preferred route will be noticed but it will not appear out of place or incongruent with existing features. Views from MR00470 are likely to be altered by the transmission line and scenic views may be negatively affected. Visual intrusion for motorists on the R75 will be **low** while for those driving along the MR00470 it will be high where visual exposure is high.

Figure **Error! No text of specified style in document.**-36 Substation next to the R75 where the proposed 132 kV line will connect with the Eskom grid.

132 kV POWER LINE – ROUTE OPTION 1

Surrounding farms and game farms

Visual intrusion will be similar to that of the preferred route except that the route is longer in general, and is longer along the MR00470 - **high** visual intrusion for viewers and viewpoints that are highly exposed to the power line.

Groendal Nature Reserve

Visual intrusion will be similar to that of a transmission line along the preferred route. Views will be from above and the power line and pylons will mostly be against a dark or mottled vegetation background. **Low** visual intrusion is excpected for views from the Groendal Nature Reserve.

Motorists

Visual intrusion along the R75 will be **low** due to other similar structures in existing views. The new transmission line will be noticed but it will not appear incongruent with the immediately surrounding landscape. The route extends further along MR00470 where visual intrusion will be **high**.

132 kV POWER LINE – ROUTE OPTION 1

Surrounding farms and game farms

Visual intrusion for this route will be **high** for visual receptors in close proximity (i.e. in areas of high visual exposure where the pylons and lines are likely to be exposed against the sky). It will be higher in the region between the WEF site and the ridge just north of the MR00407 than further north since this region is more sensitive to new developments.

Groendal Nature Reserve

Visual intrusion from the nature reserve will be **low** since visual exposure is low for areas in the reserve. Views will be from above and the power line will be against a dark or mottled background in most cases.

Motorists

The route follows the R75 and the existing power line servitude for a large part and the proposed power line will have a **low** visual intrusion on views of motorists using the R75. Visual intrusion will be higher for the gravel road connecting the MR00407 with the R75 since power lines and pylons are likely to be exposed against the sky and will potentially affect scenic views of the Groot Winterhoek Mountains (Figure 1-22).

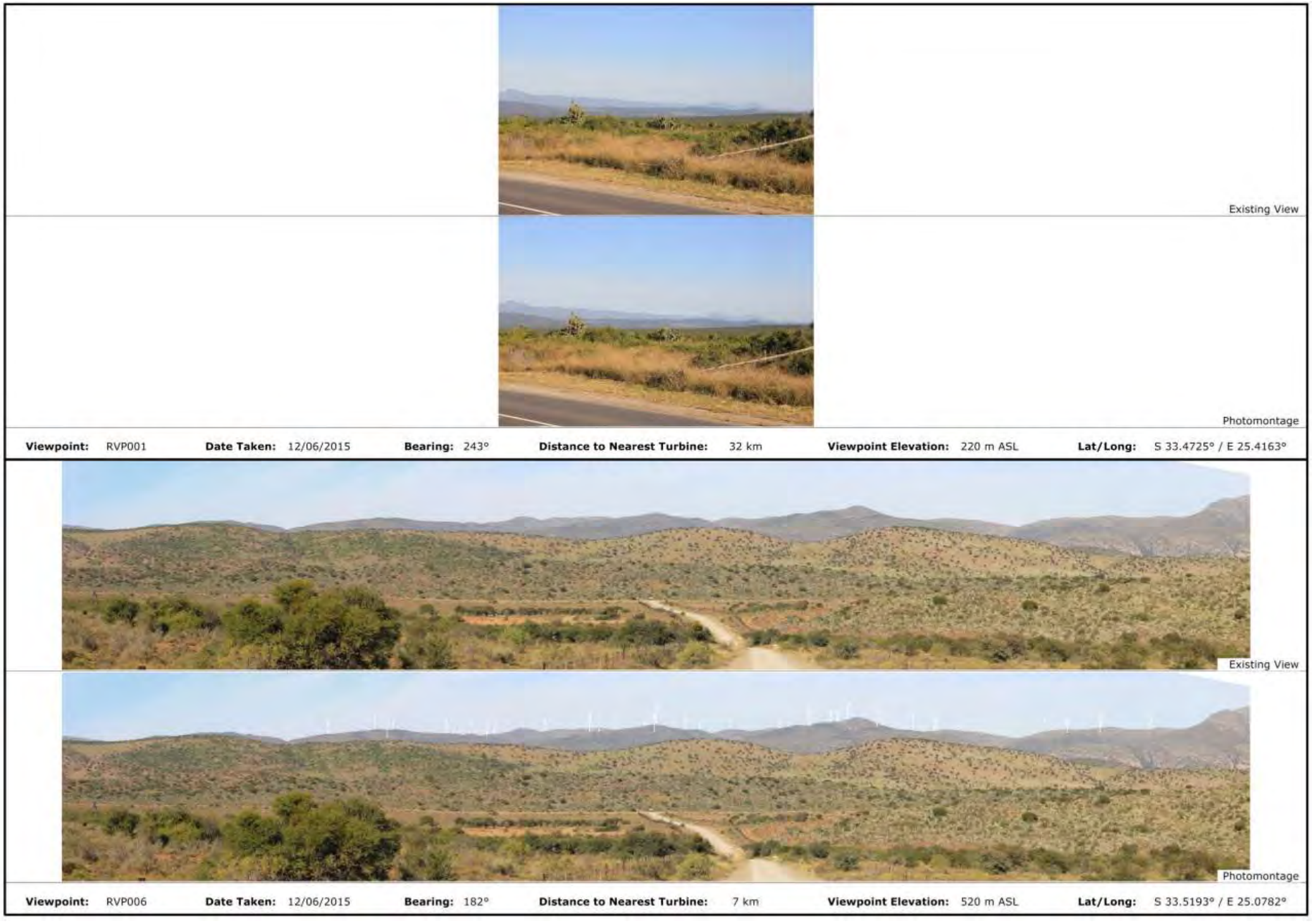


Figure **Error! No text of specified style in document.**-37 Photomontages of views from photo sites RVP001 and RVP006 showing existing views and the same views with wind turbines included.

Existing View

Photomontage

Viewpoint: RVP008 **Date Taken:** 12/06/2015 **Bearing:** 128° **Distance to Nearest Turbine:** 14 km **Viewpoint Elevation:** 520 m ASL **Lat/Long:** S 33.5154° / E 24.9161°

Existing View

Photomontage

Viewpoint: RVP017 **Date Taken:** 12/06/2015 **Bearing:** 1° **Distance to Nearest Turbine:** 11 km **Viewpoint Elevation:** 440 m ASL **Lat/Long:** S 33.7247° / E 25.0647°

Figure **Error! No text of specified style in document.**-38 Photomontages of views from photo sites RVP008 and RVP017 showing existing views and the same views with wind turbines included.

Table **Error! No text of specified style in document.**-5 Visual impact criteria and ratings for the proposed WEF

Sensitive Viewer	Criteria	Rating	Reasoning
Residents and Viewpoints on surrounding farms	Visual Sensitivity	**High**	Residents have an active interest in the landscape that surrounds them.
	Visual Exposure	**High**	Residents and viewpoints on farms within 10 km of the proposed site and within the viewshed will experience high visual exposure. This includes farms along the Kwazunga river south of the site.
	Visual Intrusion	**High**	Existing views of the mountain range contain few man-made structures and nothing on the scale the proposed WEF. Highly visible wind turbines on the mountains will not be congruent with the scenic vistas that are common in the region.
	Impact Intensity	**High**	Existing scenic mountain views will be noticeably altered and highly sensitive visual receptors will be highly exposed to the proposed development.
Visitors and viewpoints in Protected Areas	Visual Sensitivity	**High**	One of the aspects of the Groendal Nature Reserve that draws tourists is the potential for scenic views of the mountain landscapes. International tourists are included in this group.
	Visual Exposure	**High**	Ridges and peaks in Groendal Nature Reserve adjacent to the proposed site will experience high visual exposure to wind turbines.
	Visual Intrusion	**High**	The scenic mountain views are an important attraction for the Groendal Nature Reserve and existing views from ridges in close proximity to the proposed WEF site will be highly intruded on and is likely to reduce the sense of remoteness that visitors seek on these trails.
	Impact Intensity	**High**	Highly sensitive visual receptors will potentially be highly exposed to the proposed development. Scenic views will be noticeably altered.
Visitors and viewpoints on surrounding game farms	Visual Sensitivity	**High**	Scenic views of the mountains and a sense of wilderness are part of the drawcard for visitors of these farms.
	Visual Exposure	**High**	There are game farms in close proximity to the proposed site (e.g. game farm on the farm Mannetjie NR.243). Viewpoints within the viewshed on these farms will be highly exposed to the facility.
	Visual	**High**	Scenic views from viewpoints on neighbouring game farms and

Sensitive Viewer	Criteria	Rating	Reasoning
	Intrusion		eco-tourist ventures will be significantly altered by wind turbines and they will seem out of place in the views since the scenic views of the mountains are part of the attraction for visitors.
	Impact Intensity	**High**	Highly sensitive visual receptors will be highly exposed to proposed structures which alter existing scenic views in a highly noticeable way.
Residents of towns in the surrounding region	Visual Sensitivity	**Moderate**	Residents have an active interest in the landscape that surrounds them but views in urbanised areas are complex and contain highly contrasting elements.
	Visual Exposure	**Low**	Towns are more than 30 km from the proposed site and residents will experience low visual exposure when in the viewshed.
	Visual Intrusion	**Moderate**	It is likely that residents with existing views of the proposed site will notice the turbines but due to the distances involved the change in the views will be small.
	Impact Intensity	**Medium**	The towns (Uitenhage and Kirkwood) are more than 30 km from the proposed site and scenic mountain views from these towns will be moderately altered.
Motorists	Visual Sensitivity	**High**	The R75 is a major arterial route which provides access for tourists to the interior of the country. Motorists on local farm roads will include tourists visiting game farms and eco-tourist venues.
	Visual Exposure	**Low**	The R75 is more than 20 km from the nearest wind turbine site. Visual exposure will be high for motorists using local farm roads in close proximity to the proposed site.
	Visual Intrusion	**Moderate**	Views from the R75 contain many large structures such as power lines, railway lines and substations. The road is also very busy and large vehicles are common. However, the distant mountains still provide opportunities for scenic views and the wind turbines will be noticed.
	Impact Intensity	**Medium**	Motorists may include tourists and international tourists with an active interest in the surrounding landscape. The existing scenic views of the mountains along these roads will be altered to a moderate extent in the case of the R75.

Table **Error! No text of specified style in document.**-6 Visual impact criteria for assessing a 132 kV power line along the preferred route.

Sensitive Viewer	Criteria	Rating	Reasoning
Residents and viewpoints on surrounding farms and game farms	Visual Sensitivity	**High**	Residents have an active interest in the landscape that surrounds them.
	Visual Exposure	**High**	Residents and viewpoints on farms within 1 km of the preferred route. These include several farmsteads and farm buildings along the route as well as the farmstead on the game farm at Mannetjie NR 243.
	Visual Intrusion	**High**	Visual receptors that are highly exposed to the power line will experience high visual intrusion on existing views since scenic views in a region with a sense of remoteness and isolation will potentially be affected.
	Impact Intensity	**High**	Existing scenic mountain views will be noticeably altered and highly sensitive visual receptors will be highly exposed to the proposed development.
Visitors and viewpoints in Protected Areas	Visual Sensitivity	**High**	One of the aspects of the GroendalNature Reserve that draws tourists is the potential for scenic views of the mountain landscapes. International tourists are included in this group.
	Visual Exposure	**Low**	**T**he reserve is more than 2.5 km from the route
	Visual Intrusion	**Low**	Views will be downwards and the power lines are unlikely to be exposed against the sky. They will often be seen against a mottled or dark background. The power lines will seem out of place but will not always be noticed.
	Impact Intensity	**Low**	The power line is unlikely to intrude on scenic views from the Groendal Nature Reserve.
Motorists	Visual Sensitivity	**High**	The R75 is a major arterial route which provides access for tourists to the interior of the country. Motorists on local farm roads will include tourists visiting game farms and eco-tourist venues.
	Visual Exposure	**High**	A 2 km section of the R75 is within 1 km of the route and motorists will spend approximately 70 seconds in a high visual exposure section. Motorists using the MR00407 will spend approximately 13 minutes in high visual exposure sections.
	Visual Intrusion	**Low**	Views from the R75 contain many large structures such as power lines, railway lines and substations. The road is also very

Sensitive Viewer	Criteria	Rating	Reasoning
			busy and large vehicles are common. Visual intrusion will be high for motorists using the MR00407 in sections of high visual exposure. Traffic on this road is very low.
	Impact Intensity	**Low**	Motorists using the R75 are unlikely to notice the proposed power line since there are already similar structures in their views.

Table **Error! No text of specified style in document.**-7 Visual impact criteria for assessing a 132 kV power line along Route Option 1.

Sensitive Viewer	Criteria	Rating	Reasoning
Residents and viewpoints on surrounding farms and game farms	Visual Sensitivity	**High**	Residents have an active interest in the landscape that surrounds them.
	Visual Exposure	**High**	Residents and viewpoints on farms within 1 km of the preferred route. These include several farmsteads and farm buildings along the route as well as the farmstead on the game farm at Mannetjie NR 243 and viewpoints on Steenbok Vlakte game farm.
	Visual Intrusion	**High**	Visual receptors that are highly exposed to the power line will experience high visual intrusion on existing views since scenic views in a region with a sense of remoteness and isolation will potentially be affected.
	Impact Intensity	**High**	Existing scenic mountain views will be noticeably altered and highly sensitive visual receptors will be highly exposed to the proposed development.
Visitors and viewpoints in Protected Areas	Visual Sensitivity	**High**	One of the aspects of the Groendal Nature Reserve that draws tourists is the potential for scenic views of the mountain landscapes. International tourists are included in this group.
	Visual Exposure	**Low**	**T**he reserve is more than 2 km from the route
	Visual Intrusion	**Low**	Views will be downwards and the power lines are unlikely to be exposed against the sky. They will often be seen against a mottled or dark background. The power lines will seem out of place but will not always be noticed.
	Impact Intensity	**Low**	The power line is unlikely to intrude on scenic views from the Groendal Nature Reserve.

Sensitive Viewer	Criteria	Rating	Reasoning
Motorists	Visual Sensitivity	**High**	The R75 is a major arterial route which provides access for tourists to the interior of the country. Motorists on local farm roads will include tourists visiting game farms and eco-tourist venues.
	Visual Exposure	**High**	A 7 km section of the R75 is within 1 km of the route and motorists will spend approximately 4 minutes in a high visual exposure section. Motorists using the MR00407 will spend approximately 17 minutes in high visual exposure sections.
	Visual Intrusion	**Low**	Views from the R75 contain many large structures such as power lines, railway lines and substations. The road is also very busy and large vehicles are common. Visual intrusion will be high for motorists using the MR00407 in sections of high visual exposure. Traffic on this road is very low.
	Impact Intensity	**Low**	Motorists using the R75 are unlikely to notice the proposed power line since there are already similar structures in their views.

Table **Error! No text of specified style in document.**-8 Visual impact criteria for assessing a 132 kV power line along Route Option 2

Sensitive Viewer	Criteria	Rating	Reasoning
Residents and viewpoints on surrounding farms and game farms	Visual Sensitivity	**High**	Residents have an active interest in the landscape that surrounds them.
	Visual Exposure	**High**	Residents and viewpoints on farms within 1 km of the preferred route. Farmsteads, buildings and viewpoints on Adolps Poort West, Toverklip and Schuilpatdop game farms.
	Visual Intrusion	**High**	Visual receptors that are highly exposed to the power line will experience high visual intrusion on existing views since scenic views in a region with a sense of remoteness and isolation will potentially be affected.
	Impact Intensity	**High**	Existing scenic mountain views will be noticeably altered and highly sensitive visual receptors will be highly exposed to the proposed development.
Visitors and viewpoints in Protected Areas	Visual Sensitivity	**High**	One of the aspects of the Groendal Nature Reserve that draws tourists is the potential for scenic views of the mountain landscapes. International tourists are included in this group.

Sensitive Viewer	Criteria	Rating	Reasoning
	Visual Exposure	**Low**	**T**he reserve is more than 2 km from the route
	Visual Intrusion	**Low**	Views will be downwards and the power lines are unlikely to be exposed against the sky. They will often be seen against a mottled or dark background. The power lines will seem out of place but will not always be noticed.
	Impact Intensity	**Low**	The power line is unlikely to intrude on scenic views from the Groendal Nature Reserve.
Motorists	Visual Sensitivity	**High**	The R75 is a major arterial route which provides access for tourists to the interior of the country. Motorists on local farm roads will include tourists visiting game farms and eco-tourist venues.
	Visual Exposure	**High**	A 20 km section of the R75 is within 1 km of the route and motorists will spend approximately 12 minutes in a high visual exposure section. Motorists using the MR00407 will spend approximately 3 minutes in high visual exposure sections.
	Visual Intrusion	**Low**	Views from the R75 contain many large structures such as power lines, railway lines and substations. The road is also very busy and large vehicles are common. Visual intrusion will be high for motorists using the MR00407 in sections of high visual exposure. Traffic on this road is very low.
	Impact Intensity	**Low**	Motorists using the R75 are unlikely to notice the proposed power line since there are already similar structures in their views.

1.6.2 Construction Phase

1.6.2.1 Potential impact 1: Visual intrusion of construction activities associated with wind turbines on existing views of sensitive visual receptors in the surrounding landscape

Significance Statement

The extent of the impact will be regional (2) since construction activities will occur in an elevated area of the landscape and some activities will be exposed against the skyline. Impact intensity will be high (3) since construction activities will occur in a rural landscape with a sense of remoteness and scenic views will be affected. Construction of the WEF will take less than two years but some effects of construction are likely to be long term (3) – it is highly unlikely that roads required for transport of large wind turbine components will be completely rehabilitated and road cuttings along steep slopes will be highly visible for a long time, if not permanently. The Consequence Rating of the potential impact is very high (8). The impact will definitely occur since this is a very large development in a quiet rural area with many highly sensitive visual receptors. The significance rating of the potential impact is very high before mitigation. Mitigation measures, if practicable, should reduce the duration of this impact to short term (1), which will lower the Consequence Rating to medium (6) and the significance of the impact to medium. The status of the impact is negative since construction activity is experienced visually as disorderly and cluttered.

Essential Mitigation Measures

In section 1.1.4.1it is assumed that construction activities are managed and performed in such a way as to minimise its impact on the receiving environment. A number of mitigation measures are listed which are seen as standard best practice guidelines for construction. Additionally, it will be critical to the potential visual impact of the proposed development to plan access roads very carefully in order to minimise road cuttings where high slopes require them and to eliminate them from highly visible areas. It is clear from the few existing roads which provide access into the mountains that roads and road cuttings detract significantly from scenic views of the mountains. The access roads that will be required to transport components of the wind turbines will be wider and more visible than the existing roads. If it is possible to use helicopter transport for wind turbine components from a laydown area at the base of the mountain to the turbine sites then this should be preferred.

1.6.2.2 Potential impact 2: Visual intrusion of construction activities associated with overhead transmission lines on existing views of sensitive visual receptors in the surrounding landscape

Significance Statement

The extent of the impact will be local (1) since the active construction site is only a small section of the route. Impact intensity will be high (3) since construction activities will occur in a rural landscape with a sense of remoteness, and scenic views will potentially be affected. Construction of the transmission line will take less than two years and impact duration is therefore short term (1) although the construction site moves along the route and any visual impact on sensitive visual receptors caused by construction activities is likely to be much shorter than a year. The Consequence Rating for the potential impact is low (5) and the impact will definitely occur since there are highly sensitive visual

receptors that will be affected. The significance of the impact is low before and after mitigation. Construction activities cause negative impacts on visual receptors.

Essential Mitigation Measures

The assumptions listed in section 1.1.4.1 under Mitigation Measures apply.

1.6.3 Operational Phase

1.6.3.1 Potential impact 3: Impact of a wind energy facility on a landscape valued for its sense of remote wilderness and its scenic views

Significance Statement

It can be argued that the extent of the impact is national since it will affect a national resource which is scarce (the potential for scenic mountain views with very few man-made structures or human related impacts) and which is continually being reduced by a growing population and new developments. It is however a regional resource which is referred to in municipal planning and it is a resource used by the Groendal Nature Reserve and various privately protected areas such as game farms and eco-tourism ventures. The impact will therefore have at least a regional extent (2). The intensity of the landscape impact is high (3) since the landscape is highly sensitive to the development which will alter the landscape character. The impact duration is long-term (3) since the life-time of a wind energy facility is at least 25 years. The Consequence Rating for the landscape impact is therefore very high (8). The probability of the impact occurring is probable since not everyone will agree that the landscape is highly sensitive to the development. The significance of the landscape impact is very high and mitigation measures other than avoidance are unlikely to reduce the significance. Its status is negative according to I&APs' comments in the Scoping Report although this is not necessarily true for all the visual receptors that will potentially be affected by the development. Reversibility of the impact is moderate since although the most visible components of the development can be removed it is unlikely that roads and road cuttings will rehabilitate. Irreplaceability of the landscape character is very high since it is an ever-diminishing, non-renewable resource.

1.6.3.2 Potential impact 4: Visual intrusion of highly visible wind turbines on the existing views of sensitive visual receptors in the surrounding landscape

Significance Statement

The extent of the impact is regional (2) since key components of the WEF are highly visible and sensitive visual receptors up to at least 20 km from the facility will be affected. The intensity of the impact is high (3) since highly sensitive visual receptors in Groendal Nature Reserve and highly sensitive visual receptors in the region will potentially be affected. Impact duration is long term (3) since the lifetime of a wind energy facility is at least 25 years (which can be extended indefinitely with replacements and upgrades). The Consequence Rating for this impact is therefore very high (8). The impact will definitely occur since the wind turbines are highly visible in the landscape and there are many highly sensitive visual receptors that will be affected. The significance of the impact is Very High

and mitigation measures are unlikely to lower it. The impact status is negative since an aspect of what attracts highly sensitive visual receptors to the Groendal Nature Reserve is the scenic views which show little if any signs of human impact. Reversibility of the impact is moderate since although the most visible components of the development can be removed it is unlikely that roads and road cuttings will rehabilitate. Irreplaceability of visual resources is very high since highly valued scenic views will be altered for a long time.

Essential Mitigation Measures

- Ancillary buildings and structures should be located in low visibility areas;
- Maintenance of the turbines is important. Stationary rotors should be avoided as they create a negative impression – a stationary rotor is seen as not fulfilling its purpose;
- Signs near turbines should be avoided unless they serve to inform the public about wind turbines and their function. Advertising billboards should be avoided; and
- Wind turbines should be painted according to CAA regulations for wind turbines (CAA 1997).

1.6.3.3 Potential impact 5: Intrusion of obstruction lights associated with a wind energy facility on the nightscape of the surrounding region

The extent of this impact is regional (2) since the lights are likely to be seen in the surrounding region due to their elevated placement in the landscape and the dark nightscape of the region. The intensity of the impact is high (3) since the existing nightscape is very dark with only very few farmstead lights and occasional car lights. The mountains are almost completely devoid of lights and the introduction of 20+ lights along the mountain top is likely to have an impact on sensitive visual receptors in the surrounding landscape. The duration of the impact is long term (3) since the nightscape will be altered for the WEF lifetime. The Consequence Rating for this impact is very high (8) and its probability is definite since that many lights in a highly visible locality will be noticed. The significance of the impact is very high and since the lights are required by law there are no mitigation measures that will lower the significance. The reversibility of the impact is high since removal of the obstruction lights (and other lights at ancillary structures/buildings) will remove the impact. Irreplaceability of the existing dark nightscape of the region is high since it is a scarce resource that is diminished with every new development.

Essential Mitigation Measures

Mitigation measure for night lighting of buildings and structures are listed in section 1.1.4.1 and these apply to all ancillary structures and buildings. Obstruction lighting is required by law.

1.6.3.4 Potential impact 6: Visual intrusion of high voltage overhead transmission lines on the existing views of sensitive visual receptors in the surrounding landscape

The extent of the impact is regional (2) due to the length of the development and the height of the pylons – a large number of sensitive visual receptors are likely to be affected. The intensity of the impact is high (3) since there are existing, scenic views of highly sensitive visual receptors that will be highly intruded on by the proposed development (regardless of the route option chosen). The

duration of the impact is long term (3) since it will be required for the lifetime of the WEF. The Consequence Rating of the impact is therefore very high (8). The impact will definitely occur since there are many highly sensitive visual receptors that will potentially be affected. The significance of the impact is therefore very high. Power lines are almost universally experienced as detracting from scenic views and the impact status is therefore negative. Reversibility of the impact is high since the most visible components of the development - the power lines and towers - can be removed completely from views. Irreplaceability of visual resources is very high since highly valued scenic views will be altered for a long time.

Essential Mitigation Measures

Mitigation measures can lower the visual intrusion of the power line but it's unlikely that it can do that for all highly sensitive visual receptors on the route. The following mitigation measures will lower the intensity of the visual impact although it will remain high for many highly sensitive visual receptors:

- Minimal clearing of vegetation for servitude;
- Rehabilitate temporary areas cleared during construction;
- Locate towers in such a way as to maximize the screening effect of existing topography and avoid where possible locations where towers will be exposed against the skyline (e.g. avoid hill or ridge tops);
- Use wooden towers where available and practical, similar to those used for the existing transmission lines adjacent to the R75 since these have a more rural feel to them than lattice towers;
- Minimise the use of strain towers (used where the power line changes direction of more than 3°) since these towers are larger and more visually intrusive than normal towers; and
- Leave the project area in a condition that protects soil and surface materials, both on and off site, against erosion and instability.

1.6.4 Decommissioning Phase

1.6.4.1 Potential impact 7: Visual intrusion of decommissioning activities associated with a wind energy facility on the existing views of sensitive visual receptors in the surrounding landscape

Significance Statement

The extent of the impact will be regional (2) since decommissioning activities will occur in an elevated area of the landscape and some activities will be exposed against the skyline. Impact intensity will be high (3) since activities will occur in a rural landscape with a sense of remoteness and scenic views will be affected. Decommissioning of the WEF is likely to take a shorter time than its construction but a long term duration (3) for this phase is still envisaged – it is highly unlikely that roads required for transport of large wind turbine components will be completely rehabilitated and road cuttings along steep slopes will be highly visible for a long time, if not permanently. The Consequence Rating of the

potential impact is very high (8). The impact will definitely occur since this is a very large development in a quiet rural area with many highly sensitive visual receptors. The significance rating of the potential impact is very high before mitigation. Mitigation measures, if practicable, should reduce the duration of this impact to short term (1), which will lower the Consequence Rating to medium (6) and the significance of the impact to medium. The status of the impact is negative since construction activity is experienced visually as disorderly and cluttered.

Essential Mitigation Measures

In section 1.1.4.1it is assumed that decommissioning activities are managed and performed in such a way as to minimise its impact on the receiving environment. A number of mitigation measures are listed which are standard best practice guidelines for construction/decommissioning. If the construction of roads were done in such a way as to avoid permanent scarring of the landscape in highly visible areas then the decommissioning phase should also be of short term duration. Similarly, if helicopter transport of wind turbine components is possible then this should be preferred.

1.6.4.2 Potential impact 6: Visual intrusion of decommissioning activities associated with overhead transmission lines on the existing views of sensitive visual receptors in the surrounding landscape

Significance Statement

The extent of the impact will be local (1) since the active decommissioning site will comprise only a small section of the route . Impact intensity will be high (3) since decommissioning activities will occur in a rural landscape with a sense of remoteness, and scenic views will potentially be affected. Decommissioning of the transmission line will take less time than its construction and the impact duration is therefore short term (1). The Consequence Rating for the potential impact is low (5) and the impact will definitely occur since there are many highly sensitive visual receptors that will be affected. The significance of the impact is low before and after mitigation. Decommissioning activities, similar to those during construction, cause negative impacts on visual receptors.

Essential Mitigation Measures

The assumptions listed in section 1.1.4.1 under Mitigation Measures apply.

1.6.5 Cumulative Impacts

1.6.5.1 Cumulative impact 1: Visual impact of wind energy facilities on existing views of sensitive visual receptors in the region

The two wind energy facilities in the region that may contribute to cumulative visual impact are both almost 40 km and more from the proposed site for this WEF. If a visual receptor can see the Inyanda-Roodeplaat WEF as well as one of the other two (Innowind Grassridge or Ukomeleza WEFs) then it is

likely that they will make up a very small part of the view. The cumulative impact is therefore seen as **low**.

1.6.6 132 kV Transmission Line Route Alternatives

In terms of visual intrusion the proposed routes are very similar. Route Option 2 is likely to affect more sensitive visual receptors than the other two but its intrusion on scenic views will be lower since most of it is through a region that is already somewhat affected by large scale structures such as power lines, substations, roads and buildings. The preferred route and Option 1 follow the MR00407 and passes through a part of the region that appears relatively intact and contain few man-made structures. Route Option 2 should be preferred if the choice is based on minimizing visual impact only.

1.7 IMPACT ASSESSMENT SUMMARY

The assessment of impacts and recommendation of mitigation measures as discussed above are collated in Table **Error! No text of specified style in document.**-9 to Table **Error! No text of specified style in document.**-11

below.

Table **Error! No text of specified style in document.**-9 Impact assessment summary table for the Construction Phase

Construction Phase											
Impact Description	**Status**	**Spatial Extent**	**Duration**	**Reversibility**	**Potential Intensity**	**Consequence**	**Probability**	**Significance (Without Mitigation)**	**Mitigation Measures**	**Significance (With Mitigation)**	**Confidence**
	Wind Energy Facility										
Visual intrusion of construction activities associate with wind turbines on existing views of sensitive visual receptors in the surrounding landscape	Negative	Regional (2)	Long Term (3)		High (3)	High (8)	Definite	Very High	Access roads must be carefully planned to minimise road cuttings where high slopes require them and to eliminate them from highly visible areas.	Medium	**High**
									•		
	132 kV Transmission Line										
Visual intrusion of construction activities associated with overhead transmission lines on existing views of sensitive visual receptors in the surrounding landscape	Negative	Local (1)	Short Term (1)		High (3)	Low (5)	Definite	**Low**	Standard construction best practice guidelines to be followed.	**Low**	**High**
									•		
									•		

Table **Error! No text of specified style in document.**-10 Impact assessment summary table for the Operational Phase

Operational Phase											
Impact Description	**Status**	**Spatial Extent**	**Duration**	**Reversibility**	**Potential Intensity**	**Consequence**	**Probability**	**Significance (Without Mitigation)**	**Mitigation Measures**	**Significance (With Mitigation)**	**Confidence**
	Wind Energy Facility										

Impact of a wind energy facility on a landscape valued for its sense of remote wilderness and its scenic views	Negative	Regional (2)	Long Term (3)	Moderate	High (3)	Very High (8)	Probable	**Very High**		**Very High**	**High**
Visual intrusion of highly visible wind turbines on the existing views of sensitive visual receptors in the surrounding landscape	Negative	Regional (2)	Long Term (3)	Moderate	High (3)	Very High (8)	Definite	**Very High**	• Ancillary buildings and structures to be located in low visibility areas; • Maintenance of turbines is important; • Signs near turbines should be avoided; • Turbines should be painted according to CAA regulations for wind turbines.	**Very High**	**High**
Intrusion of obstruction lights associated with a wind energy facility on the nightscape of the surrounding region	Negative	Regional (2)	Long Term (3)	High	High (3)	Very High (8)	Definite	**Very High**	• Lighting of ancillary buildings and structures should be designed to minimise light pollution without compromising safety; •	**Very High**	**High**
	132 kV Transmission Line										

Visual intrusion of high voltage overhead transmission lines on the existing views of sensitive visual receptors in the surrounding landscape	Negative	Regional (2)	Long Term (3)	High	High (3)	Very High (8)	Definite	**Very High**	• Minimal clearing of vegetation for servitudes; • Rehabilitate temporary areas cleared during construction; • Locate towers in such a way as to maximise the screening effect of existing topography; • Use wooden towers;		

Table **Error! No text of specified style in document.**-11 Impact assessment summary table for the Decommissioning Phase

Decommissioning Phase											
Impact Description	**Status**	**Spatial Extent**	**Duration**	**Reversibility**	**Potential Intensity**	**Consequence**	**Probability**	**Significance (Without Mitigation)**	**Mitigation Measures**	**Significance (With Mitigation)**	**Confidence**
	Wind Energy Facility										

Visual intrusion of decommissioning activities associated with a wind energy facility on the existing views of sensitive visual receptors in the surrounding landscape	Negative	Regional (2)	Long Term (3)		High (3)	Very High (8)	Definite	**Very High**	See mitigation measures for construction activities	**Medium**	**High**
	132 kV Transmission Line										
Visual intrusion of decommissioning activities associated with overhead transmission lines on the existing views of sensitive visual receptors in the surrounding landscape	Negative	Local (1)	Short Term (1)		High (3)	Low (5)	Definite	**Low**	See mitigation measures for construction activities	**Low**	High

1.8 CONCLUSION AND RECOMMENDATION

The proposed site is located in a landscape that is highly sensitive to a wind energy facility. Locating wind turbines on the Groot Winterhoek Mountains in very close proximity to the Groendal Nature Reserve will have a very significant visual impact on highly sensitive visual receptors. Wind turbines will intrude on scenic mountain views from the surrounding region and, importantly, from the Groendal Nature Reserve. The proposed facility will have more than 50 wind turbines and a 132 kV power line of more than 30 km in length in a region where scenic mountain views are valued. It can be argued that wind energy facilities stand as symbols for a change in the way humans interact with nature, and as such that they are congruent with landscapes in which nature conservation is a significant component. Wind energy facilities are not traditional industrial developments and are relatively passive in terms of their effects on the environment when compared to traditional power generation facilities. There are no activities associated with them once they are operational. However, the landscape in which the turbines are to be placed has relatively few large scale and visually obvious man-made structures. Visitors to the Groendal Nature Reserve can find scenic views of the mountain ranges with very few man-made structures in them. It provides visitors with a sense of remote wilderness where human influences are minimal. Not many of these landscapes remain in South Africa and the Groendal Nature Reserve is an attempt to preserve one of them. Highly visible wind turbines located on a mountain range in close proximity to declared nature reserves will most likely prevent the Groendal Nature Reserve from achieving that goal.

The very high significance rating for the potential visual and landscape impacts identified in this report indicates that the proposed site for the Inyanda Roodeplaat WEF is not ideal in terms of landscape and visual considerations.

1.9 REFERENCES

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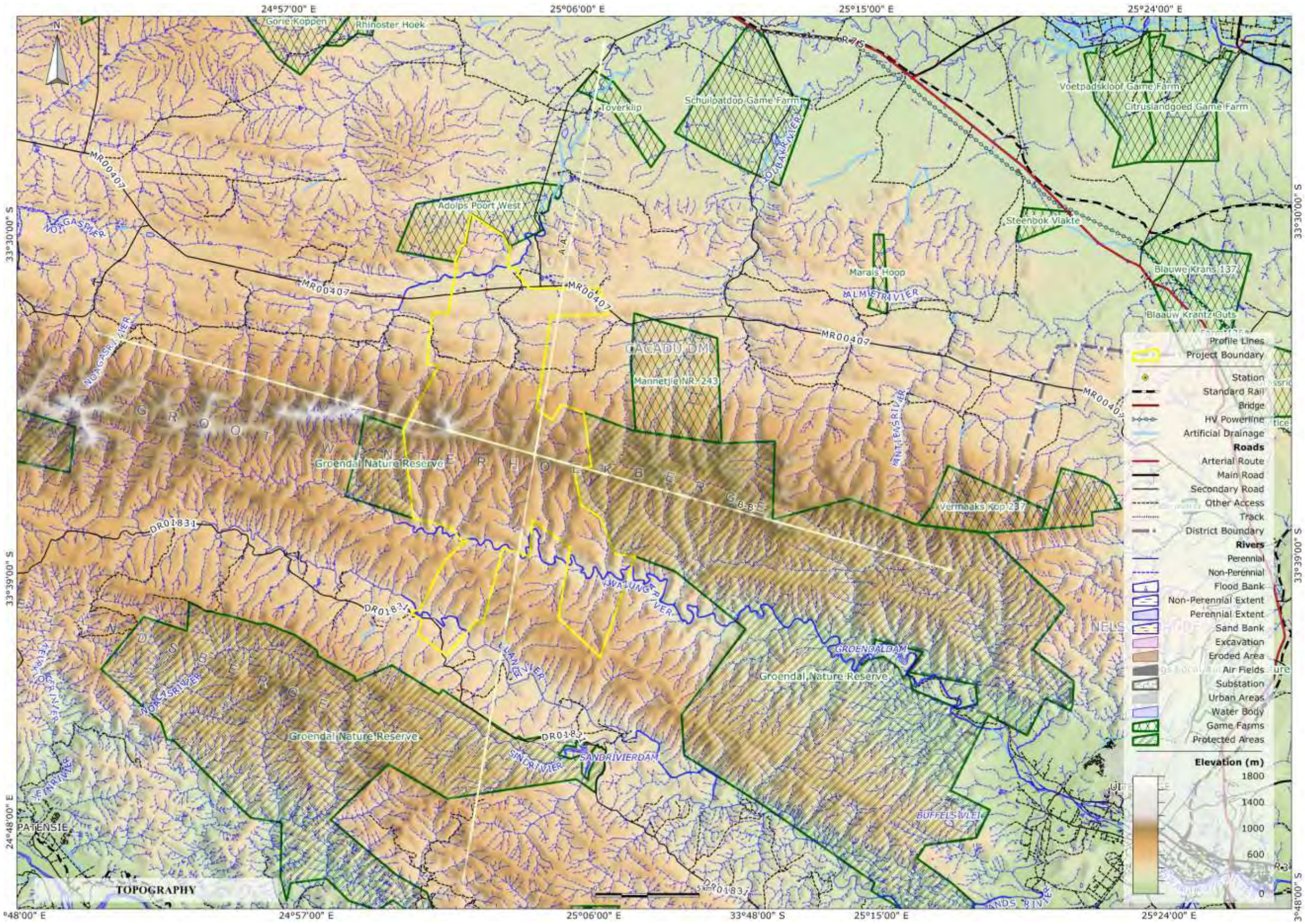
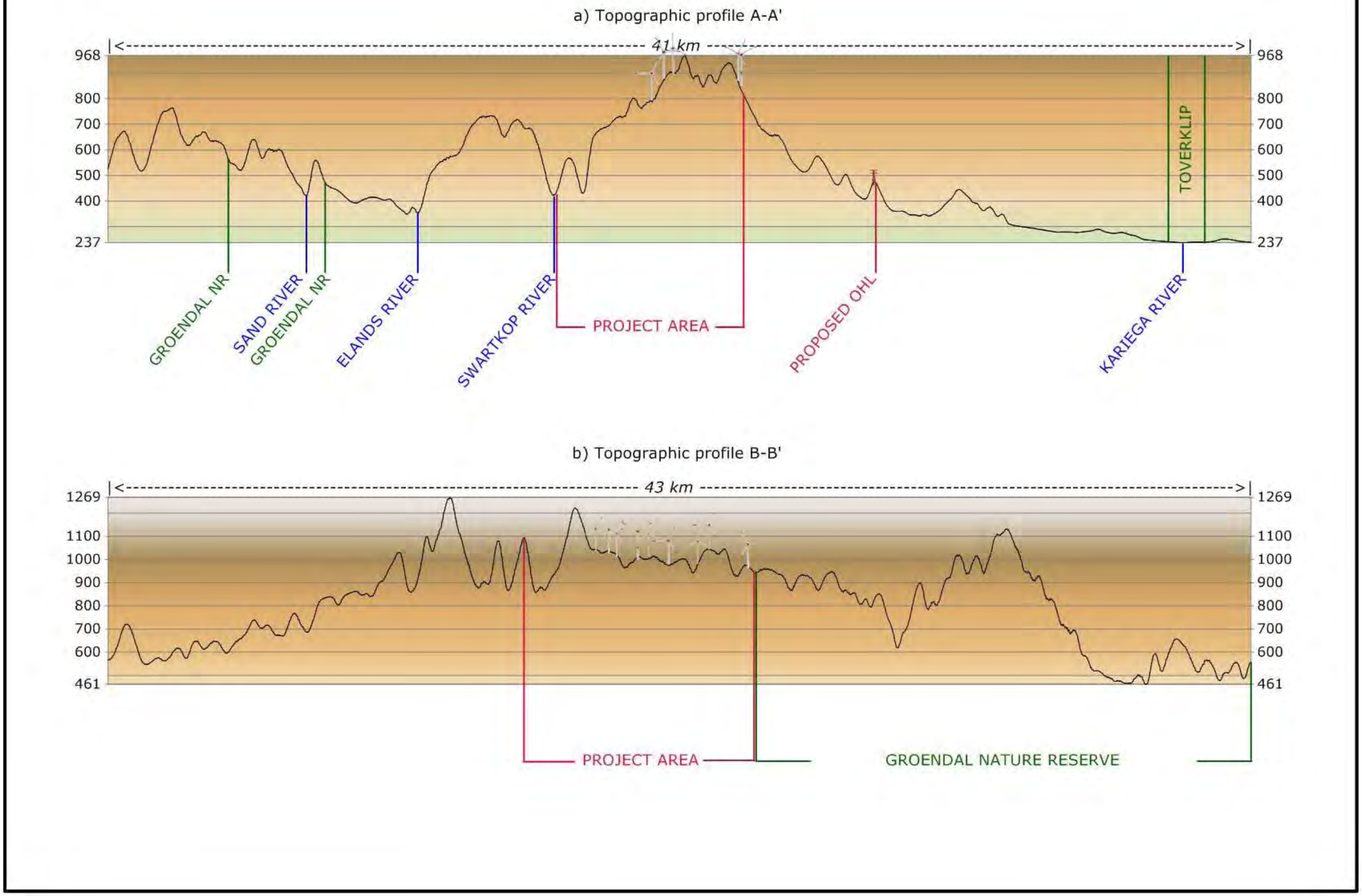
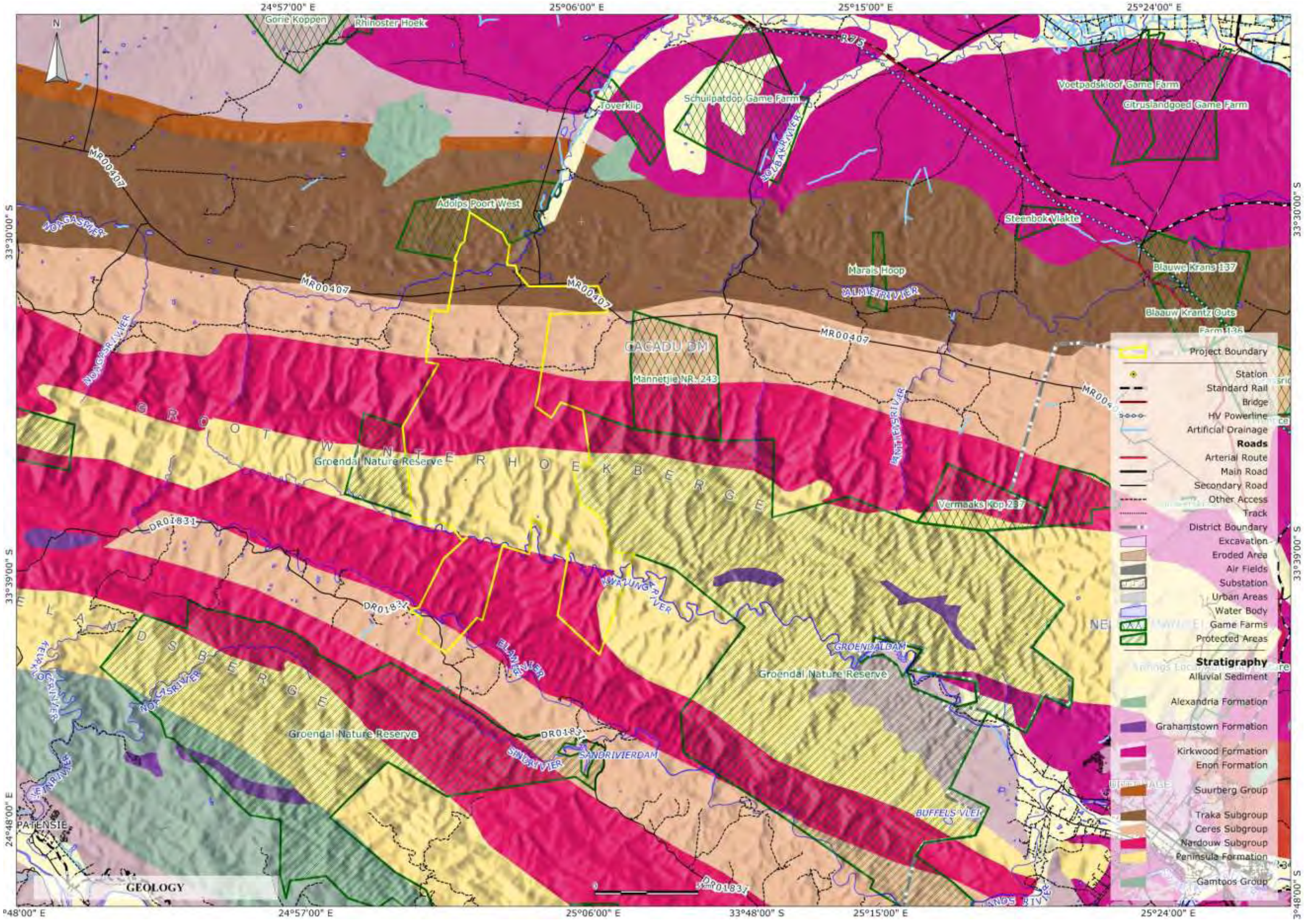
1.10 APPENDIX – A3 FORMAT MAPS



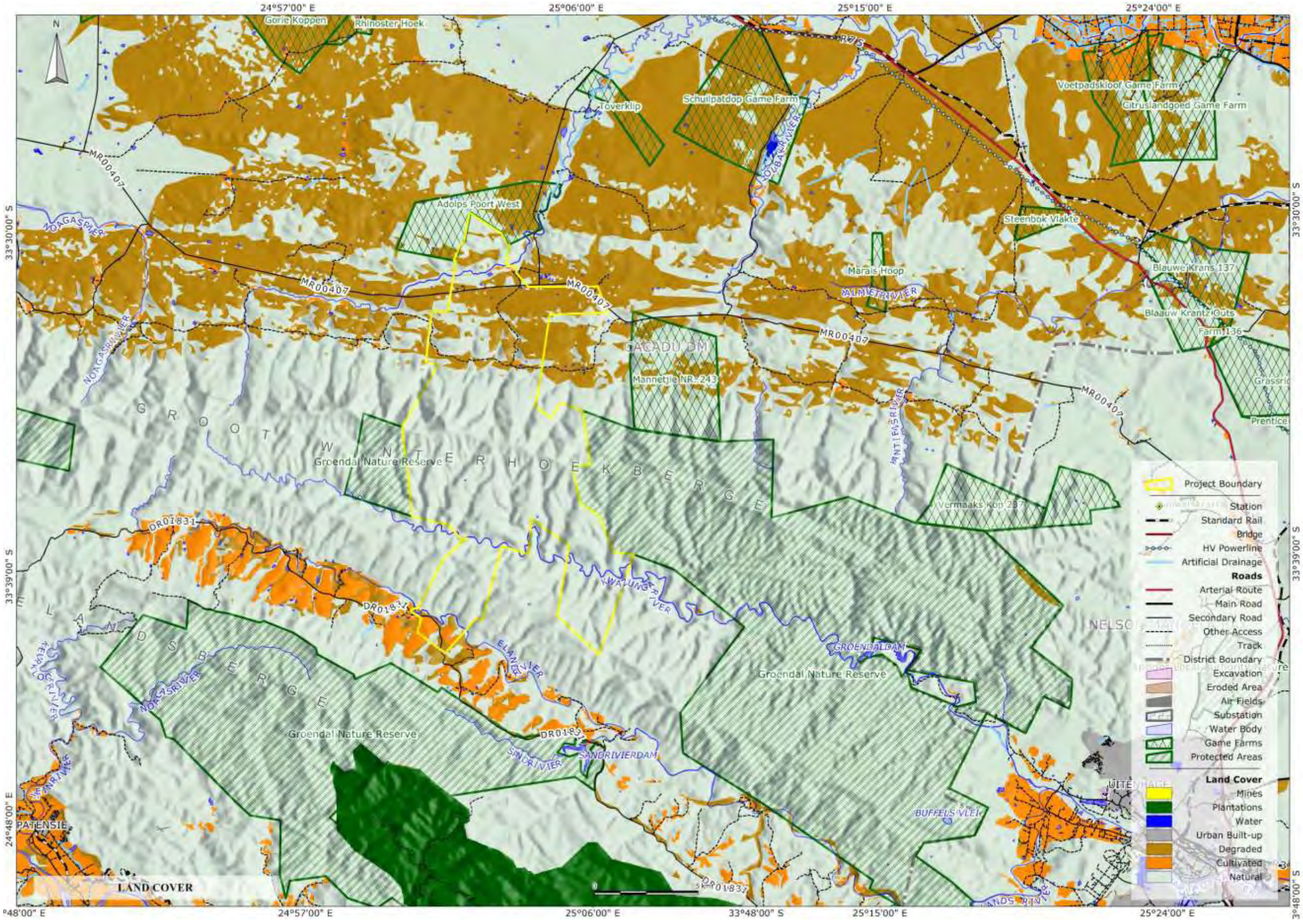
Map 1 Topographic map of the region surrounding the proposed WEF.



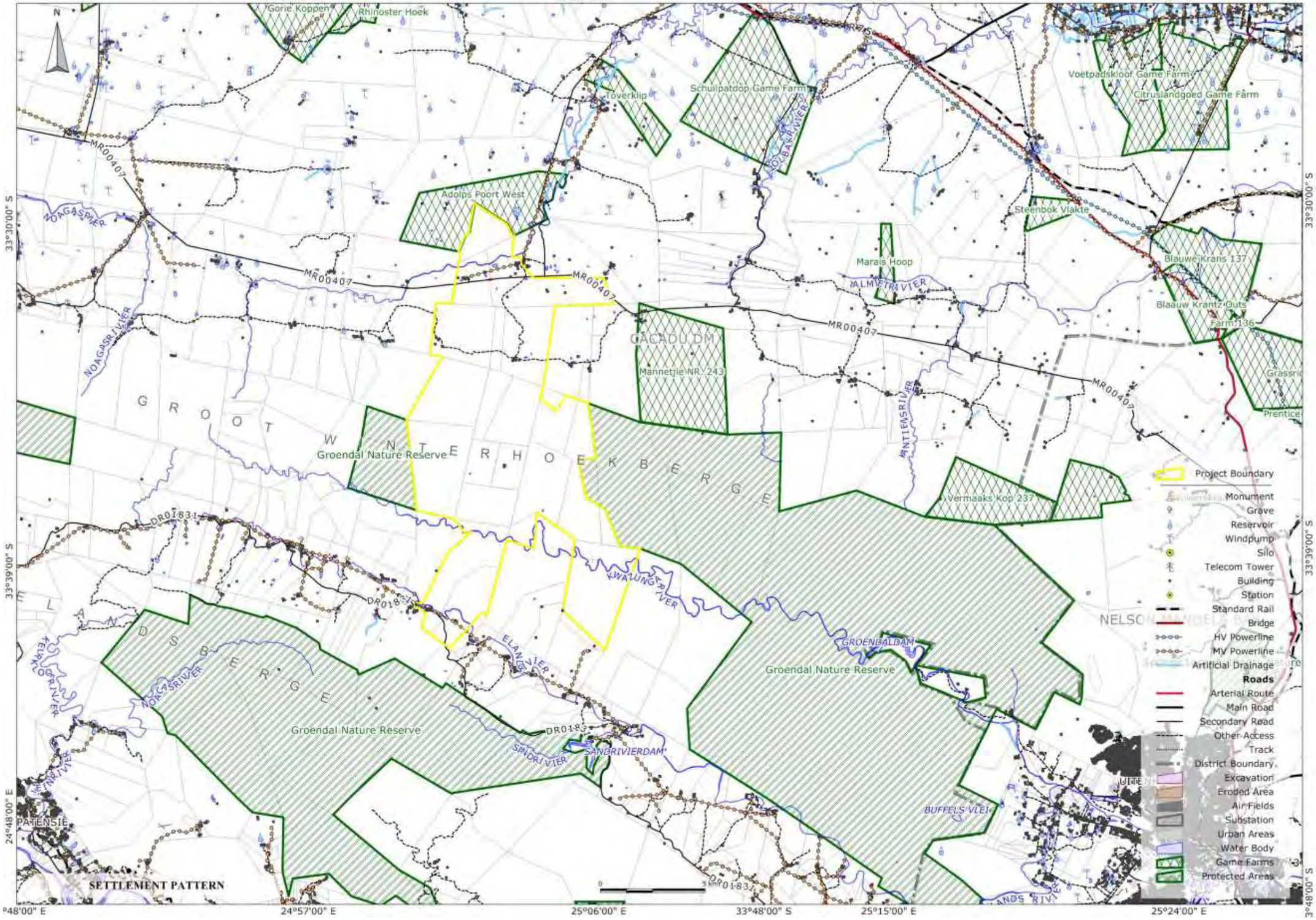
Map 2 Topographic profiles along lines shown on the topographic map.



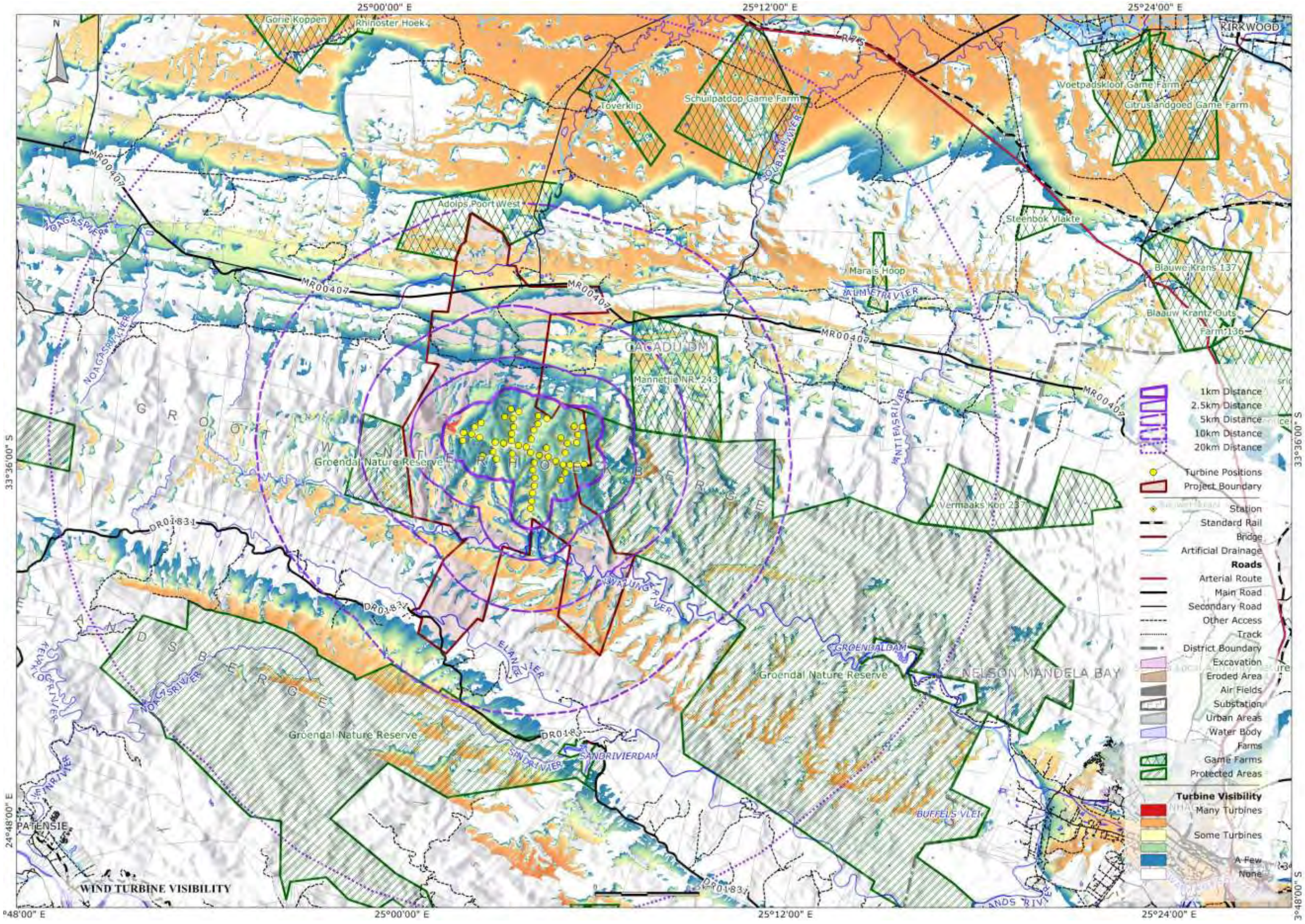
Map 3 Simplified geology of the region proposed for the development.



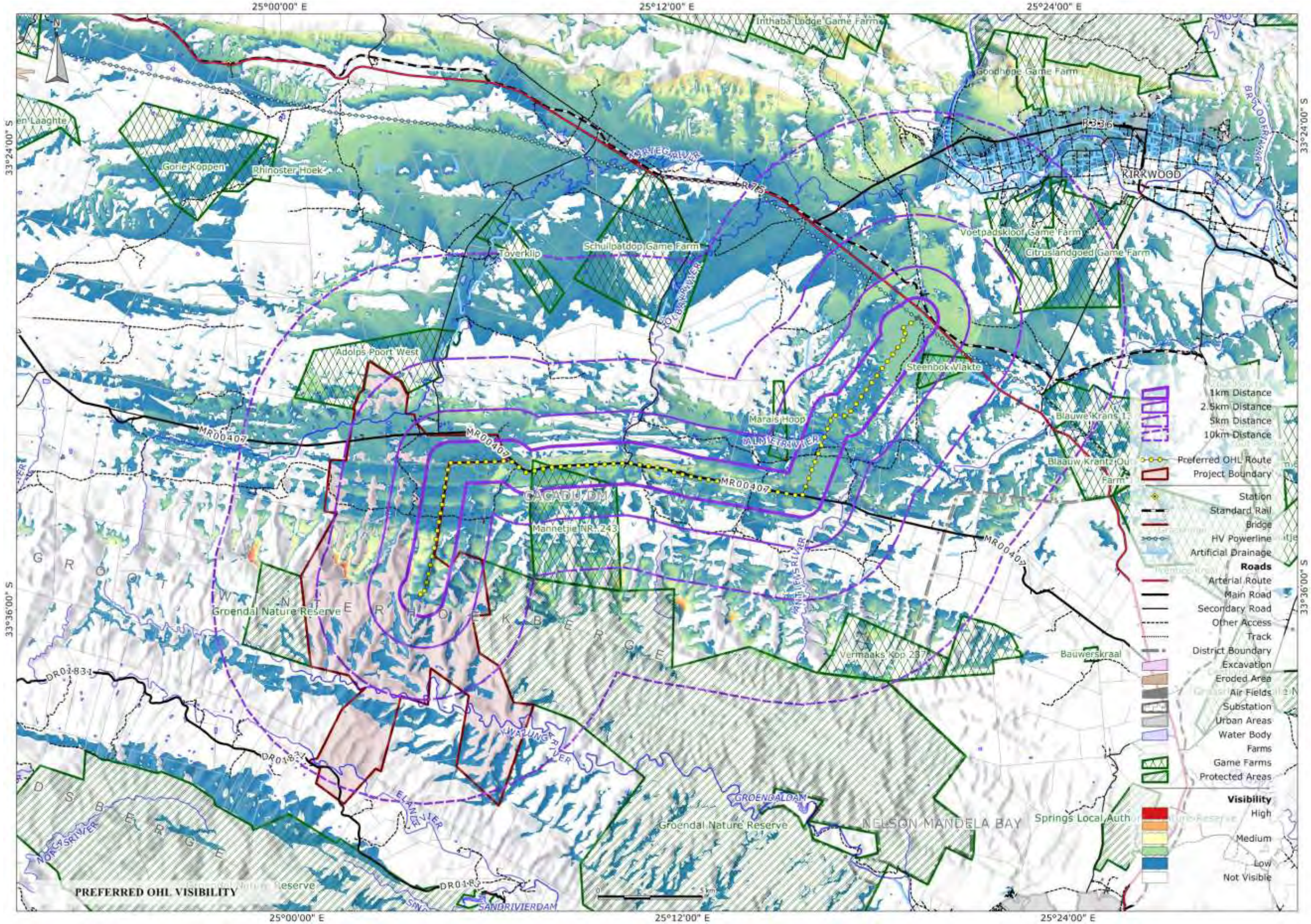
Map 4 Land cover (combination National Land Cover 2009 and that of the Biodiversity Sector Plan for the Sundays River Valley Municipality 2012) of the region surrounding the proposed development site.



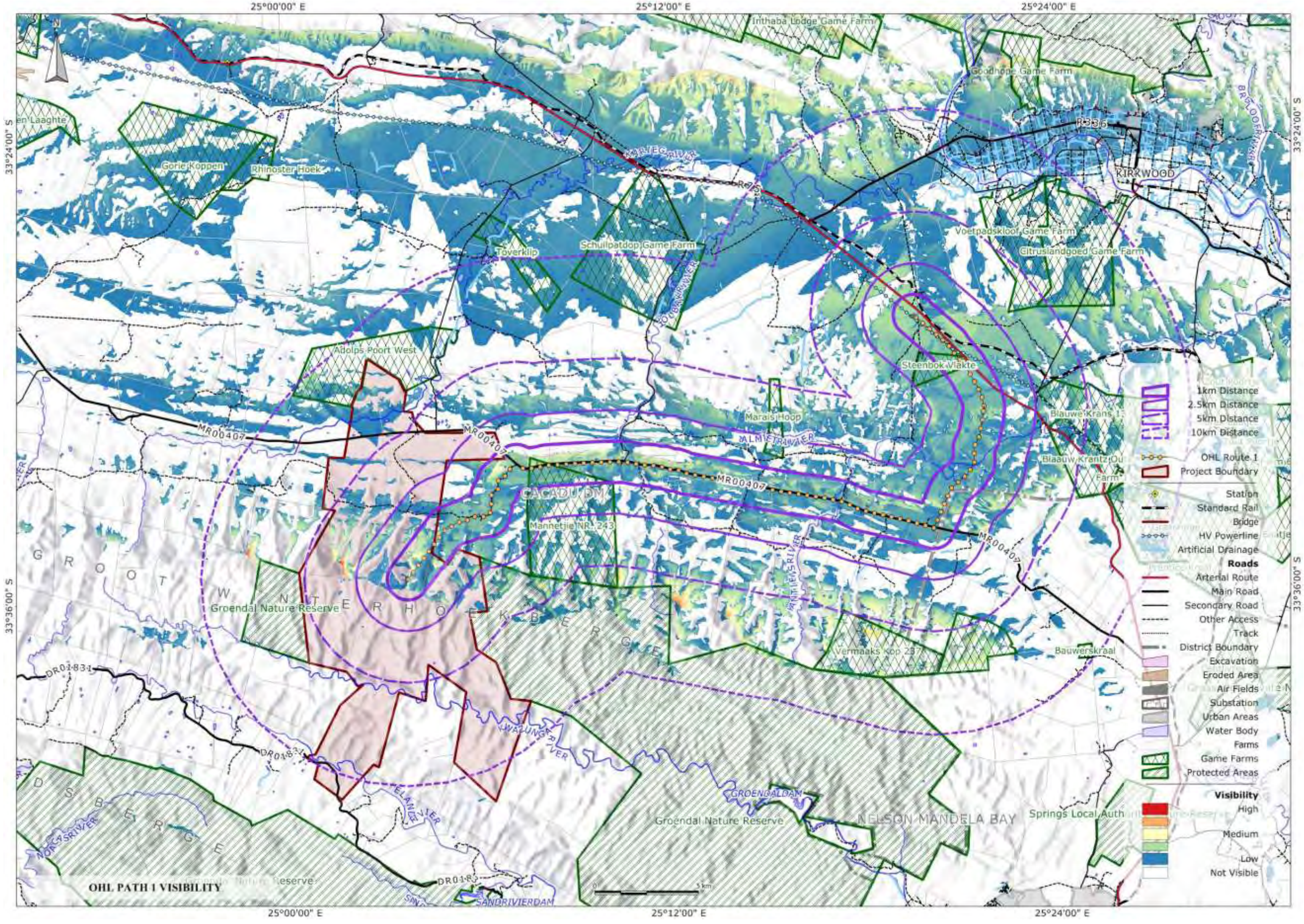
Map 5 Settlement patterns and man-made structures in the region surrounding the proposed development.



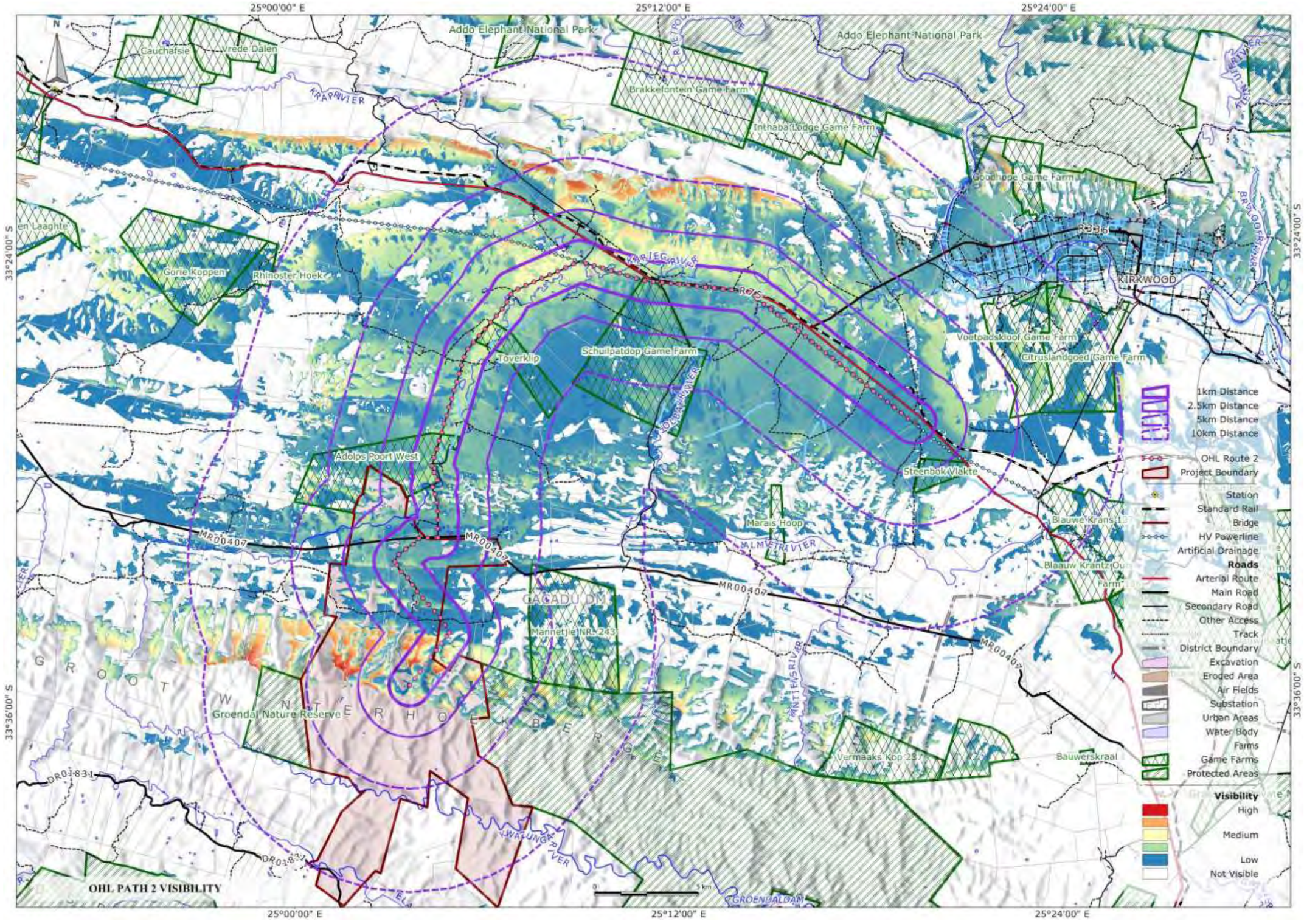
Map 6 Cumulative viewshed of wind turbines



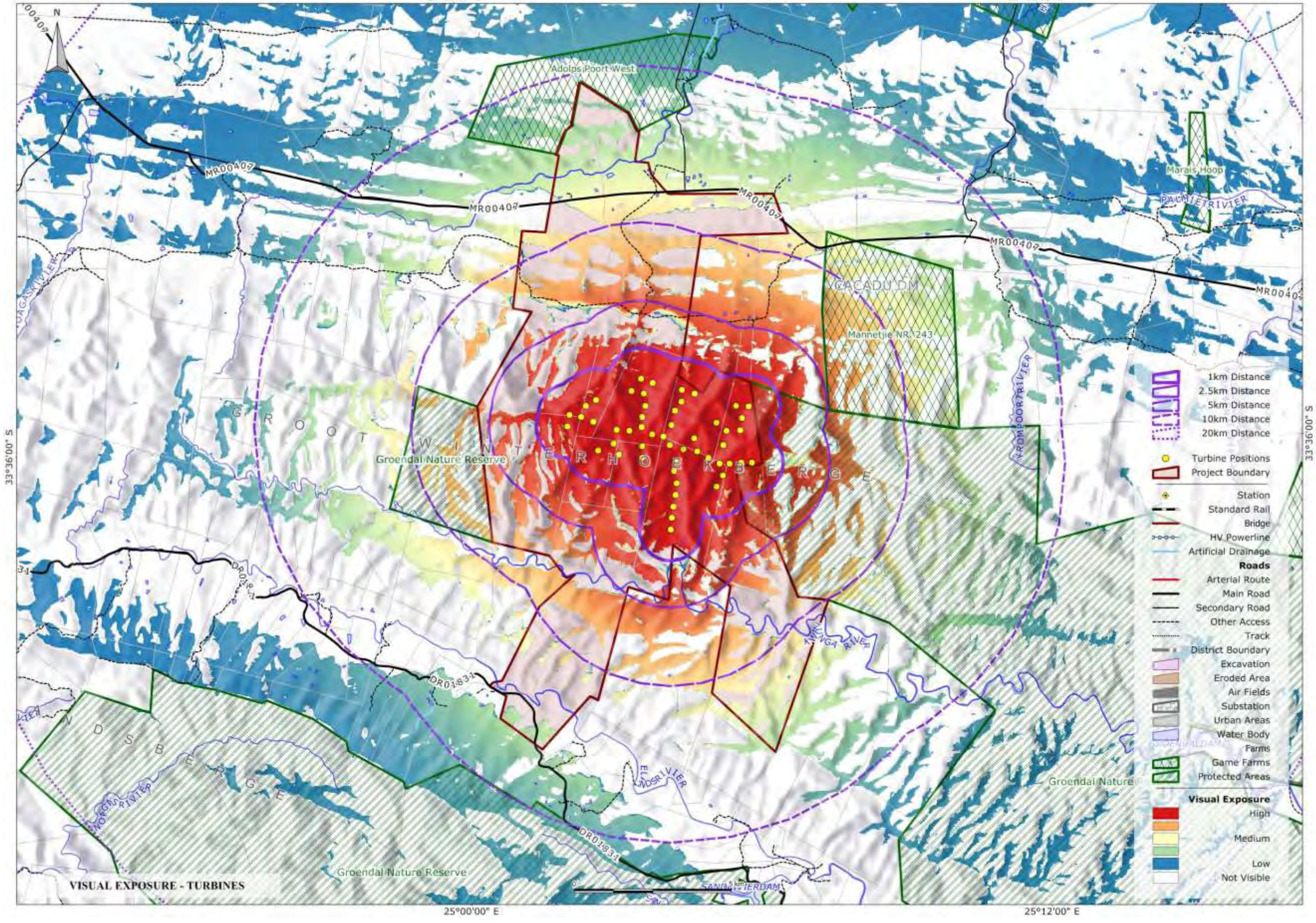
Map 7 Cumulative viewshed of a high voltage transmission line along the preferred route.



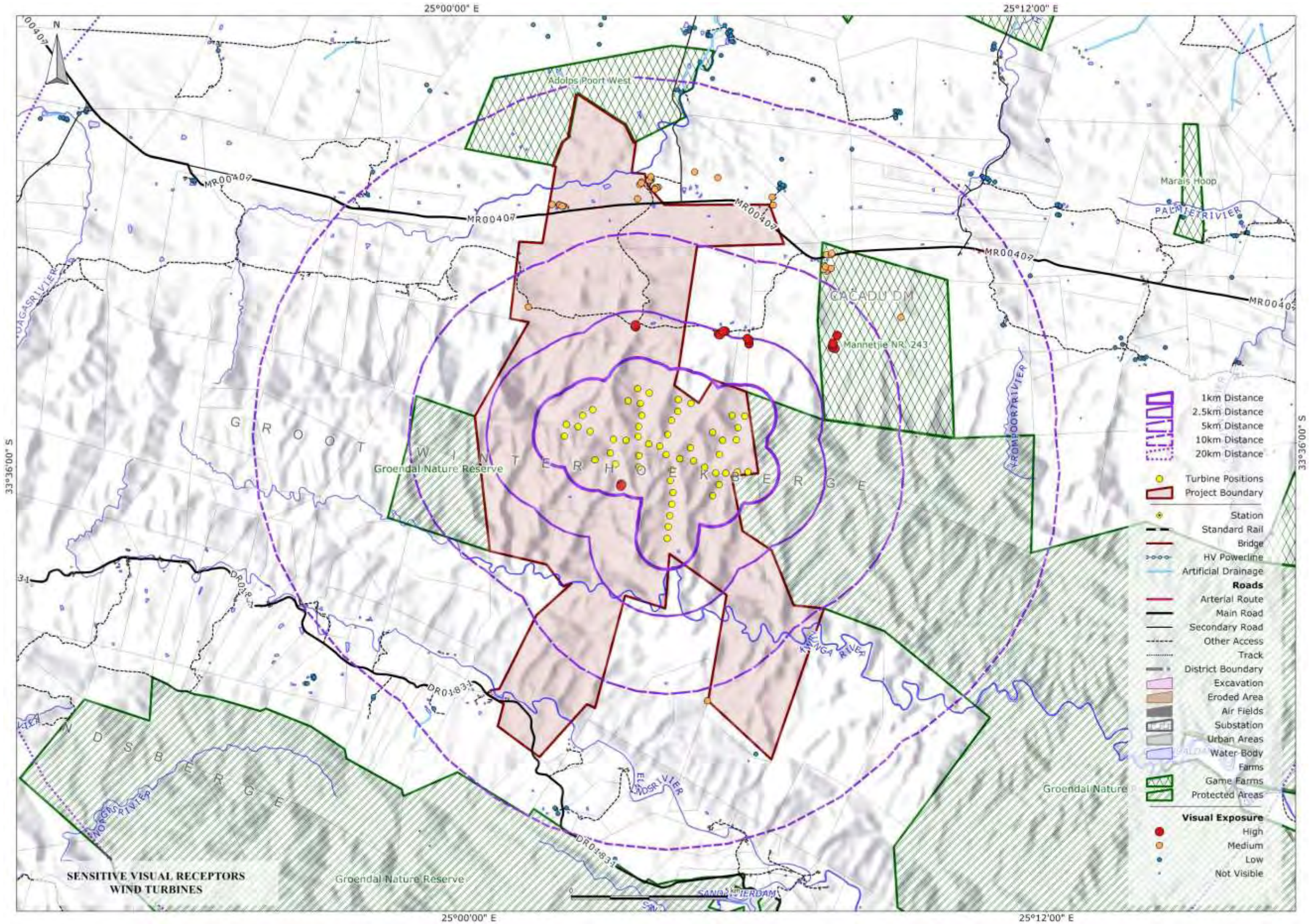
Map 8 Cumulative viewshed of a high voltage transmission line along route option 1.



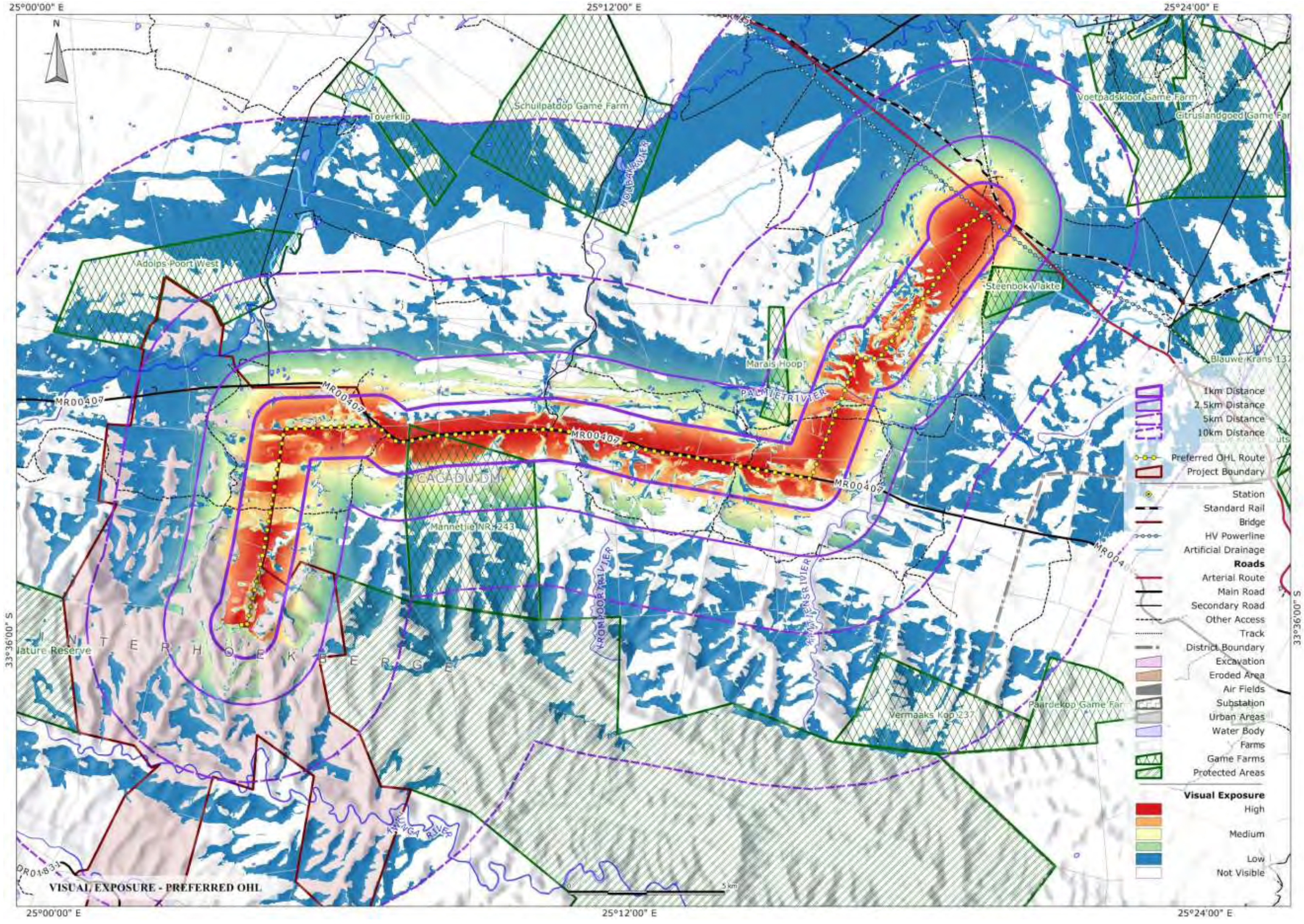
Map 9 Cumulative viewshed of a high voltage transmission line along route option 2.



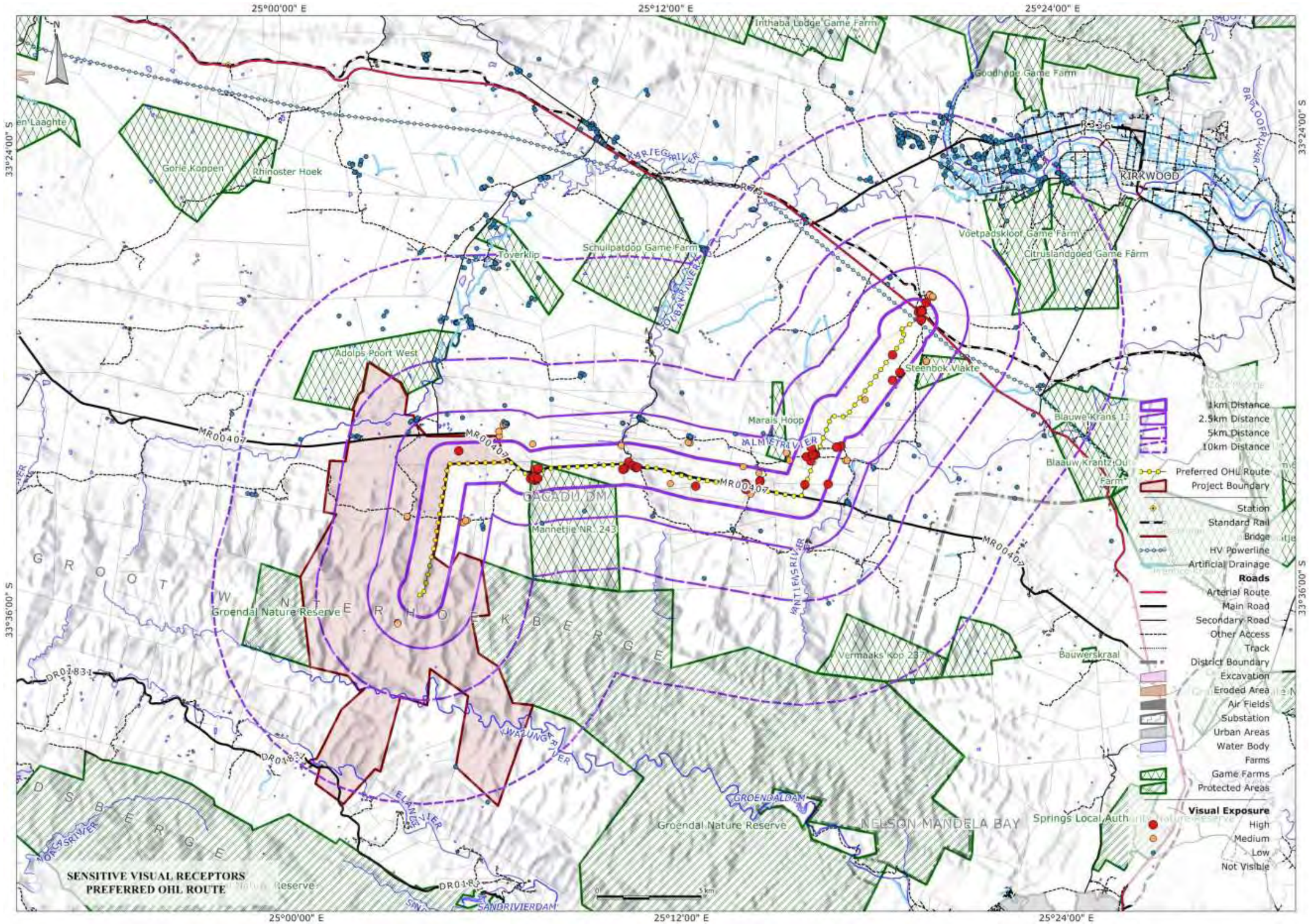
Map 10 Visual exposure to wind turbines.



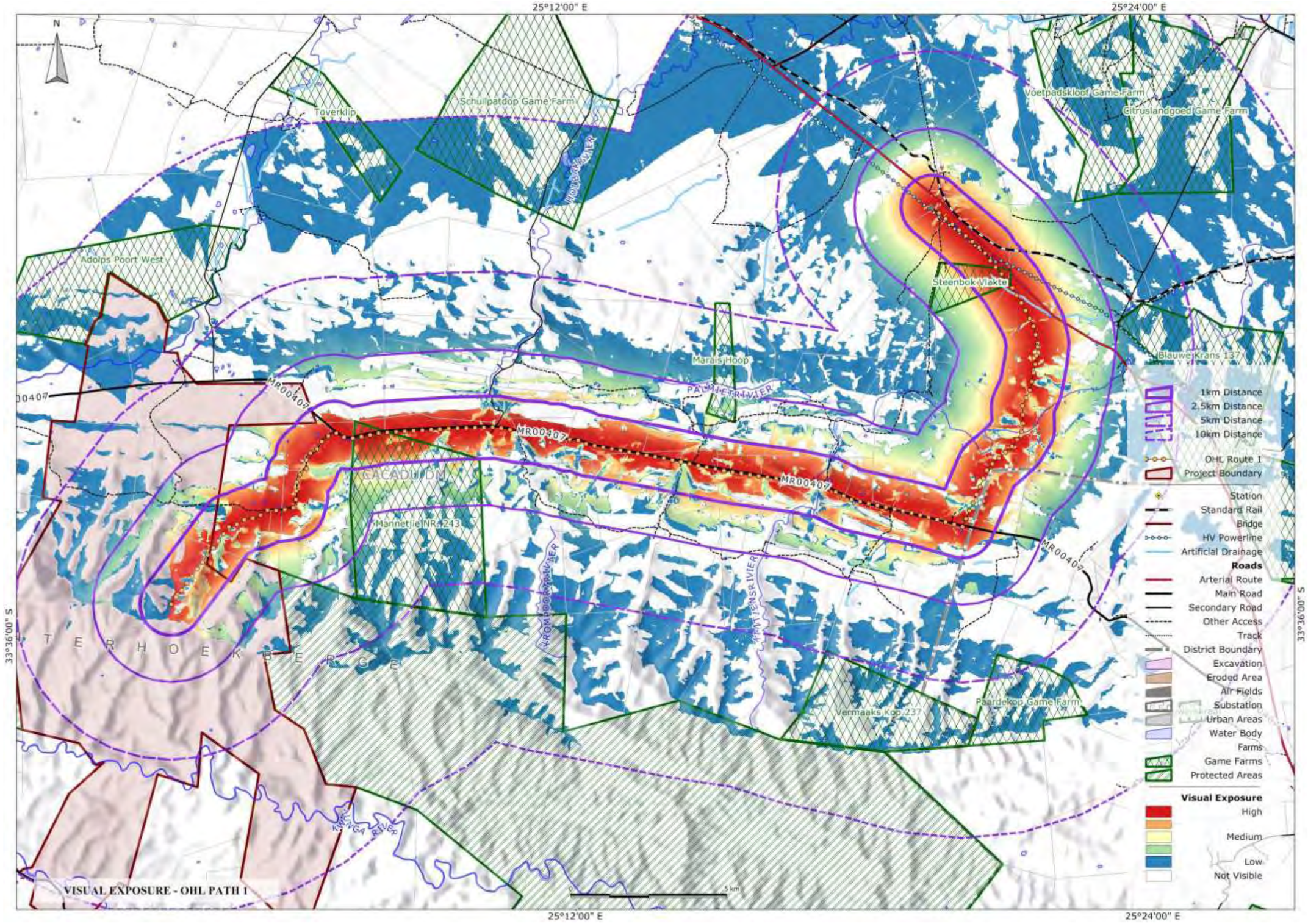
Map 11 Visual exposure of sensitive visual receptors to wind turbines.



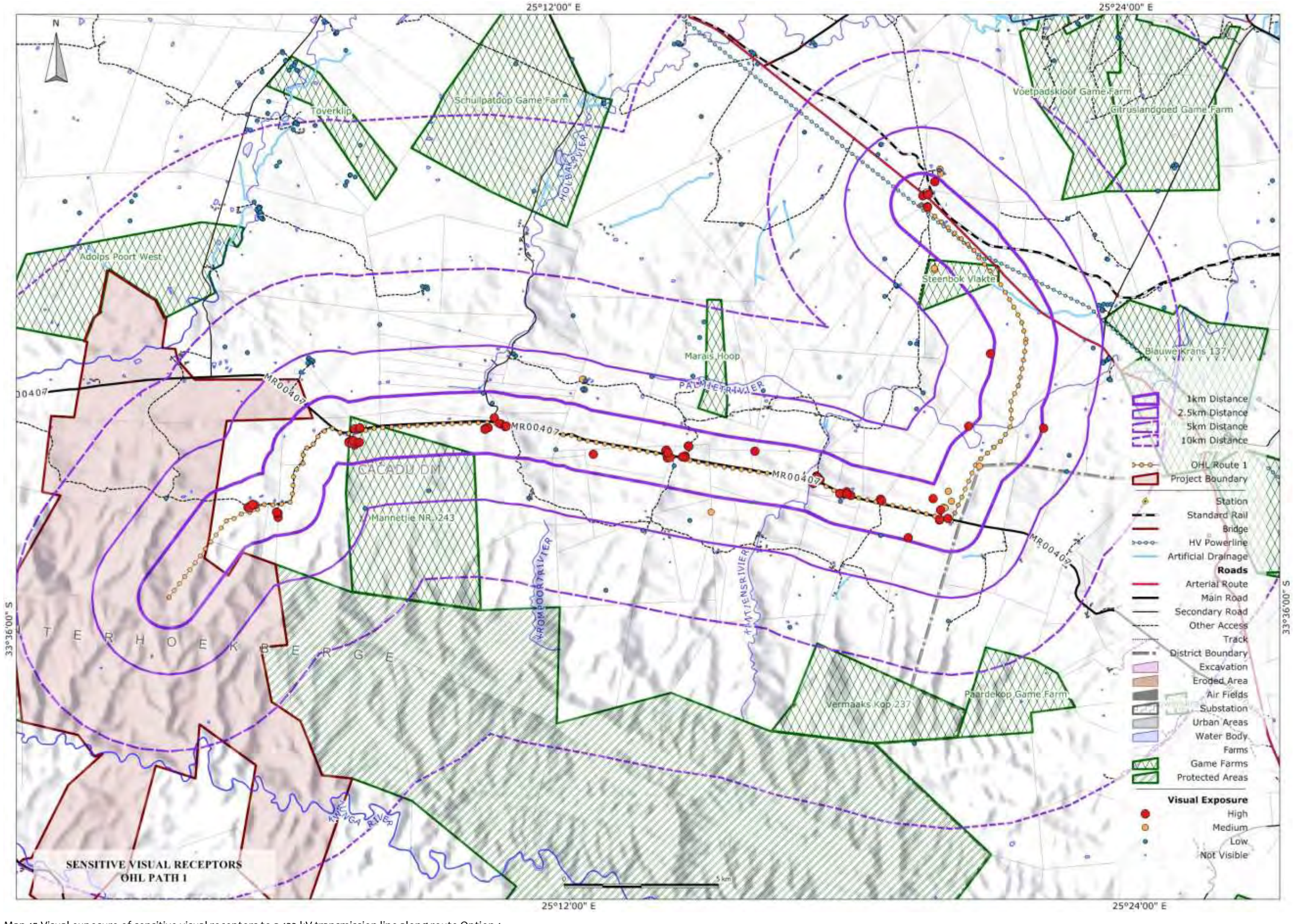
Map 12 Potential visual exposure to proposed transmission line along preferred route.



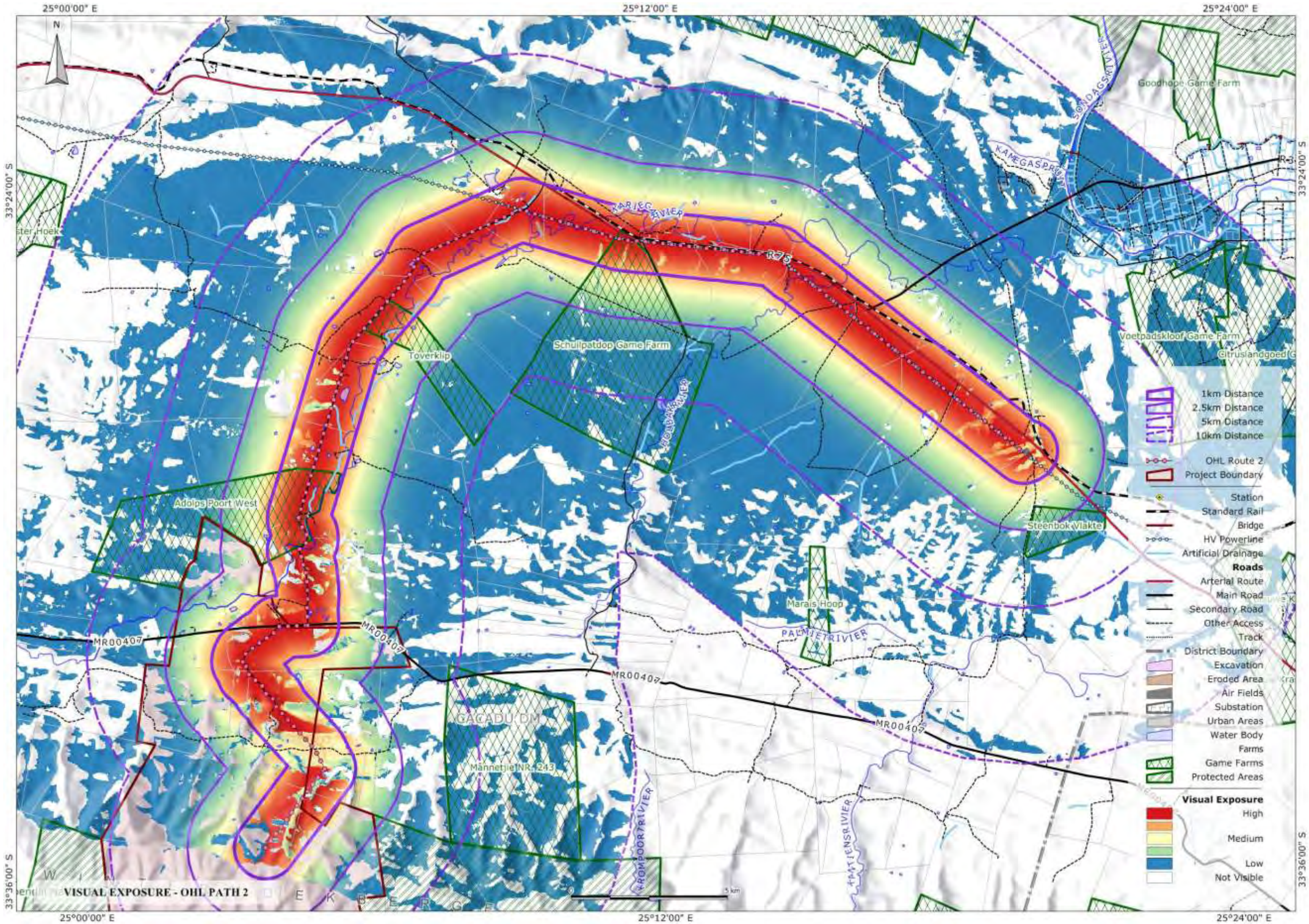
Map 13 Potential visual exposure of sensitive visual receptors to OHL transmission lines along preferred route.



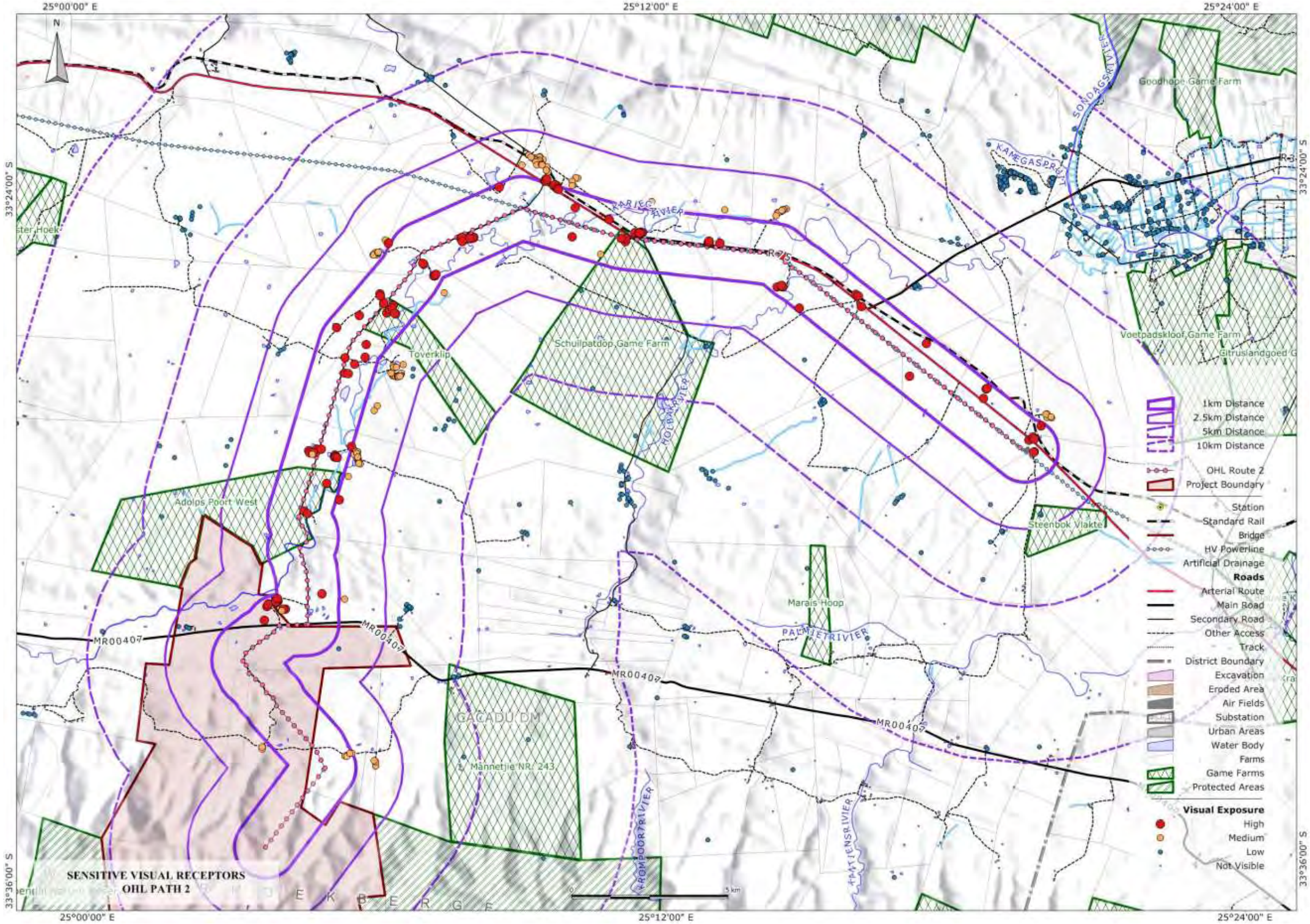
Map 14 Visual exposure for an overhead transmission line along route Option 1.



Map 15 Visual exposure of sensitive visual receptors to a 132 kV transmission line along route Option 1.



Map 16 Visual exposure to a 132 kV transmission line along route Option 2.



Map 17 Visual exposure of sensitive visual receptors to a 132 kV transmission line along route Option 2.

Map 18 Sites from which photos were taken as part of the photographic survey.