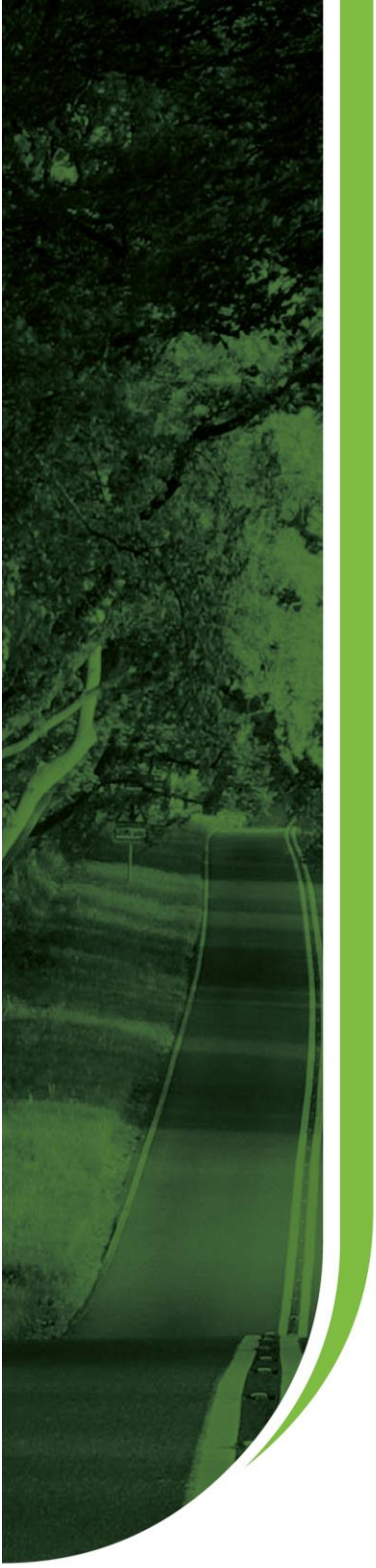


PROPOSED DEVELOPMENT OF THE GROMIS-NAMA-AGGENEIS 400 KV POWER LINE AND ASSOCIATED INFRASTRUCTURE FOR THE IPP INTEGRATION WITHIN THE NORTHERN CAPE PROVINCE

Visual Impact Assessment

January 2020

Prepared for:

Prepared by:

Mr Christoff du Plessis
christoff@enviroworks.co.za

1 QUALITY AND REVISION RECORD

1.1 QUALITY APPROVAL

	Capacity	Name	Signature	Date
Author	Visual Specialist	Christoff du Plessis		28/02/2020
Reviewer	Quality Check Officer	Elbi Bredenkamp		02/03/2020

This report has been prepared in accordance with Enviroworks Quality Management System.

1.2 REVISION RECORD

Revision Number	Objective	Change	Date
Version 1	-	-	03/03/2020

2 EXECUTIVE SUMMARY

Enviroworks was appointed by Eskom to compile the Visual Impact Assessment (VIA) for the proposed development of the 400 kV IPP Powerline from Gromis sub-station via Nama Sub-station to Aggeneis sub-station in order to determine the Visual Impact thereof. This VIA Report was compiled in accordance with the Guidelines for involving a Visual and Aesthetic Specialist in the EIA process (DEA&DP, 2005). This Guideline was developed by the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) to be implemented as best practise.

2.1 PROJECT DESCRIPTION

Eskom proposes to develop a new powerline from Gromis sub-station via Nama sub-station towards Aggeneis sub-station in the Northern Cape Province. In order to ensure that the Namaqualand network is compliant and that there is sufficient line capacity to accommodate potential Independent Power Producers (IPPs) within the Namaqualand area, the construction of the new Gromis-Nama-Aggeneis 400 kV line and establishment of a 400/132 kV yard at Nama sub-station is proposed. The Screening Assessment aims to assess possible route alternatives for the proposed new powerline.

In 2016 a Strategic Environmental Assessment (SEA) was undertaken by CSIR. The purpose of the SEA was to identify strategic Electricity Grid Infrastructure (EGI) Corridors to support electricity transmission up to 2040. The vision for the strategic EGI was to expand in an environmentally responsible and efficient manner that effectively meet the country's economic and social development needs. The final EGI Power Corridors assessed as part of the 2016 EGI Strategic SEA were gazetted for implementation on 16 February 2018 in Government Gazette 41445, Government Notice R. 113. One of these corridors, was the Northern Corridor. The proposed new powerline will be constructed within the Northern Corridor.

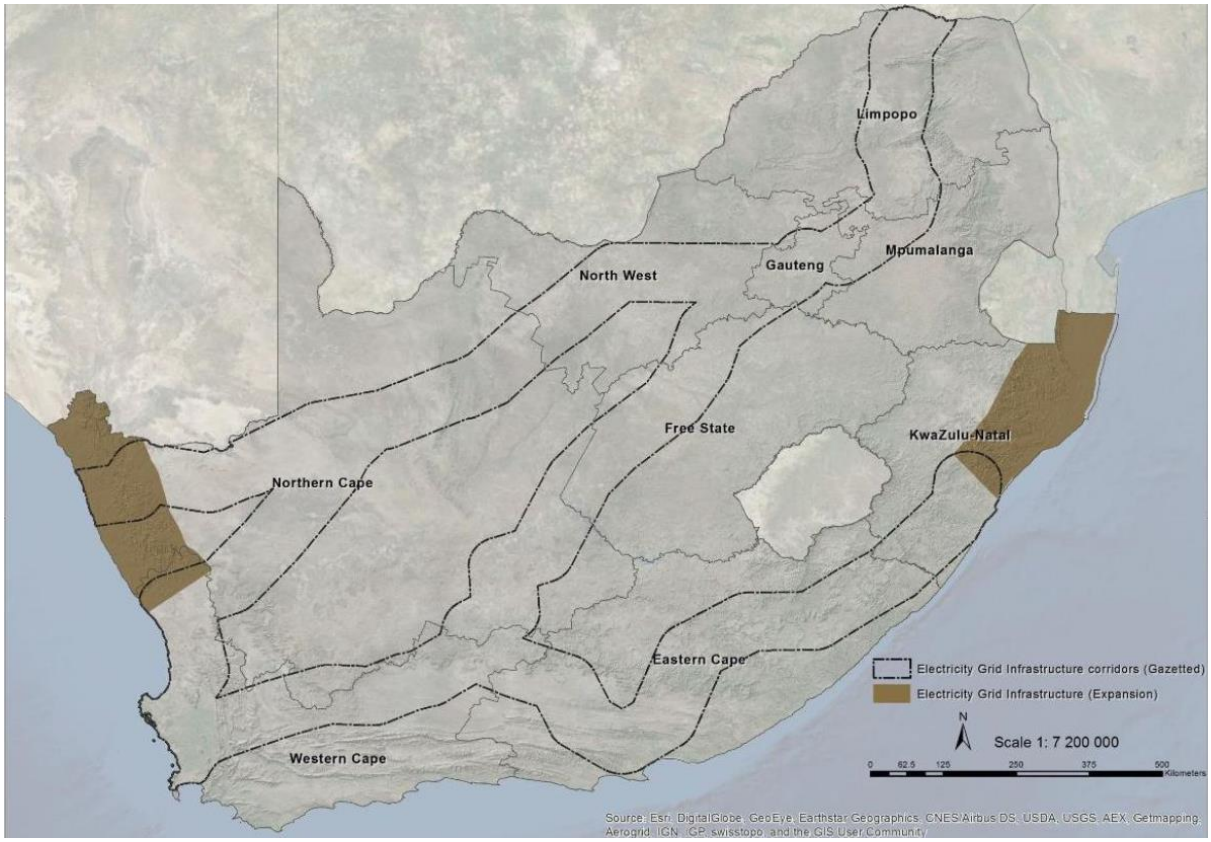


Figure 1: Electricity Grid Infrastructure Corridors of South Africa.

The above mentioned Gazette provided an alternative procedure to be followed when applying for Environmental Authorisation for the development of large scale electricity transmission and distribution infrastructure (identified in terms of Section 24(2)(a) of the National Environmental Management Act (Act 107 of 1998, as amended)(NEMA)) when these activities fall within the identified Strategic Transmission Corridors, such as the Northern Corridor.

The development of large scale electricity transmission infrastructure triggers Listed Activity 9 of Government Notice Regulation 325 of 07 April 2017 which usually would require a full Scoping and Environmental Impact Assessment. However, when such a development is to take place within a Strategic Transmission Corridor, a Basic Assessment (BA) Process in terms of the 2017 EIA Regulations is to be followed. This speed up the Environmental Authorisation Process for EGI developments within any of the five (5) Strategic Transmission Corridors. A pre-requisite for the BA process to be followed is that a servitude must be determined prior to the commencement of the application for Environmental Authorisation.

Two (2) tower designs will be used for the construction of the 400 kV Powerline, namely:

1. Where the gradient is below 15% the Cross Rope Suspension Towers and Guyed-Vee Towers will be used (height of 32 metres); and,
2. Where the gradient is steeper than 15% the Self Supporting Towers will be used (average height of 28 metres; however, can go as high as 43 metres depending on the topography of the study area).

The towers will be installed four hundred and sixty metres (460 m) from one (1) another on average; however, this won't be the case when traversing over mountainous terrain.

Table 1: Building Plans for the proposed Cross Rope Pylon.

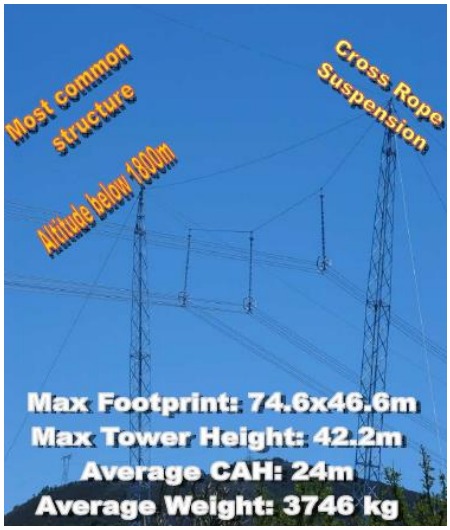
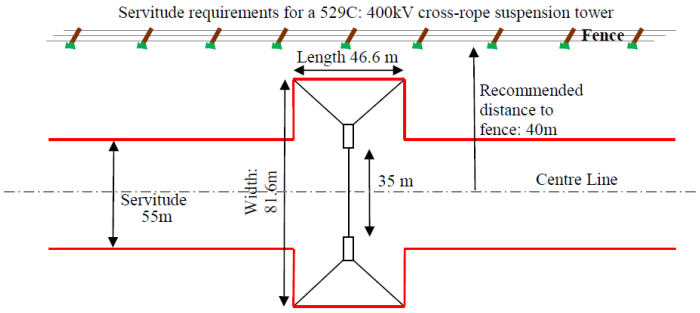
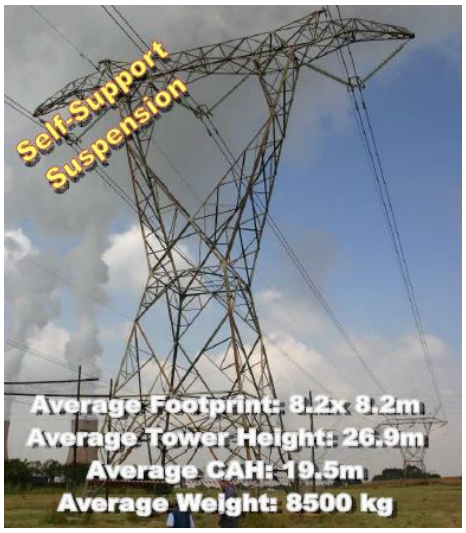
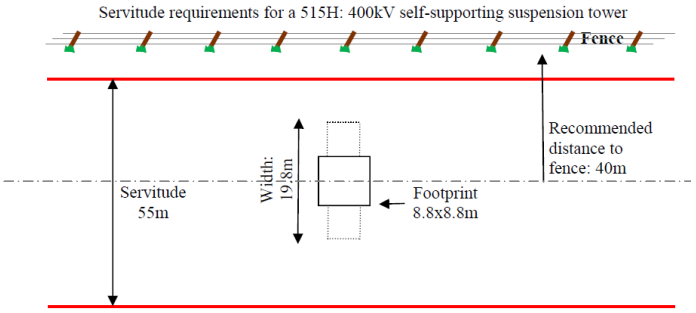
	

Table 2: Building Plans for Self Supporting Pylon.

2.2 LAYOUT ALTERNATIVES

Five (5) design Alternatives were considered during the site inspection as conducted during the week of 13 October 2019. The first Alternative followed the existing powerline; however, during fieldwork, intensive and collaborative meetings held with the Specialists and Eskom Officials it was decided to focus on Alternatives 1, 4 and 5 as Alternative 2 and 3 were considered no-go areas. Figure 2 below illustrates the different Layout Alternatives as mentioned above. The three routes were sub-divided into four quadrants and each quadrant is discussed in great detail (please refer to Figure 3).

2.3 CONCLUSION AND RECOMMENDATIONS

After careful consideration of Alternative 1, 4 and 5, it is advised from a visual perspective that Alternative 5 be developed. Although there is not a lot of difference between Alternative 1 and 5 the following points can be considered as motivation for the development of Alternative 5:

1. National Route 14 is avoided near Springbok where it deviates from Alternative 1;
2. Alternative 5 will not traverse through the Goegap National Park as Alternative 1 but will traverse towards the north of the National Park.

Alternative 4 is not considered to be a viable option due to the pristine natural area and lack of development along the route. Numerous tourist attractions are situated within the area which consist of hiking trails, 4 x 4 routes and guest lodges.

Alternative 5 will have the lowest visual impact of all listed Alternatives. If all mitigation measures are implemented by Eskom the visual impact will be moderate to residence of Aggeneys, Springbok and Buffelsrivier, commuters making use of National Route 14 (N14) as well as to tourist visiting the surrounding tourist attractions.

Construction Phase:

- All areas disturbed by construction activities must be subject to landscaping and rehabilitation;
- All spoil and waste will be disposed to a registered waste site and certificates of disposal provided;
- All slopes in excess of 2% (1:50) must be contoured in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983;
- All slopes in excess of 12% (1:8.3) must be terraced in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983;
- Berms that have been created should have a slope of 1:4 and be replanted with indigenous species and grasses;
- The project must be timed so that rehabilitation can take place at the optimal time for vegetation establishment;
- Access roads are to be kept clean;
- Site offices and structures should be limited to one location and carefully situated to reduce visual intrusions. Roofs should be grey and non-reflective;
- Construction camps as well as development areas should be screened with netting;
- Lights within the construction camp should face directly down (angle of 90˚);
- Vegetation clearance should be limited to the development footprint only;
- Litter should be strictly controlled, as the spread thereof through wind could have a very negative visual impact;
- Avoid shiny materials in structures. Where possible shiny metal structures should be darkened or screened to prevent glare; and,

- Mitigation of visual impacts associated with the construction phase would entail proper planning, management and rehabilitation of the construction site. Mitigation measures include the following:
- Reduce the time of construction through careful planning of logistics and ensure the productive implementation of resources;
- Limit disturbance of the environment to the development footprint; and,
- Limit construction activities to business hours (07:00 – 17:00).
- The use of different pylon types should be avoided, where possible, particularly where these are in visual proximity to each other;
- Maintenance roads required for transmission lines should use existing access roads or farm roads as far as possible;
- Signage, if essential, should be discrete and confined to entrance gates. No corporate or advertising signage should be permitted.

Operation Phase:

There are no special visual management actions that are applicable during the operational phase once the transmission infrastructure has been installed, except for the standard maintenance of revegetation work as part of an Environmental Management Programme (EMPr).

3 DECLARATION OF THE SPECIALIST

I, **Christoff du Plessis**, **ID 911126 5012 084**, declare that I:

- am an Environmental Specialist at Enviroworks;
- act as an independent Specialist Consultant in the field of Visual Impacts;
- am assigned as Specialist Consultant by Eskom for this proposed project;
- I do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work as stipulated in the terms of reference;
- remuneration for services by the proponent in relation to this proposal is not linked to approval by decision-making Authorities responsible for permitting this proposal;
- the consultancy has no interest in secondary or downstream developments as a result of the Authorisation of this project;
- have no and will not engage in conflicting interests in the undertaking of the Activity;
- undertake to disclose to the Client and the Competent Authority any material, information that have or may have the potential to influence the decision of the Competent Authority required in terms of the Environmental Impact Assessment Regulations 2017; and,
- will provide the Client and Competent Authority with access to all information at my disposal, regarding this project, whether favourable or not.

Christoff du Plessis

051 436 0793

4 SPECIALIST CV AND DETAILS

Business name of Specialist:	Enviroworks
Specialist Name:	Christoff du Plessis
Physical address:	5 Walter Sisulu Road, Bloemfontein, Free State Province
Postal address:	Suite 116, Private Bag X01, Brandhof
Postal code:	9324
Telephone:	051 436 0793
E-mail:	christoff@enviroworks.co.za
Fax:	086 601 7507

Christoff du Plessis

Relevant Qualifications

Baccalaureus Scientiae (B.Sc) in Environmental Geography: University of the Free State (2014)

Work Experience

January 2015 – Present: Environmental Specialist at Enviroworks

Key Specialist Experience

Visual Impact Assessment (VIA):

- Phalaborwa Wildlife Activity Hub, Kruger National Park, Limpopo Province (SANParks).
- 4.9ha Sand Mine on Portion 5 of the Farm Doornekraal No. 830, Western Cape Province (Greenmined).
- Proposed development of the Harvard Powerline, Bloemfontein, Free State Province (Centlec).
- Proposed development of the 35 m Buffeljagsrivier Monopole Mast, Buffeljagsrivier, Western Cape Province (Coast to Coast Towers).
- Proposed development of the 25 m Robertson Monopole Mast, Robertson, Western Cape Province (Coast to Coast Towers).
- Proposed development of the Klein Mooimaak Rest Camp Facility, West Coast National Park (SANParks).
- Proposed development of a Sand Mine near Malmesbury, Western Cape Province (Greenmined).
- Proposed upgrade of the R27 Gate and Geelbek Restaurant, West Coast National Park, Western Cape Province (SANParks).
- Proposed development of the 25 m Roodekrans Monopole Mast, Krugersdorp, Gauteng Province (Coast to Coast Towers).
- Proposed development of a 25 m Monopole Mast on Portion 25 of the Farm Klein Bottelary No. 17, Brackenfell, Western Cape Province (Coast to Coast Towers).

- Proposed development of a Landfill Site on Portion 3 of the Farm Katbosch No. 93, Sasolburg, Free State Province (Metsimaholo Landfill).
- Proposed development of numerous visitor information centres at Schroda and Mapungubwe Hill, Mapungubwe National Park, Limpopo Province (SANParks).
- Proposed development of a 35 m Monopole Mast on Portion 13 of the Farm Van Aries Kraal No. 455, Grabouw, Western Cape Province (Coast to Coast Towers).
- Proposed development of a 25 m Monopole Mast on Erf 532, Gansbaai, Western Cape Province (Coast to Coast Towers).
- Proposed development of a 35 m Lattice Mast on Portion 7 of the Farm Jagersvlakte No. 292, Grabouw, Western Cape Province (Warren Petterson Planning).
- Proposed development of a 35 m Lattice Mast on Erf 532, Stanford, Western Cape Province (Warren Petterson Planning).
- Proposed development of a 15 m Lattice Mast on Portion 4 of the Farm No. 53, Genadendal, Western Cape Province (Warren Petterson Planning).
- Proposed development of a 25 m Monopole Mast on Portion 8 of the Farm Delta No. 1003, Groot Drakenstein, Western Cape Province (Coast to Coast Towers).
- Proposed development of a 30 m Tree Mast on Portion 87 of the Farm Langverwacht No. 241, Kuils River, Western Cape Province (Warren Petterson Planning).
- Proposed development of a 20 m Tree Mast on Erf 679, Gouda, Western Cape Province (Atlas Towers).
- Proposed development of an IPP 400kV Power Line from Grommis to Aggeneis, Northern Cape Province (Eskom).
- Proposed development of a 30 m Lattice Mast on Erf 2819, Caledon, Western Cape Province (Atlas Towers).
- Proposed development of a 54 m Lattice Mast on Portion 7 of the Farm Haane Kuil No. 335, Beaufort West, Western Cape Province (Star Towers).
- Proposed development of a 25 m Monopole Mast on Erf 1035, Caledon, Western Cape Province (Atlas Towers).
- Proposed development of a 25 m Tree Mast on Erf 47, Birkenhead, Western Cape Province (Atlas Towers).
- Proposed development of a 25 m Monopole Mast on Erf 1201, Van Dyks Bay, Western Cape Province (Atlas Towers).
- Proposed development of a 20 m Tree Mast on Erf 1671, Melkbosstrand, Western Cape Province (Atlas Towers).
- Proposed development of a 15 m Tree Mast on Erf 740, Klein Brak River, Western Cape Province (Atlas Towers).
- Proposed Upgrades to the Alpha 1 Recreational Lounge, Robben Island, Western Cape Province (Robben Island Museum).

Wetland Delineation Studies:

- Wetlands Delineation study for the development of 13 borrow pits along National Road 8, Ladybrand, Free State Province (SANRAL).
- Wetland Delineation study for the development of a 12.5ha cemetery on Erf 4233, Western Cape Province (Theewaterskloof Local Municipality).
- Wetland Delineation study for the proposed development of an Agri-Hub near Cederville, Eastern Cape Province (Femplan).
- Wetland Delineation study for the proposed development of an Agri-Hub near Lambasi, Eastern Cape Province (Femplan).
- Wetland Delineation study for the proposed development of the Blue Hills Curro Castle, Midrand, Gauteng Province (Curro Holdings).

Stormwater Management Plans:

- Stormwater Management Plan for the Agri-World Recycling Plant, Swellendam, Western Cape Province (Agri-World Recycling Plant).
- Stormwater Management Plan for the Klaasvoogds Granite Mine, Springbok, Northern Cape Province (Greenmined Environmental).
- Stormwater Management Plan for the Moreson Poultry Project, Brandfort, Free State Province (Moreson Poultry).
- Stormwater Management Plan for the Sintier Poultry Project, Bronkhorstspruit, Gauteng Province (Sintier Poultry).
- Stormwater Management Plan for the maintenance and extending of a canal near Karatera, Western Cape Province (Eden Municipality).

5 ABBREVIATIONS

CBA	-	Critical Biodiversity Area
DEA	-	Department of Environmental Affairs
DEA&DP	-	Department of Environmental Affairs & Development Planning
DEM	-	Digital Elevation Model
DTM	-	Digital Terrain Model
EIA	-	Environmental Impact Assessment
ESA	-	Ecological Support Area
GIS	-	Geographical Information System
IPP	-	Independent Power Producers
Km	-	Kilometre
M	-	Metre
MAP	-	Mean Annual Precipitation
MAT	-	Mean Annual Temperature
USGS	-	United States Geological Survey
UTM	-	Universal Transverse Mercator
VAC	-	Visual Absorption Capacity
VIA	-	Visual Impact Assessment

6 REQUIREMENTS OF A SPECIALIST REPORT

Appendix 6 of Government Notice Regulation 326 of 7 April 2017 outlines the basic requirements of a Specialist Report. Please refer to Table 1 below of all requirements.

Table 3: Requirements of a Specialist Report as set out in GN R. 326 of 07 April 2017.

REQUIREMENTS	YES/NO
A Specialist report prepared in terms of these Regulations must contain – a. Details of – i. The Specialist who prepared the report; and, ii. The expertise of that Specialist to compile a specialist report including a curriculum vitae;	Yes
b. A declaration that the Specialist is independent in a form as may be specified by the Competent Authority;	Yes
c. An indication of the scope of, and the purpose for which, the report was prepared; i. An indication of the quality and age of base data used for the Specialist Report; ii. A description of existing impacts on site, cumulative impacts of the proposed development and levels of acceptable change;	Yes
d. The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Yes
e. A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Yes
f. Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Yes
g. An identification of any areas to be avoided, including buffers;	Yes
h. A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Yes
i. A description of any assumptions made and any uncertainties or gaps in knowledge;	Yes
j. A description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Yes
k. Any mitigation measures for inclusion in the EMP'r	Yes
l. Any conditions for inclusion in the Environmental Authorisation;	Yes
m. Any monitoring requirements for inclusion in the EMP'r or Environmental Authorisation;	Yes
n. A reasoned opinion – i. Whether the proposed activity, activities or portions thereof should be authorised; ii. If the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMP'r, and where applicable, the closure plan;	Yes
o. A description of any consultation process that was undertaken during the course of preparing the specialist report;	N/A
p. A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and,	N/A
q. Any other information requested by the Competent Authority.	Yes

7 VISUAL IMPACT EVALUATION CRITERIA CHECKLIST

As per the Provincial Government of the Western Cape Guideline for involving Visual and Aesthetic Specialists in the EIA Process (DEA&DP, 2005), a high quality visual assessment should include the following criteria:

Table 4: Requirements of a Visual Impact Assessment.

REQUIREMENTS	YES/NO
Meet the minimum requirements for a visual assessment;	Yes
Is appropriate to the nature and scale of the proposed development;	Yes
Provides a full description of the environment and the project;	Yes
Considers the project within its wider context;	Yes
Provides a clear methodology using accepted conventions for visual assessment;	Yes
All sources of information and references are given;	Yes
Graphics, including maps and visual simulations, are clear;	Yes
Include both quantitative and qualitative criteria;	Yes
Cumulative visual impacts have been considered;	Yes
An evaluation of alternatives has been made;	Yes
An explanation of significance ratings, related to bench-marks, is given;	Yes
Recommendations for visual mitigation are sensible and practical;	Yes
Recommendations for monitoring programmes have been outlined;	Yes
The best practical environmental option has been considered;	Yes
All the visual issues raised in the scoping have been addressed;	Yes
A clear summary of mitigation measures, including essential and optional measures, is given.	Yes

Contents

8 STUDY APPROACH

8.1 Methodology

The study was undertaken using Geographical Information System (GIS) software as a tool to generate a viewshed analyses and to apply relevant spatial criteria to the proposed development. A detailed Digital Elevation Model (DEM) for the study area (S30E17 & S30E18) was obtained from the National Aeronautic Space Administration (NASA). The methodology utilised to identify issues to the visual impact include the following activities:

- The creation of a detailed digital terrain model of the potentially affected environment;
- The identification of sensitive environments upon which the proposed 400 kV Power Line and associated infrastructure could have a potential impact on; and,
- The creation of viewshed analyses from the proposed Pylons in order to determine the visual exposure and the topography's potential to absorb the potential visual impact. The viewshed analysis takes into account the dimension of the proposed Pylons and was calculated at a height of thirty two meters (32 m).

This Report (Visual Impact Assessment) sets out to identify and quantify the possible visual impacts related to the proposed 400 kV Power Line, as well as offer potential mitigation measures where required. The following methodology has been adopted for the assessment of the Visual Impact Assessment:

- **Determine the Potential Visual Exposure**

  The visibility or visual exposure of any structure or activity is the point of departure for the VIA. It stands to reason that if the proposed infrastructure was not visible, no impact will occur. Viewshed analyses of the proposed structures indicate the potential visibility.

- **Determine Visual Distance/Observer Proximity to the facility**

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

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

  The visual distance theory and the observer's proximity to the 400 kV Power Line are closely related, and especially relevant, when considered from areas with a high viewer incidence and a predominantly negative visual perception of the proposed infrastructure.

- **Determine Viewer Incidence/Viewer Perception**

  The number of observers and their perception of a structure determine the concept of visual impact. If there are no observers, then there would be no visual impact. If the visual perception of the structure is favourable to all observers, the visual impact would be positive.

  It is therefore necessary to identify areas of high viewer incidence and to classify certain areas according to the observer's visual sensitivity towards the proposed infrastructure. It would be impossible not to generalise the viewer incidence and sensitivity to some degree, as there are many variables when trying

to determine the perception of the observer; regularity of sighting, cultural background, state of mind, and purpose of sighting which would create a myriad of options.

- **Determine the Visual Absorption Capacity of the Natural Vegetation**

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

  The VAC will also be high where the Environment can readily absorb the structure in terms of texture, colour, form and light/shade characteristics of the structure. On the other hand, the VAC for a structure contrasting markedly with one or more of the characteristics of the environment will be low. The VAC also generally increases with distance, where discernible detail in visual characteristics of both environment and structure decreases.

  The Digital Terrain Model utilised in the calculation of the visual exposure of the proposed Pylons do not incorporate the potential VAC of the natural vegetation of the region. It is therefore necessary to determine the VAC by means of the interpretation of the vegetation cover, supplemented with field observation.

- **Determine the Visual Impact Index**

  The results of the above analyses are merged in order to determine where the areas of likely visual impact would occur. These areas are further analysed in terms of the previously mentioned issues (related to the visual impact) and in order to judge the magnitude of each impact.

- **Determine the Impact Significance**

  The potential visual impacts identified and described are quantified in their respective geographical locations in order to determine the significance of the anticipated impact. Significance is determined as a function of the extent, duration, magnitude and probability.

8.2 Projections

Projected coordinate systems are defined by ArcGIS Resource Centre (The developers) as "*a flat, two dimensional surface. Unlike a geographical coordinate system, a projected coordinate system has constant lengths, angles, and areas across the two dimensions. A projected coordinate system is always based on a geographic coordinate system that is based on a sphere or spheroid".* Projected Coordinates systems are world based and thus the larger the area the larger the distortion. To minimise the distortion the Universal Transverse Mercator (UTM) coordinate reference system divides the Earth into 60 equal zones that are all 6 degrees wide in longitude from East to West. The study area falls within the thirty four degree (34˚) UTM Zone, thus the WGS84/UTM S34 (32734) was used as projection.

9 ASSUMPTIONS AND LIMITATIONS

- Information is assumed to be the latest available information.
- Visual impact studies and assessments depend, to some extent, on subjective judgements. The subjectivity, of the analysis relates to the value driven nature of VIA. However, to deal with subjectivity, the methodology of this VIA is explained and rating categories clearly defined.

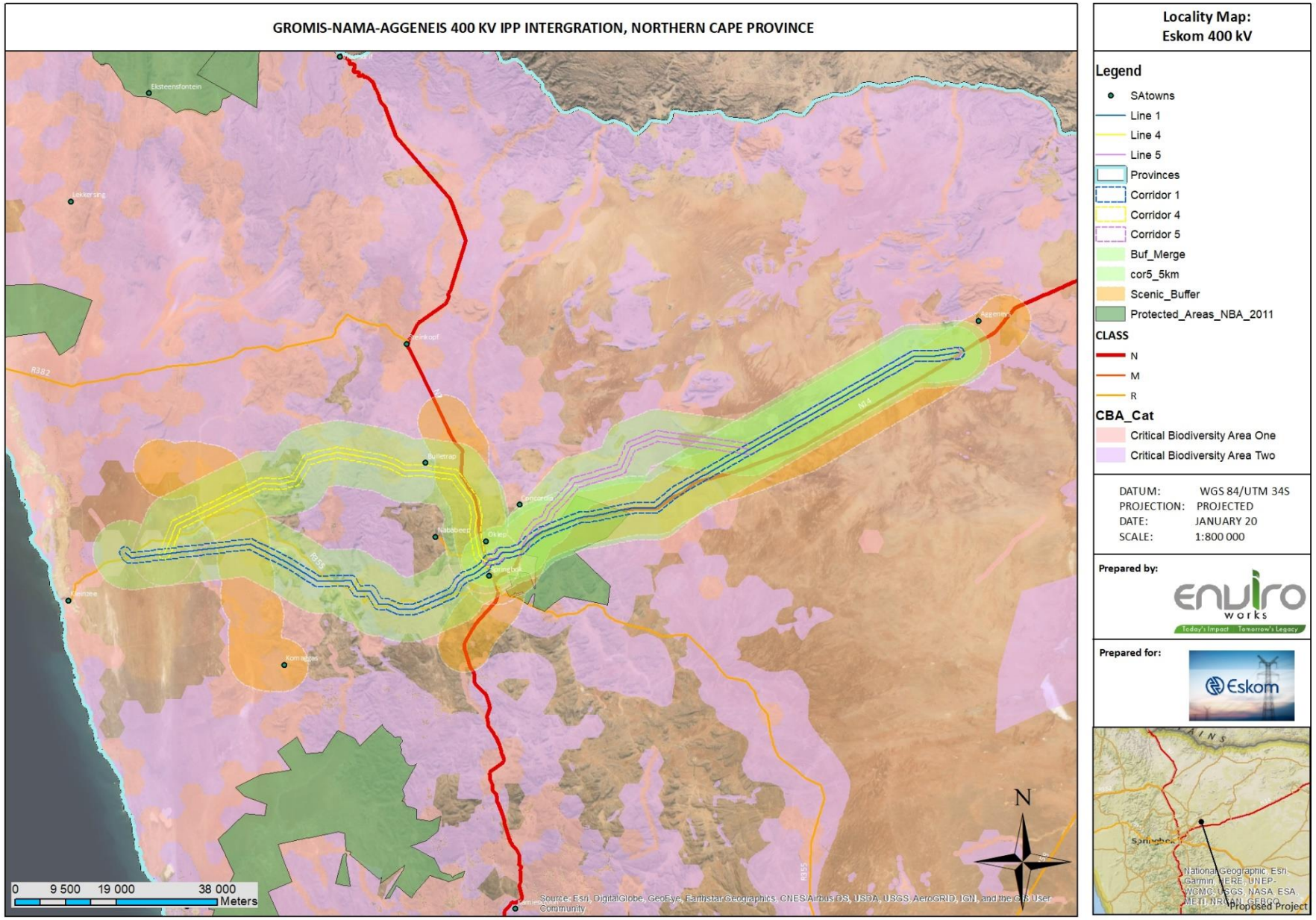


Figure 2: Locality Map of the Proposed 400 kV Corridors, Western Cape Province.

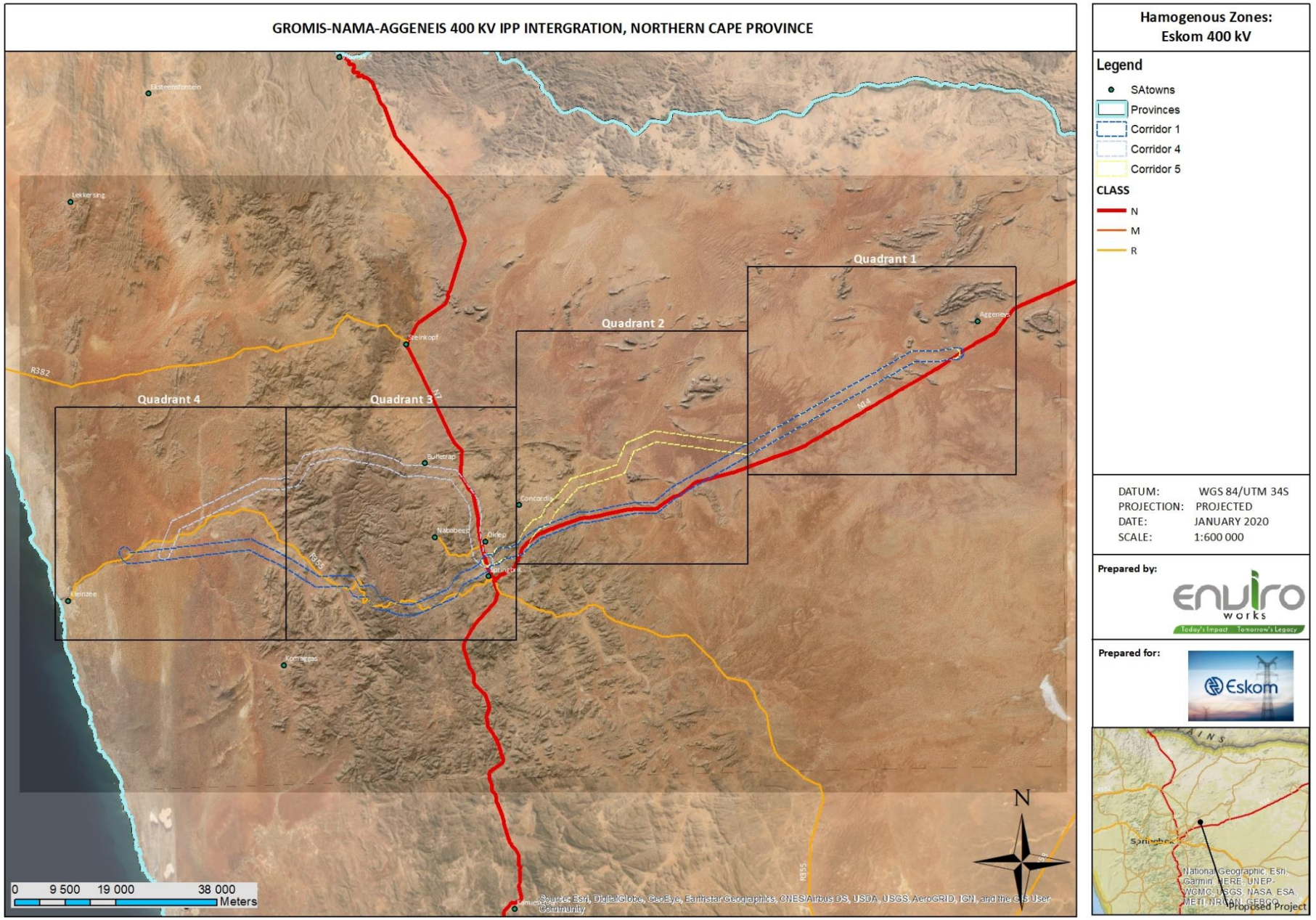


Figure 3: Quadrant locality for each Corridor.

10 SCOPE OF WORK

The determination of the potential visual impacts is undertaken in terms of nature, extent, duration, magnitude, probability and significance of the construction and operation phases of the proposed project. The study area for the visual assessment encompasses a geographical area of 130 km^2 (extent of the maps) and includes a ten kilometre (10 km) buffer zone from the proposed Pylons. The study area constitutes of local tourist attractions, residential areas and agricultural activities.

Anticipated issues related to the potential visual impact of the proposed development include the following:

- The visibility of the proposed development to, and potential visual impact on, observers travelling along National Route 14, National Route 7 and secondary roads within the study area;
- The visibility of the Powerline to, and potential visual impact on tourists visiting tourist attractions within the study area;
- The visibility of the facility to, and potential visual impact on observers residing within Aggeneis, Carolusberg, Springbok, Buffelsrivier, Kleinsee, Nababeep and O'kiep;
- The Visual Absorption Capacity (VAC) of natural or planted vegetation as well as man-made topographical features;
- Potential visual impacts associated with the construction- and operational-phase; and,
- The potential to mitigate visual impacts.

It is anticipated that the issues listed above may constitute a visual impact at a local scale.

11 THE AFFECTED ENVIRONMENT

The proposed development will tie in with the Aggeneis Sub-Station from where it will traverse one hundred and seventy five kilometres (175 km) to the Gromis Sub-Station via the Nama Sub-Station situated in Springbok, Northern Cape Province. The study area constitutes of residential areas, agricultural practises, mines, tourist destinations, natural areas and numerous rivers and dams.

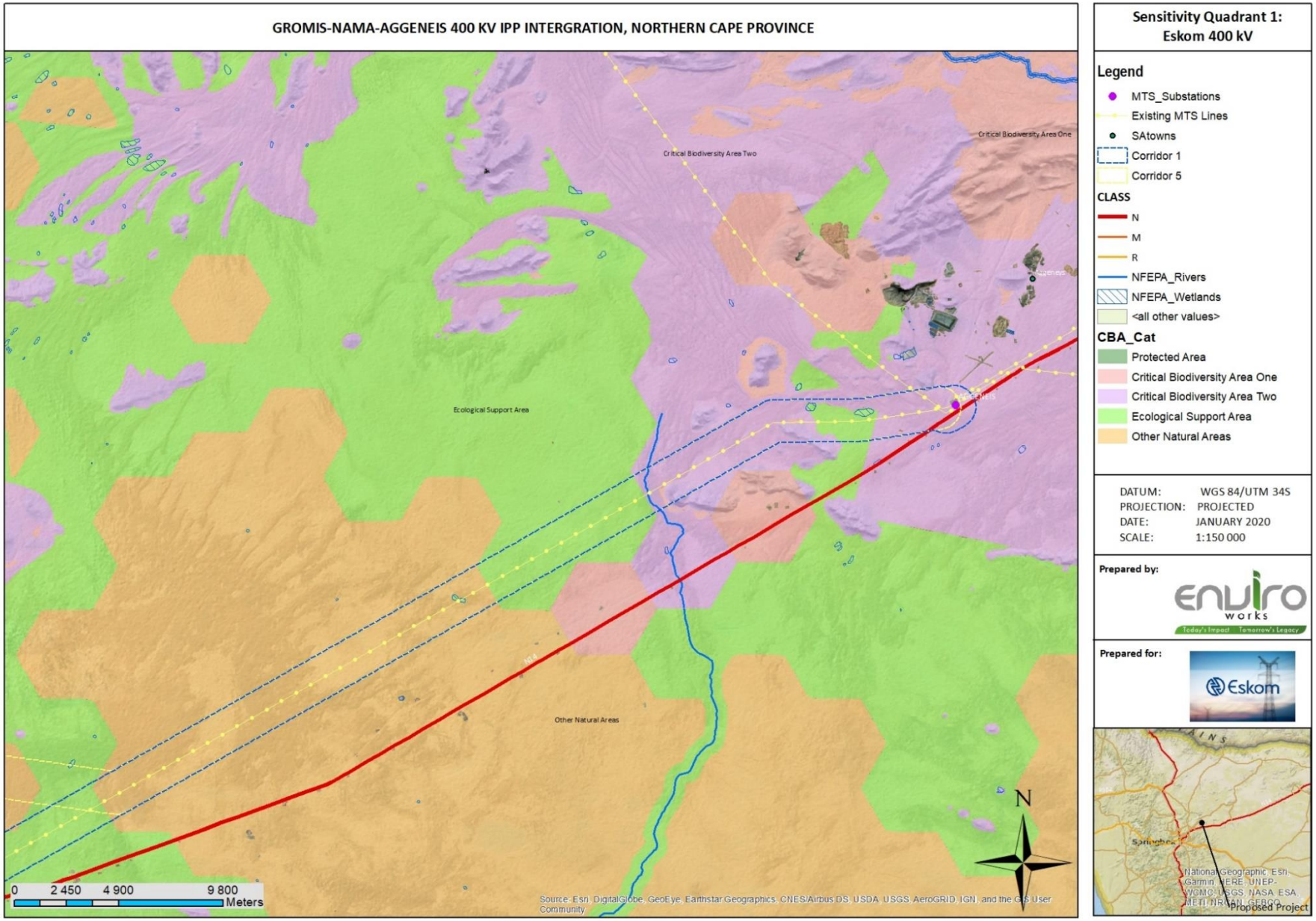


Figure 4: Sensitivity Map of Quadrant 1

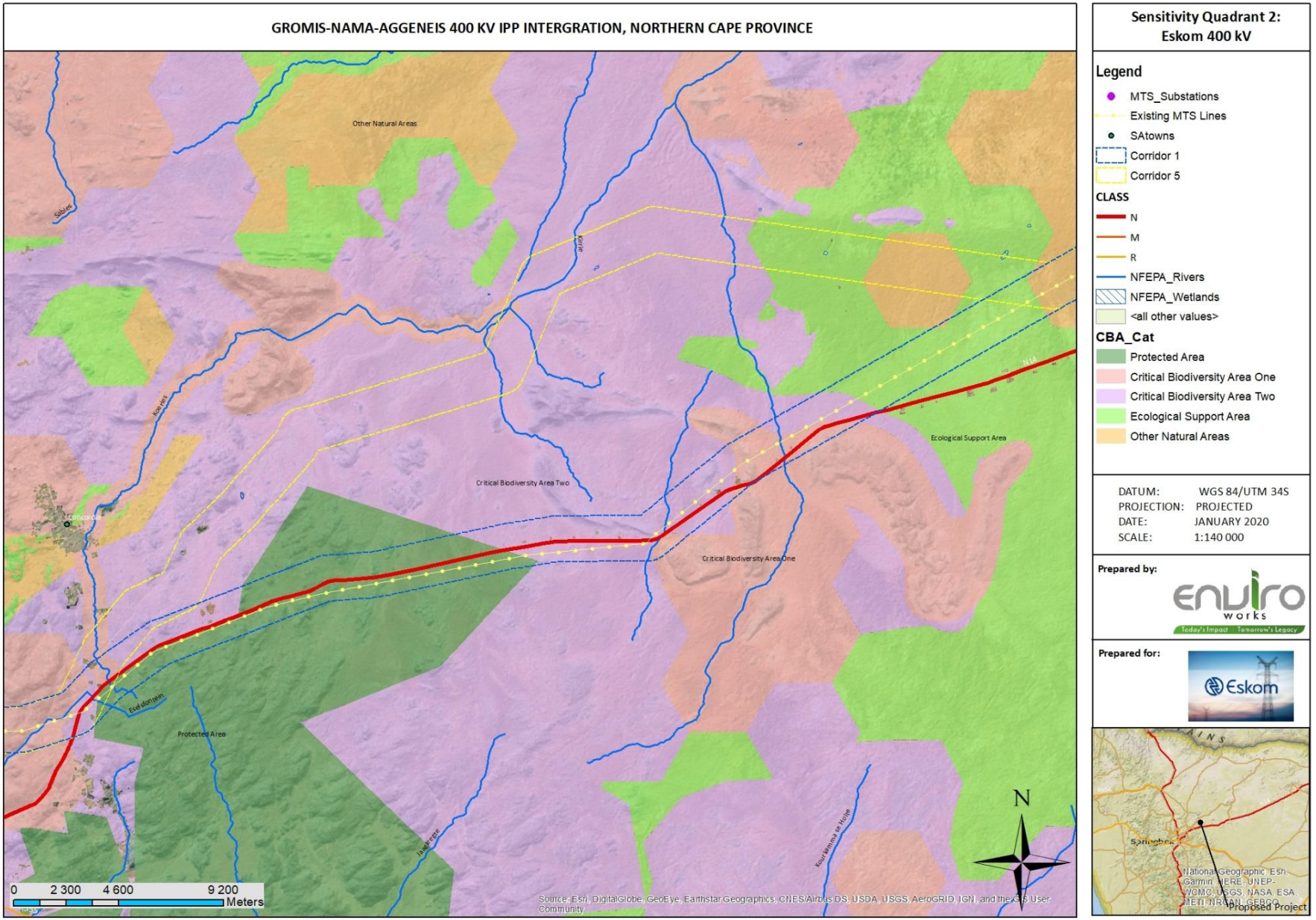


Figure 5: Sensitivity Map of Quadrant 2.

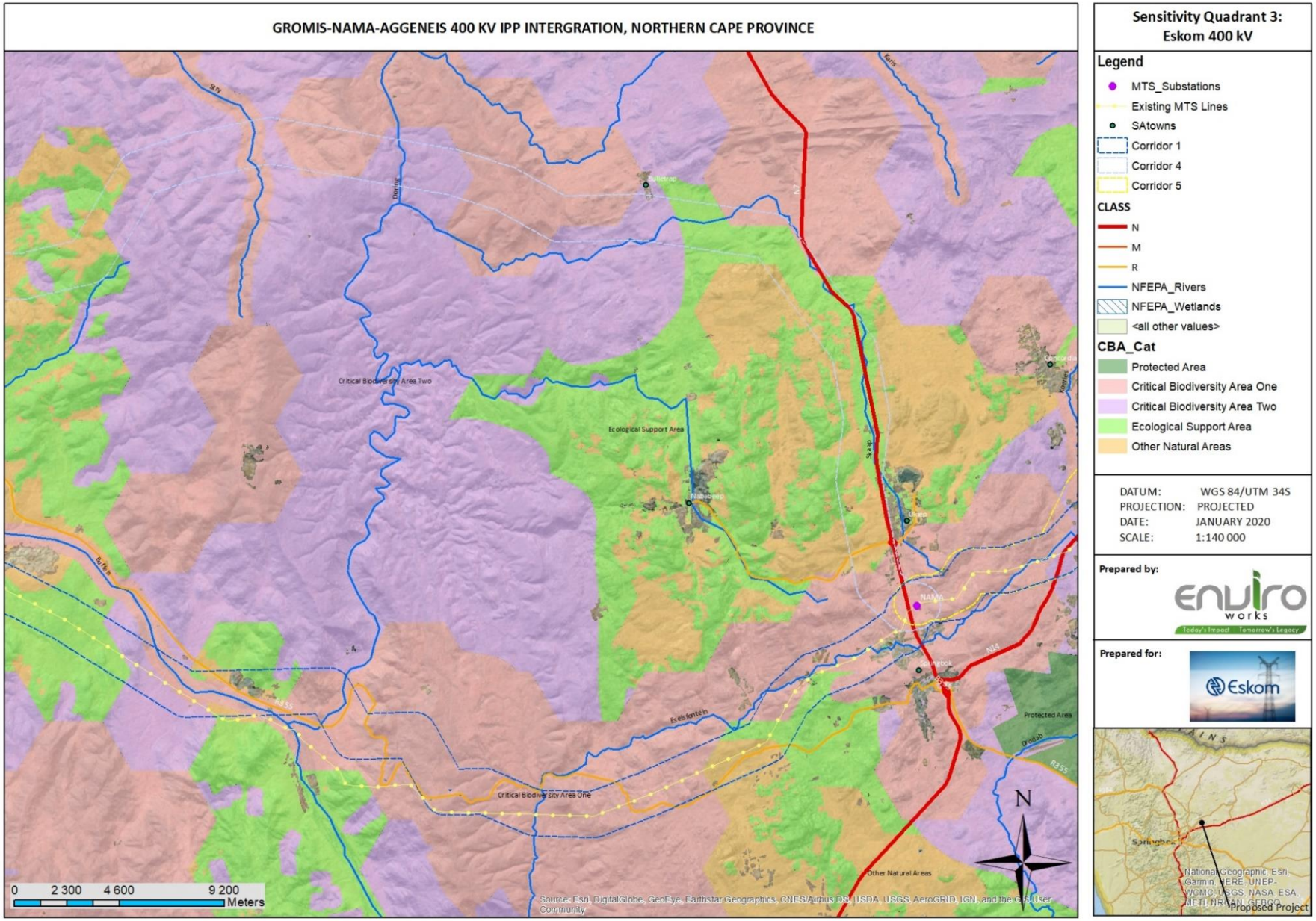


Figure 6: Sensitivity Map of Quadrant 3.

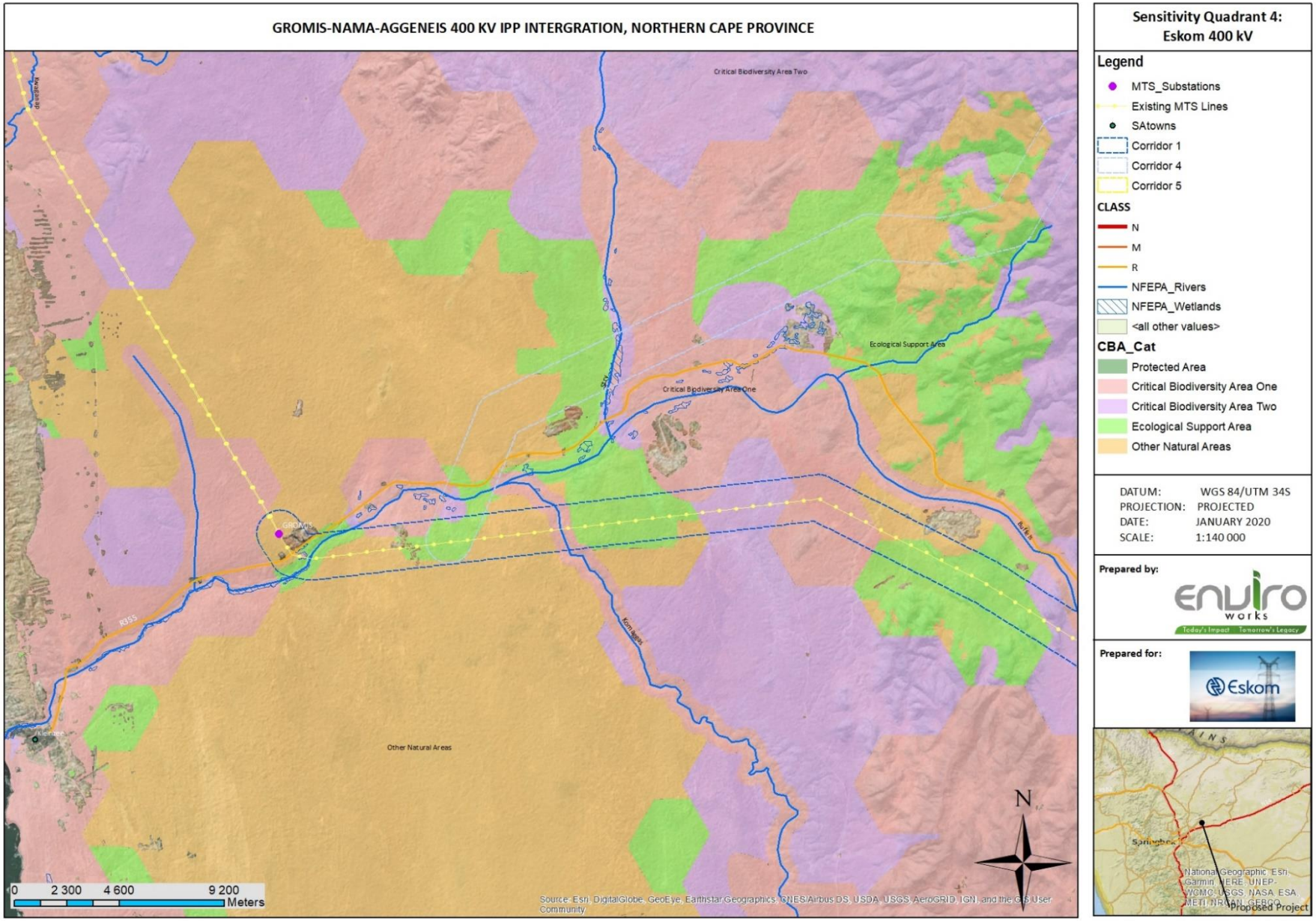


Figure 7: Sensitivity Map of Quadrant 4.

12 RELEVANT LEGISLATION AND GUIDELINES

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

- This Visual Impact Assessment was undertaken in accordance with the Guidelines for Involving Visual and Aesthetic Specialists in EIA Processes, as issued by the Department of Environmental Affairs and Development Planning (DEA&DP).
- The Environmental Impact Assessment Regulation as outlined in Government Notice Regulation 326 of 7 April 2017.

13 DEVELOPMENT CATEGORY

As per the Guidelines for Involving Visual and Aesthetic Specialists in EIA Processes, the development categories are as follow:

Table 5: Development Categories.

Category 1	Items listed in this category include: ➢ Nature reserves; ➢ Nature related recreation; ➢ Camping; ➢ Picnicking; and, ➢ Trails and minimal visitor facilities.
Category 2	Items listed in this category include: ➢ Low-key recreation/resort/residential type developments; ➢ Small scale agriculture/nurseries/narrow roads; and, ➢ Small scale infrastructure
Category 3	Items listed in this category include: ➢ Low density residential/resort type development; ➢ Golf or polo estates; and, ➢ Low to medium-scale infrastructure.
Category 4	These include: ➢ Medium density residential development; ➢ Sport facilities; ➢ Small-scale commercial facilities/office parks; ➢ One-stop petrol stations; ➢ Light industry; ➢ Medium scale infrastructure.
Category 5	These include: ➢ High density township/residential developments; ➢ Retail and office complexes; ➢ Industrial facilities; ➢ Refineries; ➢ Treatment plants; ➢ Power stations;

	➢ Wind energy farms; ➢ Powerlines; ➢ Freeways; ➢ Toll roads; ➢ Large scale infrastructure generally; ➢ Large scale development of agriculture land and commercial tree plantations; ➢ Quarrying and mining activities with related processing plants.

Derived from Table 5, the proposed project falls within Category 5 (Powerlines and Power Stations). From the aforementioned Table 6 was compiled in order to determine the Visual Impact of any proposed development.

Table 6: Expected Visual Impact of the Proposed Development.

Type of Environment	Type of Development				
	Category 1	Category 2	Category 3	Category 4	Category 5
Protected/wild areas of international or regional significance.	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected	Very high visual impact expected
Areas or routes of high scenic, cultural, historical significance.	Minimal visual impact expected.	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected
Areas or routes of medium scenic, cultural or historical significance.	Little or no visual impact expected	Minimal visual impact expected.	Moderate visual impact expected	High visual impact expected	High visual impact expected
Areas or routes of low scenic, cultural or historical significance/disturbed.	Little or no visual impact expected	Little or no visual impact expected	Minimal visual impact expected.	Moderate visual impact expected	High visual impact expected
Disturbed or degraded sites/run-down urban areas/wasteland.	Little or no visual impact expected	Little or no visual impact expected	Little or no visual impact expected	Minimal visual impact expected.	Moderate visual impact expected

From the table above, it is anticipated that the proposed 400 kV Powerline will have a high visual impact on the surrounding areas.

14 DESCRIPTION OF THE RECEIVING ENVIRONMENT

Landscape character is defined by the U.K Institute of Environmental Management and Assessment (IEMA) as the "*distinct and recognizable 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, land form, soil, vegetation, land use and human settlement*" (GLVIA, 2002). According to DEA&DP Guideline Section 9.2, information describing the current state of the affected environment, as well as trends in the area, is required for visual input into the EIA process. The receiving environment was determined using the 2013-2014 South African National Land-Cover

data as provided by the National Department of Environmental Affairs (DEA) and field observation conducted on 10 – 14 October 2019.

14.1 Sense of Place

The term sense of place captures the identity of places we recognize. It embraces natural and cultural features, the distinctive sights, sounds and experiences to the people residing in or nearby that place. Places with a strong sense of place have a clear identity and character that is recognisable by inhabitants and visitors alike.

Sense of place differs from place attachment by considering the social geographical context of place bonds and the sensing of place, such as aesthetic and a feeling of dwelling. An impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light.

Prior to 1652, the indigenous people (the Koisan or Nama) of the area extracted raw copper from the gneiss and granite hills that make up the surrounding Namaqualand Copper belt. This copper was beaten into decorative items, worn as bangles and neck adornments. Early settlers in the Cape Colony heard rumours of mountains in the north-west that were fabulously rich in copper. Governor Simon van der Stelwas inclined to believe these tales when, in 1681, a group of Namas visited the Castle in Cape Town and brought along pure copper. Van Der Stel himself led a major expedition in 1685 and reached the fabled mountains on 21 October. Three shafts were sunk and revealed a rich lode of copper ore – the shafts exist to this day. For almost two hundred (200) years nothing was done about the discovery, largely due to its remote location. The explorer James Alexander was the first to follow up on Van Der Stel's discovery (Lavin, 2019).

In 1852 he examined the old shafts, discovered some other copper outcrops and started mining operations. Prospectors, miners and speculators rushed to the area, but many companies collapsed when the logistical difficulties became apparent. The first miners were Cornish, and brought with them the expertise of centuries of tin-mining in Cornwall. The ruins of the buildings they constructed as well as the stonework of the bridges and culverts of the railway built to transport the ore to Port Nolloth, can still be seen. The Namaqualand Railway started operating in 1876 and lasted for 68 years, carrying ore to Port Nolloth and returning with equipment and provisions. The carriages were initially pulled by mules and horses, which were later replaced by steam locomotives – the last of these, the Clara, stands at Nababeep. Nowadays road transport is used to convey the ore to the railhead at Bitterfontein. The other principal mines of the area are at Carolusberg and Nababeep (Lavin, 2019).

Springbok (was known as Springbokfontein until 1911) is located in a valley that lies between the high granite domes of *Klein Koperberge*. Copper was first discovered in the area by Simon van der Stel in 1685 at Blue Mine – this event is said to mark the beginnings of the mining industry in South Africa. In 1852, the farm on which the town is located was purchased with the intention of establishing a copper mine. The town layout dates to 1862. During the Second Boer War, the mountains around Springbok were used by the Boer forces. The "klipkoppie" was used for a fort under General Manie Maritz as it provided an excellent vantage point across the valley. Remains of stone walls inside the remain from this time. Monument Koppie, a small hill situated in the centre of town, remains a historical site and landmark. While most of this area was destroyed by dynamite planted by a commando led by General Jan Smuts, some of the remains stand till this day. Okiep's mine saw action on 04

April 1902 during the Anglo-Boer war when some seven hundred (700) officers and men of the 3rd Battalion Queen's Royal Regiment, 5th Warwickshire Regiment, Namaqualand Border Scouts, the Town Guard and the Cape Garrison Artillery, withstood a 30-day siege by Jan Smuts' forces. The village of Concordia with a garrison of 100 men, surrendered a day after the siege started. On 4 May 1902 a British relief column arrived from Port Nolloth and ended the siege. A ruined blockhouse is still visible on a hill north-east of the town (Lavin, 2019).

Today the area is still known for its mining activities; however, due to the high demand of power in South Africa a lot of farms are bought by Power Generating Companies as the area offers high yielding capacity for renewable energy project. The Namaqualand region is highly dependent on tourism especially during the flowering season with two (2) National Parks situated within close proximity of Springbok. Numerous trails and 4 by 4 routes are present within the area to further enhance tourism within the area.

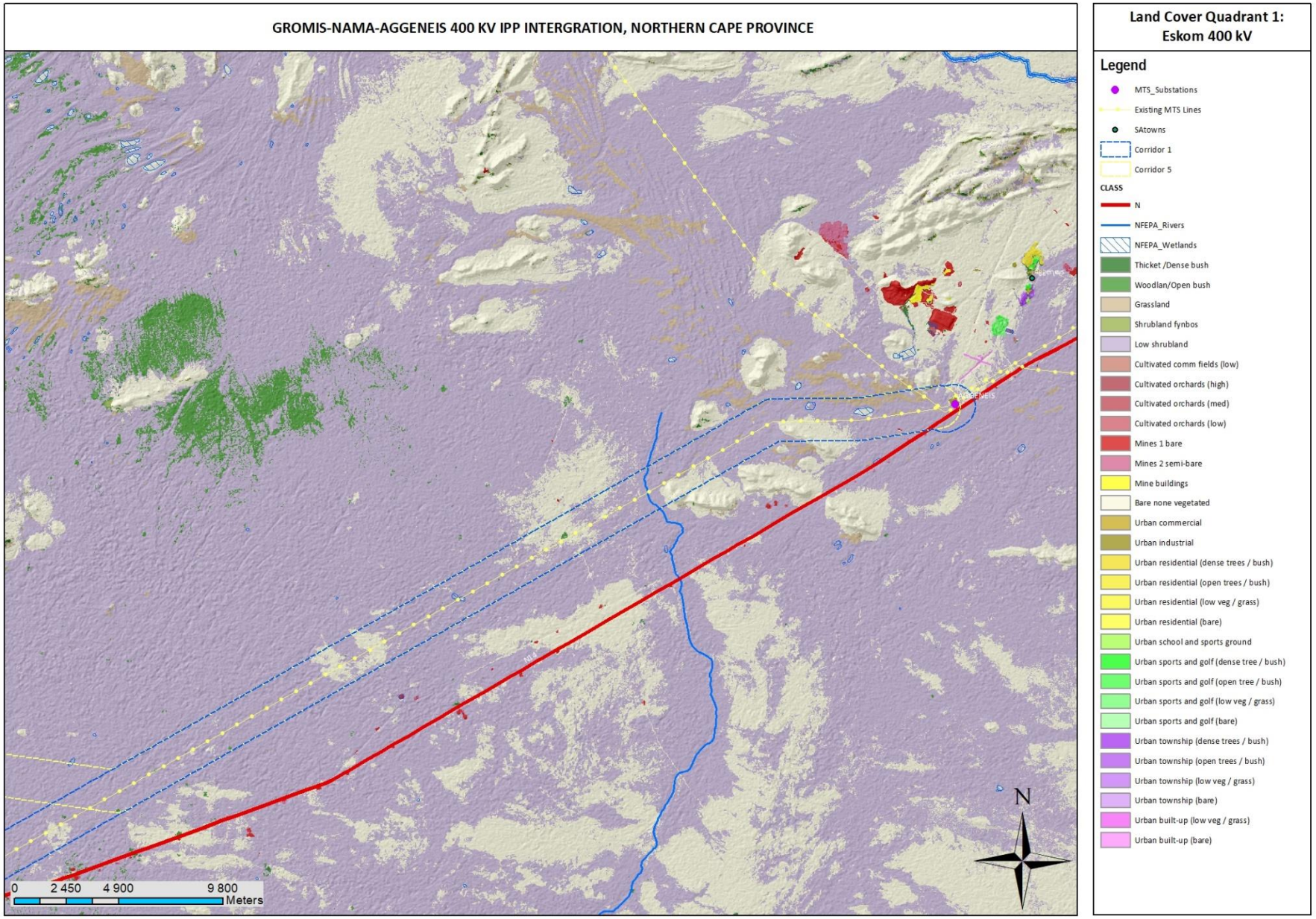


Figure 8: Land Cover Map of Quadrant 1.

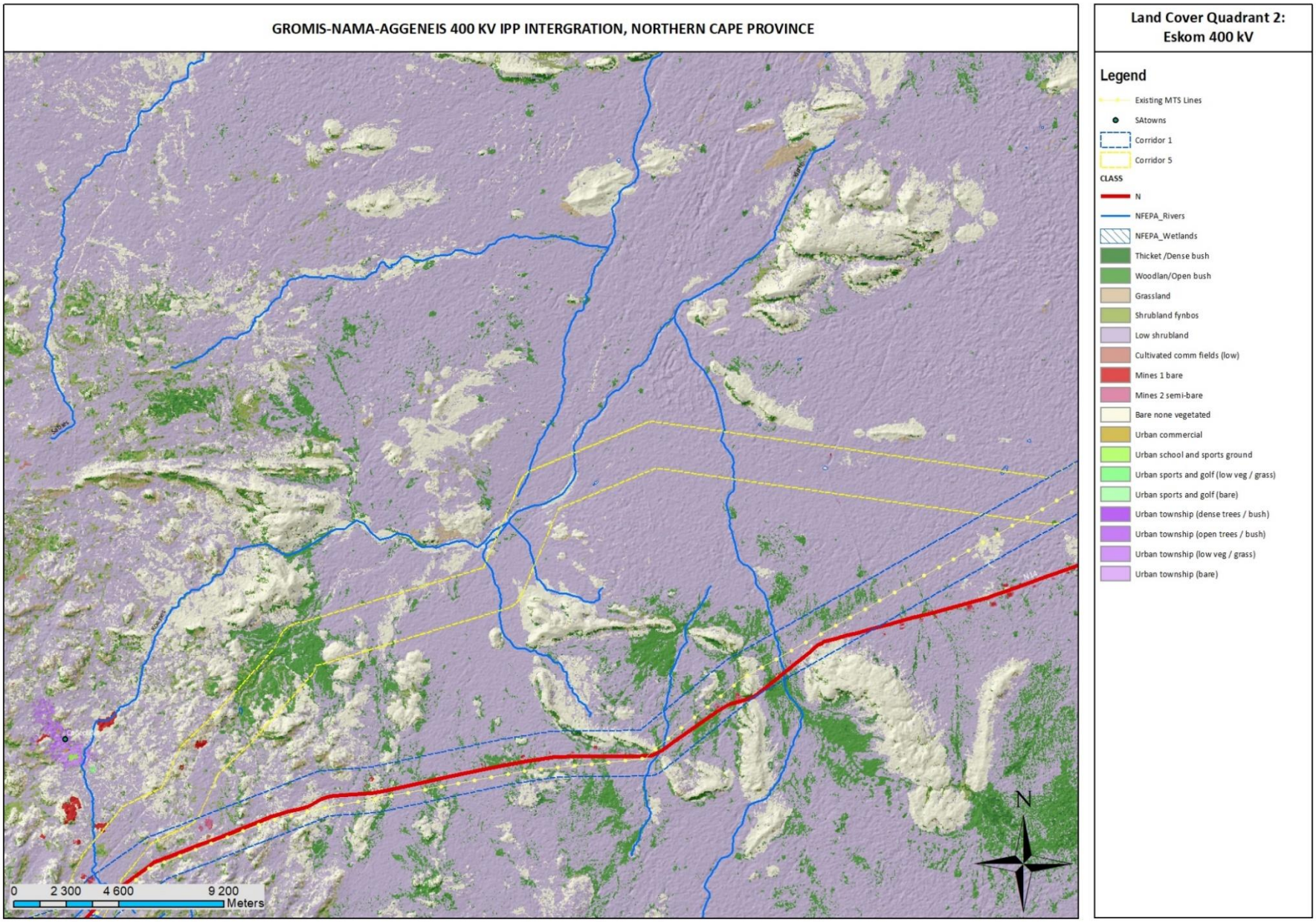


Figure 9: Land Cover Map of Quadrant 2.

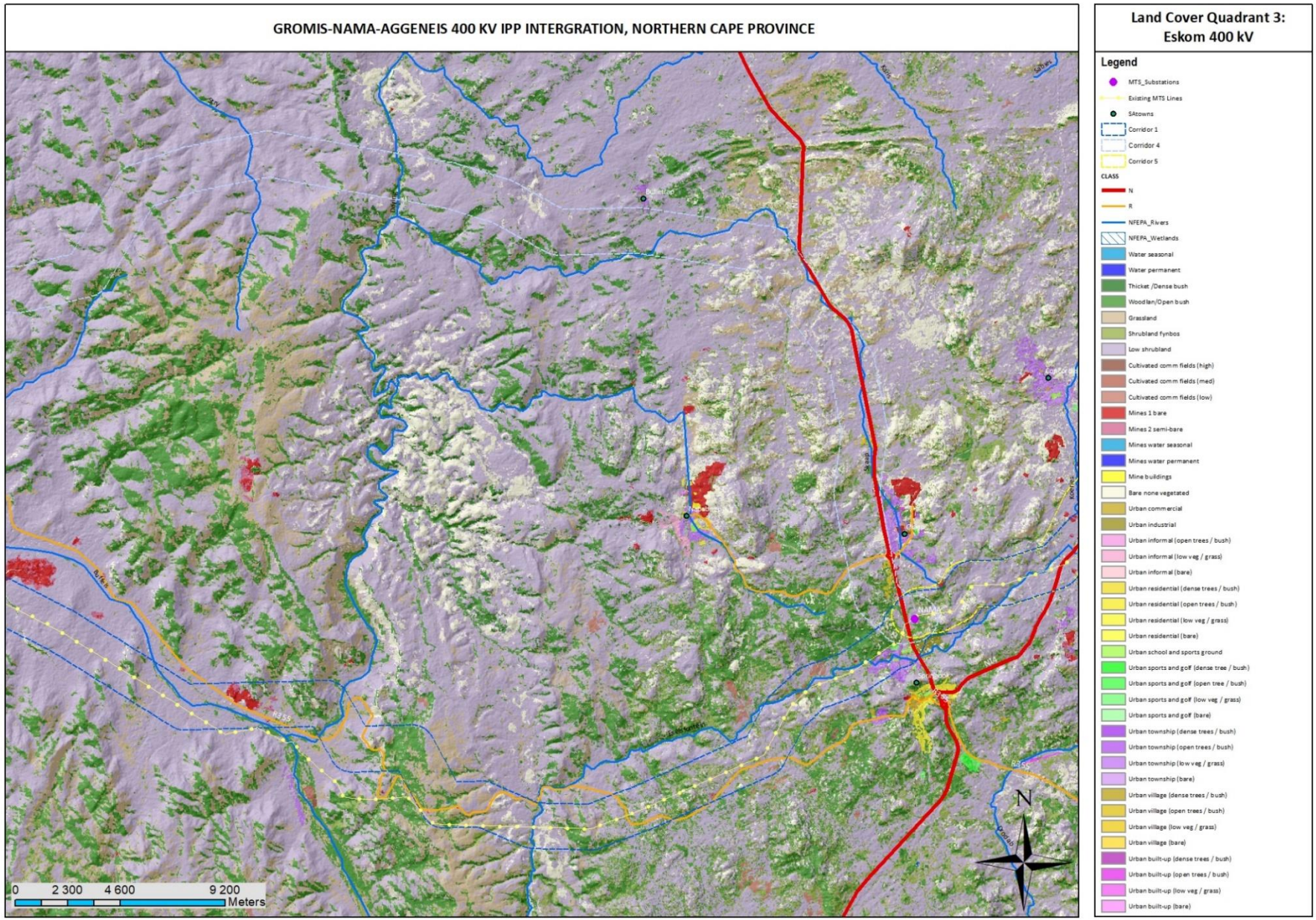


Figure 10: Land Cover Map of Quadrant 3.

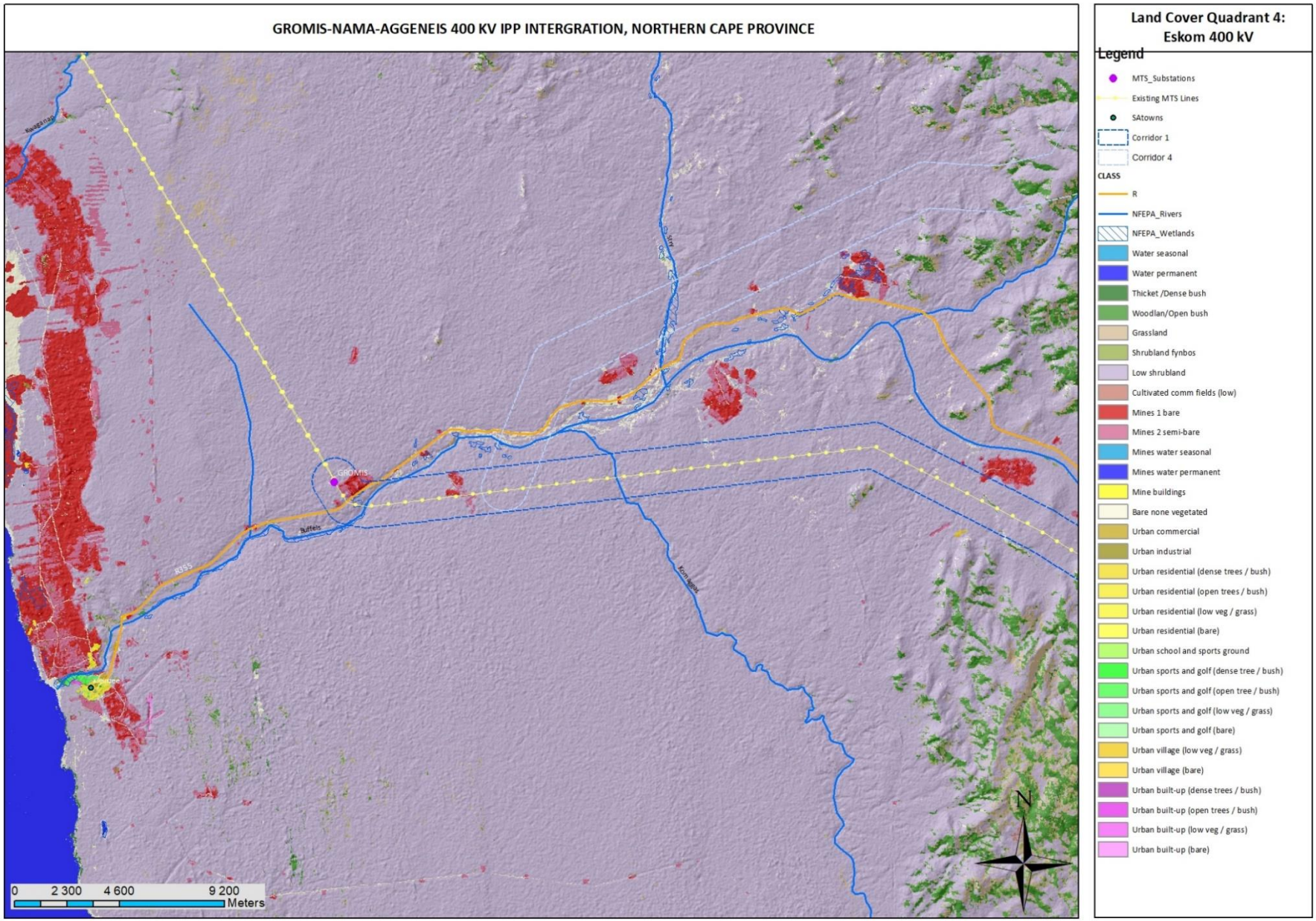


Figure 11: Land Cover Map of Quadrant 4.

15 RESULTS

15.1 Eskom Preferred Corridor 1, 4 & 5

15.1.1 Quadrant 1

Within quadrant 1, Alternative 1 and 5 traverse over the same terrain parallel to the existing line for approximately forty six kilometres (46 km) from the Aggeneis sub-station. As per the Landcover Map and photographic evidence the area consists of low shrubland coupled with bare non vegetated areas. Over the first ten kilometres (10 km) there will be no visual impact due to the undulating topography of the study area towards the south. The visual impact is considered to be moderate within Quadrant 1 as visual intrusion already occurs within this area due to the existing line. The visual impact will be temporary as observers will only consist of motorists travelling through the area with the proposed development not being situated within their direct line of sight.

15.1.2 Quadrant 2

Quadrant 2 includes a study of Alternative 1 and 5. Alternative 5 break away from Alternative 1 towards the north west to ensure that it does not pass through the Goegap National Park. The visual impact from Alternative 1 will be high as it is situated adjacent to National Route 14 (N14) and the Goegap National Park. Alternative 5 traverse a more mountainous area towards the north which aids in restricting the visual impact to some degree. The visual impact of Alternative is considered to be moderate as limited observers are situated within the area; however, it must be noted that a guest house was observed within this area. Alternative 1 will have a cumulative impact as it will be constructed parallel to the existing line where Alternative 5 will not contribute to the cumulative impact.

15.1.3 Quadrant 3

Quadrant 3 includes a study of Alternative 4 situated towards the north and Alternative 1 and 5 which will run parallel to the existing line in the south. Alternative 4 is considered a no-go area as no developments have taken place within this corridor with scattered tourists facilities within the area. Numerous tourist attractions such as hiking trails and 4x4 routes are situated within this area. From a visual perspective Alternative 4 is considered to be a pristine natural area resulting in the no-go. Alternative 1 and 5 is considered to be the preferred line route within Quadrant three as the Visual Absorption Capacity of the landscape is high. The visual impact assessment will be moderate to low depending on the elevation of the observer. The highest visual impact will occur within the towns of Springbok and Buffelsrivier from where the impact will be temporary. Given the existing line visual intrusion have already occurred within the area; however, the proposed development will contribute to the cumulative impact.

15.1.4 Quadrant 4

Quadrant 4 will have the lowest visual impact of the entire study area due to its remoteness. The landscape consists of undulating topography with dunes situated between Buffelsrivier and Gromis sub-station. No permanent residence occur within the area as the land is occupied by mines. The highest visual impact will occur from the R355 leading to Kleinsee in the west; however, it must be noted that the proposed development will not be situated within close proximity to the road. Furthermore, due to elevation changes of the road the VAC of the study area is increased at an higher elevation of the road. It must be noted that the overall visual impact

for Quadrant 4 will be low; however, the cumulative impact will be moderate as there is an exiating 132 kV line within the area.

15.1.5 Conclusion

After careful consideration of Alternative 1, 4 and 5, it is advised from a visual perspective that Alternative 5 be developed. Although there is not a lot of difference between Alternative 1 and 5 the following points can be considered as motivation for the development of Alternative 5:

3. National Route 14 is avoided near Springbok where it deviates from Alternative 1;
4. Alternative 5 will not traverse through the Goegap National Park as Alternative 1 but will traverse towards the north of the National Park.

Alternative 4 is not considered to be a viable option due to the pristine natural area and lack of development along the route. Numerous tourist attractions are situated within the area which consist of hiking trails, 4 x 4 routes and guest lodges.

Alternative 5 will have the lowest visual impact of all listed Alternatives. If all mitigation measures are implemented by Eskom the visual impact will be moderate to residence of Aggeneys, Springbok and Buffelsrivier, commuters making use of National Route 14 (N14) as well as to tourist visiting the surrounding tourist attractions.

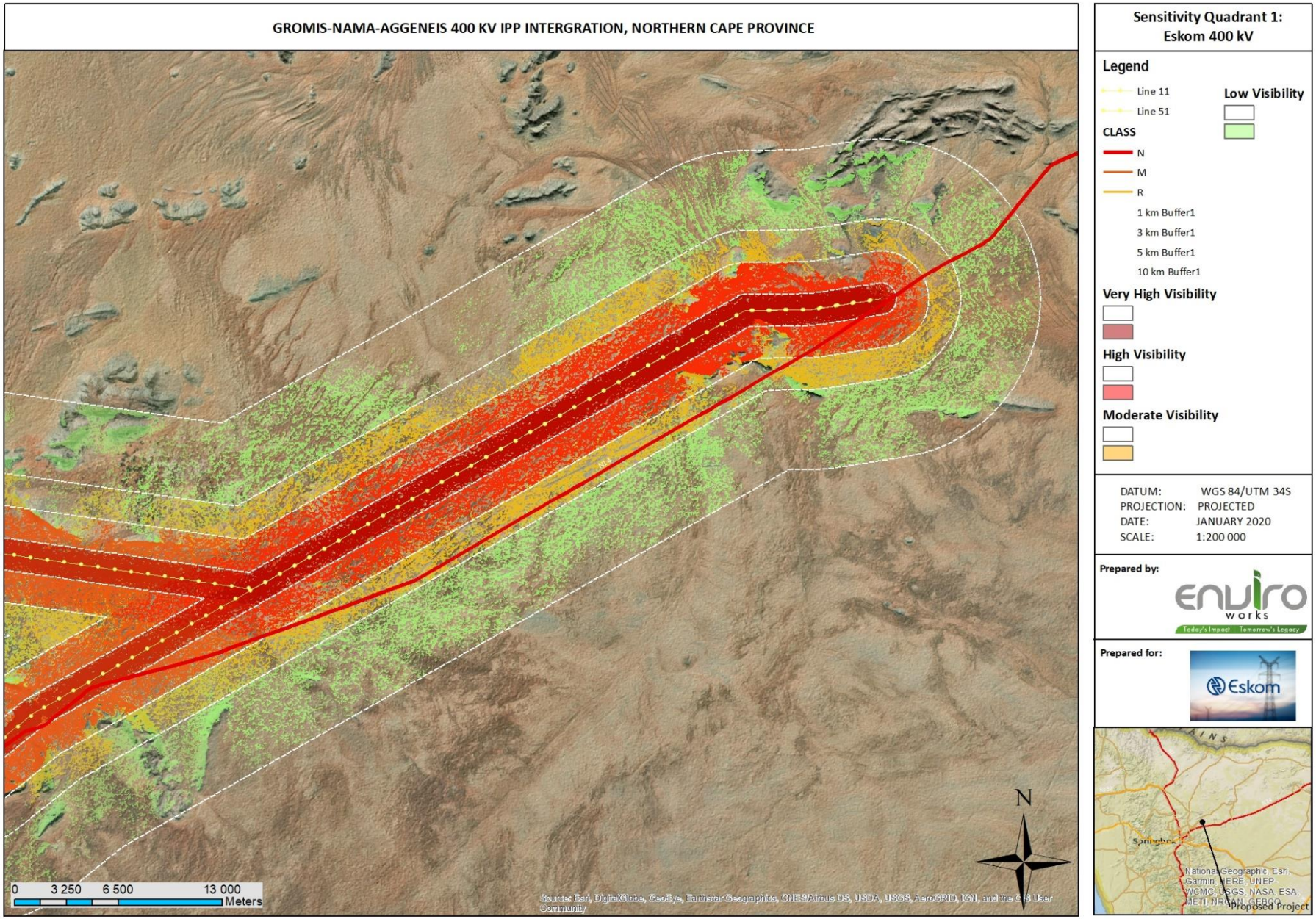


Figure 12: Viewshed Analysis of Quadrant 1.

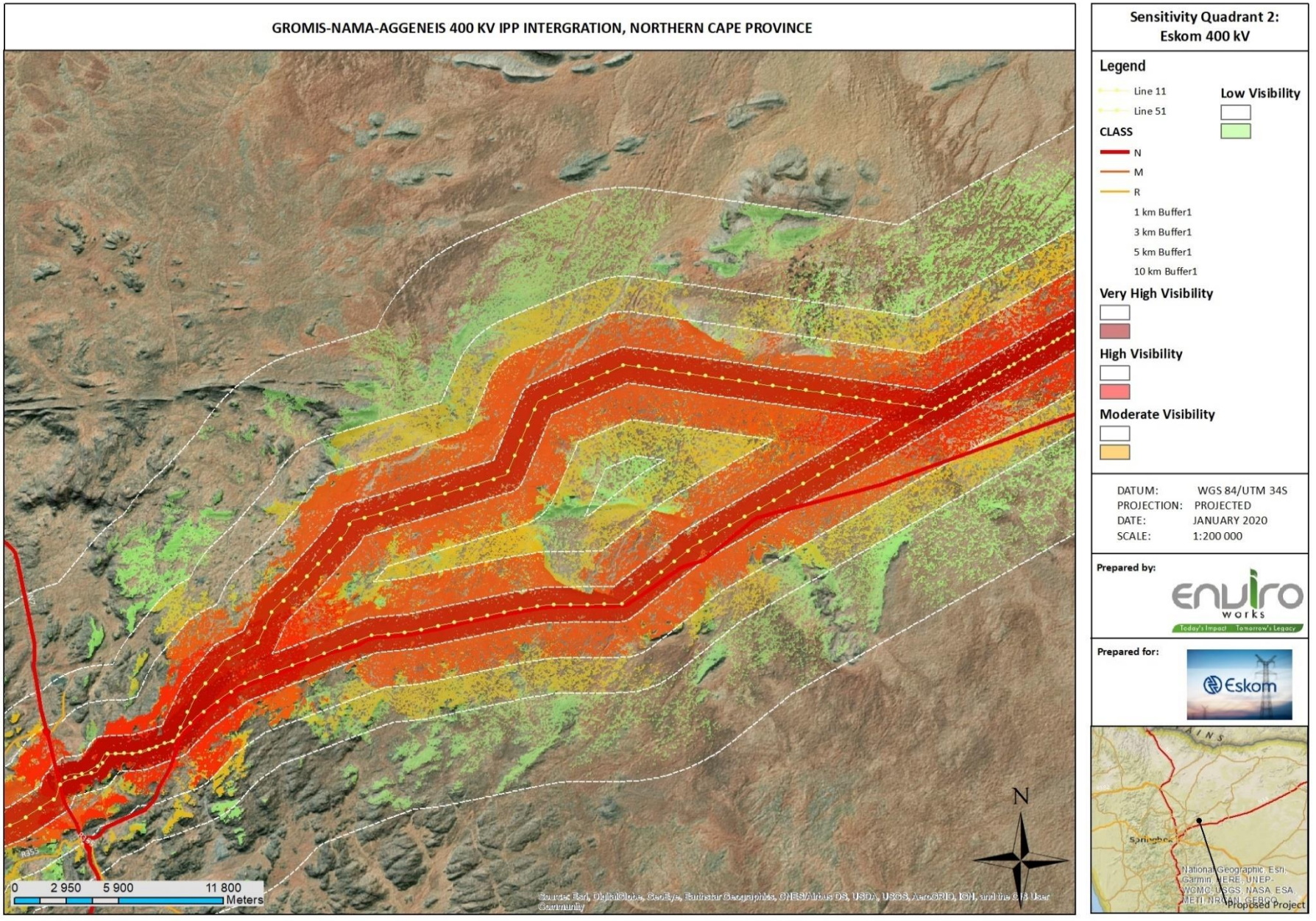


Figure 13: Viewshed Analysis of Quadrant 2.

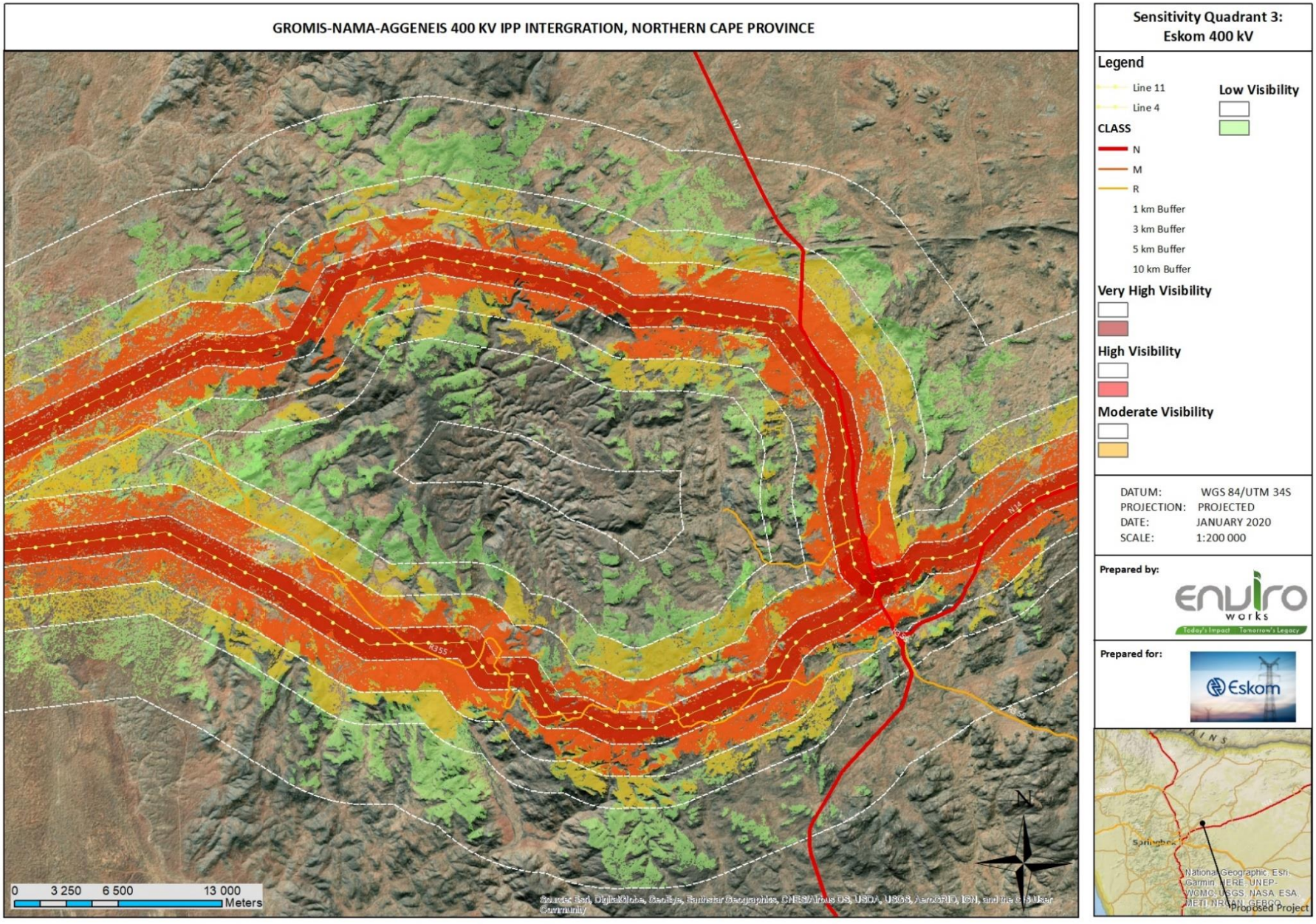


Figure 14: Viewshed Analysis of Quadrant 3.

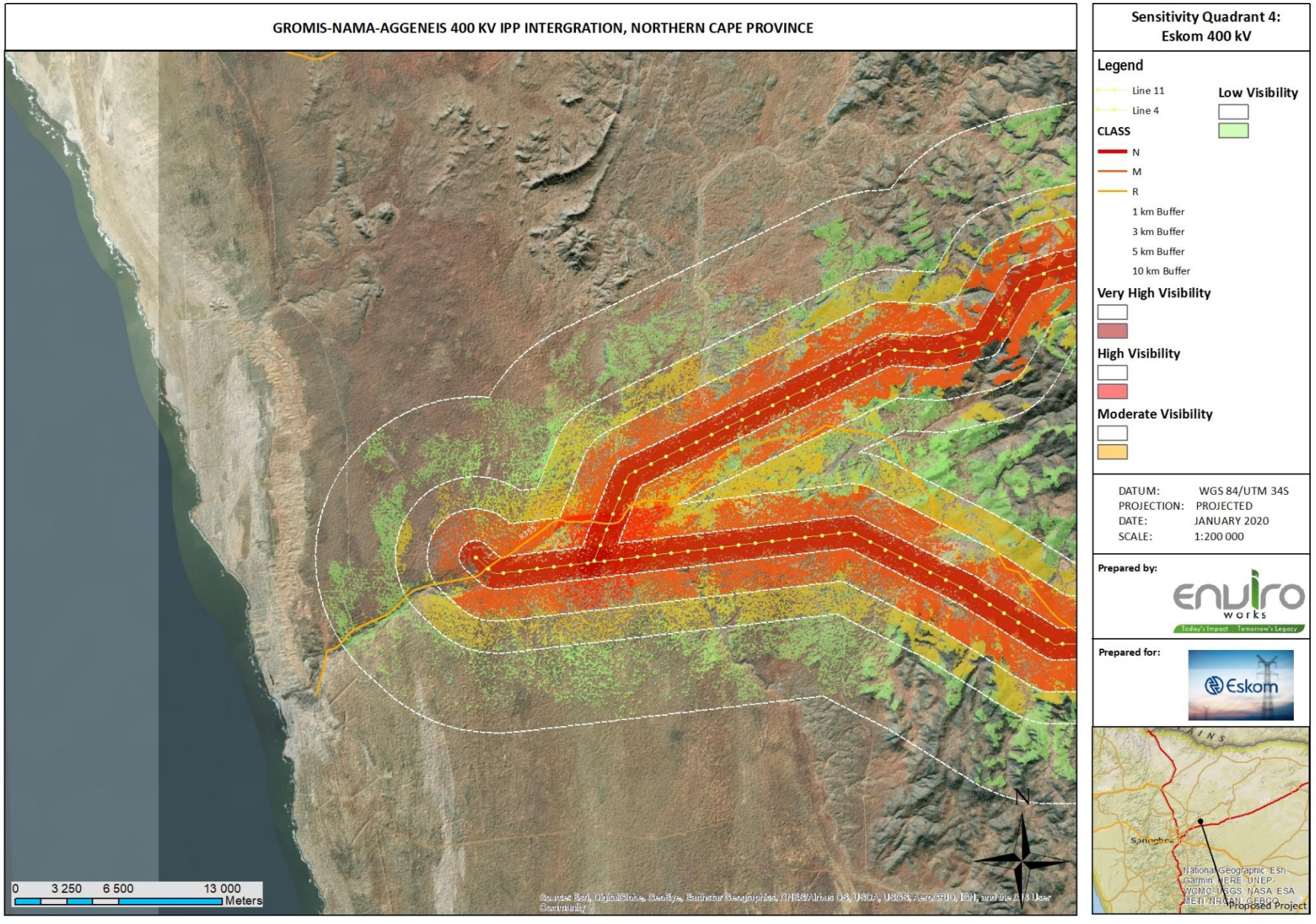


Figure 15: Viewshed Analysis of Quadrant 4.

16 VISUAL ABSORPTION CAPACITY

The following section provides a description of the viewshed analysis via photographic evidence taken at a height of one point eight metres (1.8m) and thirty two metres (32 m) respectively. This will enable the reader to understand the Visual Absorption Capacity (VAC) of the area and provide a visual reference of each Quadrant.

PHOTOGRAPHIC EVIDENCE – QUADRANT 1

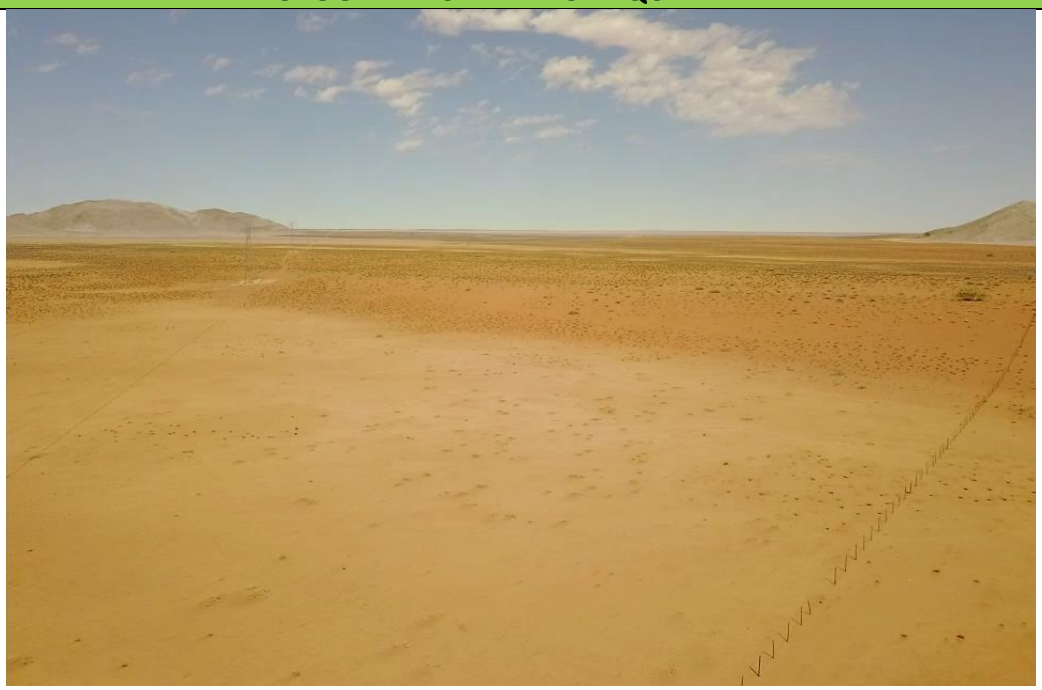


Figure 16: Photo Position 1 situated 10 km towards the west of the Aggeneis sub-station.

Photo 1 was taken ten kilometres (10 km) along the existing route in a westerly direction illustrating the low vegetation cover within the area. It must be noted that as lattice pylons will be used the visual impact is lessen to some degree as it allow for the visibility within the background. From this vantage point the proposed development will not be visible from National Route Fourteen (N14) due to the undulating topography situated towards the south. No farmhouses were noted within the immediate surrounding.

Figure 17: Photo Position 2 situated 10 km towards the west of the Aggeneis sub-station.

Figure 18 was taken from the same vantage point as Figure 8 in an easterly direction of the existing route. The degree of visibility of the pylons is clearly illustrated in Figure 9. The VAC of the area towards the east can be described as low as vegetation cover within the area is extremely low. The visual impact from this vantage point will be low as it will not be visible from the N14 and limited observers are situated within the area.

Figure 18: Photo Position 3 taken 46 km towards the west of the Aggeneis sub-station.

Photo Position 3 was taken forty two kilometres (42 km) at the point from where Alternative 5 will deviate from Alternative 1. The visual impact from this vantage point is considered to be moderate as it will be situated within three kilometres (3 km) from National Route 14; however, the proposed pylons will not be situated within the direct line of sight of motorists; furthermore, the line will be situated adjacent to the existing line resulting in no new visual disturbance. The visual impact will be temporary as motorists will travel through the area and won't be permanently station within.

PHOTOGRAPHIC EVIDENCE - QUADRANT 2

Figure 19: Photo Position 4 taken 50 km towards the west along Alternative 5.

Photo Position 4 was taken fifty kilometres (50 km) from the Aggeneis sub-station along Alternative 5. The visual impact from this vantage point will be low due to the distance between the observers and the proposed development as National Route 14 is situated six kilometre (6 km) towards the south. The visual absoprtion capacity from the vantage point is low; however, only two (2) dwellings were observed within the area.

Figure 20: Photo Position 5 taken 53 km from the Aggeneis sub-station along Route Alternative 1.

Photo 5 was taken fifty three kilometres (53 km) from the Aggeneis sub-station along Route Alternative 1. The visual impact from this vantage point will be high due to the low VAC of the environment as evident. National Route 14 is situated within one kilometre (1 km) from the proposed development from where the highest visual impact will occur.

Figure 21: Photo Position 6 taken 5 km towards the east of Nama sub-station.

Photo 6 was taken five kilometres (5 km) towards the east of the Nama sub-station where Alternative 1 and 5 come together. The visual impact from this vantage point will be high as the two powerlines will be situated within a one kilometre (1 km) of National Route 14. The visual impact will be permanent as the residential area of Carolusberg is situated towards the south of the proposed development.

Figure 22: Photo Position 7 taken 7 km towards the east of Nama sub-station.

Photo Position 7 was taken seven kilometres (7 km) towards the east of the Nama sub-station near National Route 14 and Carolusberg. The visual impact from this vantage point will be high due to the distance between the observers and the proposed development. The visual impact will be permanent to residents of Carolusberg; however, it must be noted that visual exposure already occurs within the area. The visual impact from National Route 14 (N14) will be temporary as motorists will commute through the area towards Pofadder and Springbok.

Figure 23: Photo Position 8 taken 5 km towards the east of the Nama sub-station.

Photo 8 was taken five kilometres (5 km) towards the east of the Nama sub-station in an easterly direction. The visual impact within the area will be moderate as the VAC of the study area is considered to be moderate as the landscape can absorb the bottom half of the pylons. The cumulative impact will be high as the proposed tower will be constructed parallel to the existing line.

Figure 24: Photo Position 9 taken 5 km towards the east of the Nama sub-station.

Photo 8 was taken five kilometres (5 km) towards the east of the Nama sub-station in a westerly direction. The visual impact within the area will be high as the VAC of the study area is considered to be low as the landscape does not absorb the pylons. The cumulative impact will be high as the proposed tower will be constructed parallel to the existing line.

Figure 25: Photo Position 10 taken 3.5 km towards the east of Nama sub-station.

Figure 26 was taken three and a half kilometres (3.5 km) towards the east of the Nama sub-station. Alternative 1 and 5 will traverse through the area; however, the visual impact is considered to be low as the road is not frequently travelled. Furthermore, the VAC of the study area is considered to be high due to the undulating topography of the study area. No observers were observed within this area.

Figure 26: Photo Position 11 taken 500 m towards the east of the Nama sub-station.

Figure 27 was taken five hundred metres (500 m) from the Nama sub-station. The photograph was taken in an easterly direction. Alternative 1 and 5 will be constructed parallel to the existing line over the first kilometre (1st km). The VAC of the study area is considered to be high due to the undulating topography as evident within the foreground.

Figure 27: Photo Position 12 taken towards the north of the Proposed Development.

Photo 12 was taken at the Nama sub-station situated towards the north of Springbok. The visual impact will be moderate as the proposed development will blend in with the surrounding powerlines; however, the cumulative impact at Nama sub-station will be high. The proposed development will especially be visible from National Route 7 from where the impact will be temporary. It must be noted that the proposed development will be visible from the Residential Area of Bergsig situated one kilometre (1 km) towards the south west from where the visual impact will be permanent and moderate.

PHOTOGRAPHIC EVIDENCE - QUADRANT 3

Figure 28: Photo Position 13 taken 16 km towards the north of Nama sub-station along Alternative 4.

Photo 13 was taken sixteen kilometres (16 km) towards the north of the Nama sub-station where Alternative 4 will cross over National Route 7. The visual impact will be moderate and temporary as the proposed

development will be situated within the direct line of sight of the motorists. No permanent residential areas are situated near Photo Position 12; however, the proposed development will traverse past O'Kiep from where the visual impact will be high.

Figure 29: Photo Position 14 taken 25 km towards the north west along Alternative 4.

Figure 30 was taken twenty five kilometres (25 km) towards the north west within the Alternative 4 Corridor on a hill just outside of Bulletrap. Beyond the hill situated within the foreground the study area is considered as pristine from a visual perspective as limited observers are situated within this area. The area predominantly consists of natural vegetation with no visual disturbances situated within. Should Alternative 4 be developed the visual impact from this area will be high and permanent to residents of Bulletrap.

Figure 30: Photo Position 15 taken 27 km towards the north west of Nama sub-station along Alternative 4.

Photo Position 15 was taken twenty seven kilometres (27 km) towards the north west of the Nama sub-station within the mountainous terrain of Alternative 4. As evident within the photo no visual obstructions occur within the area. After an extensive desktop study numerous hiking and 4 x4 trails are situated within this area. As the area is considered to be in pristine natural condition it is advised to treat it as a no-go area. Should Eskom wish to proceed with Alternative 4 the visual impact will be extremely high within this area.

Figure 31: Photo Position 16 taken 41 km towards the north west of Nama sub-station along Alternative 4.

Photo Position 16 was taken forty one kilometres (41 km) towards the north west of the Nama sub-station within the mountainous terrain of Alternative 4. As evident within the photo no visual obstructions occur within the area. After an extensive desktop study numerous hiking and 4 x4 trails are situated within this area. As the area is considered to be in pristine natural condition it is advised to treat it as a no-go area. Should Eskom wish to proceed with Alternative 4 the visual impact will be extremely high within this area.

Figure 32: Photo Position 17 taken at the abandoned Copper Mine.

Photo 17 illustrates one of the abandoned copper mines situated near Alternative 4. The exact location can't be pointed out at this stage as no signal was available for the mapping of co-ordinates (Please note this photo was only included as a fascinating occurrence and has no relevance to the study).

Figure 33: Photo Position 18 taken 6 km towards the west of Springbok along Alternative 1.

Photo Position 18 was taken six kilometres (6 km) towards the west of Springbok along Alternative 1. The proposed development will be situated parallel to the existing line within the background. Due to the distance between the observer and the proposed development the visual impact is considered to be low. Furthermore, limited observers are situated within this area resulting in a temporary visual impact.

Figure 34: Photo Position 19 taken 16 km towards the west of Nama sub-station along Alternative 1 & 5.

Photo Position 19 was taken sixteen kilometres (16 km) towards the west of the Nama sub-station along the R355 on-route to Kleinsee. The figure above illustrates the high VAC of the study area within this section as the existing powerline is situated within the foreground. The visual impact from this vantage point will be low as it takes a lot of effort to spot the pylons. Furthermore, the impact will be temporary as it will only be observed by motorists travelling to Buffelsrivier.

Figure 35: Photo Position 20 taken 18 km from Nama sub-station along Alternative 1 & 5.

Photo 20 was taken eighteen kilometres (18 km) along the R355. Although in close proximity to Photo Position 18 it clearly illustrates the pylons against the backdrop of the sky. The visual impact will be moderate as the VAC is considered to be moderate due to the backdrop of sky. The visual impact from this vantage point will be temporary as it can't be observed from any nearby places of residence nor tourist attractions.

Figure 36: Photo Position 21 taken 21 km towards the west of Nama sub-station.

Photo Position 21 was taken from the well-known Lookout Point situated near Buffelsrivier along Alternative 1 & 5. It must be noted that the proposed development will be visible within the background; however, the visual impact is considered to be low due to the high VAC of the study area.

PHOTOGRAPHIC EVIDENCE – QUADRANT 4

Figure 37: Photo Position 22 taken towards the north west of the Proposed Development.

Photo 22 was taken fifty kilometres (50 km) from the Gromis sub-station near Buffelsrivier. The proposed development will be visible from this vantage point with a moderate visual impact; however, the cumulative impact will be high due to the existing line. The Visual Absorption Capacity is moderate due to the undulating topography of the area. It must be noted that limited observers traverse through the area as Buffelsrivier is the last town within the area.

Figure 38: Photo Position 23 taken 32 km from the Gromis sub-station in between Alternative 1, 4 & 5.

Photo Position 23 was taken thirty two kilometres (32) towards the east of the Gromis sub-station between Alternative 1, 4 & 5. The area consists of natural vegetation and dunes with limited observers within the area. The only observers situated within the area are mines. No permanent residence were observed within the area. The visual impact will be low from this vantage point due to the moderate VAC of the study area.

Figure 39: Photo Position 24 taken 19 km from Gromis sub-station along Alternative 1 & 5.

Figure 40 was taken nineteen kilometres (19 km) from the Gromis sub-station along Alternative 1 & 5. The proposed development will be constructed parallel to the existing line. The visual impact within the area will be low as the limited observers will traverse through the area. The R355 is situated at a higher elevetation than the proposed development assisting in limiting the visual exposure. No permanent residence were observed within this area.

Figure 40: Photo Position 25 taken 5 km from Gromis sub-station along Alternative 1, 4 & 5.

Figure 41 was taken five kilometres (5 km) from the Grmis sub-station along the R355. The photograph illustrates the Visual Absorption Capacity of the area as the existing line can't be seen in the background. The visual impact will be low within Quadrant 4 as the area is unoccupied except for a few mines in the area.

Figure 41: Photo Position 26

Figure 26 illustrates the Gromis sub-station near Kleinsee. Since De Beers closed its mine near Kleinsee the town experienced a high outflux of residence. When the town was visited it had nothing more than a few residence. The visual impact within this area will be low and temporary as the substation will only be visible from the R355.

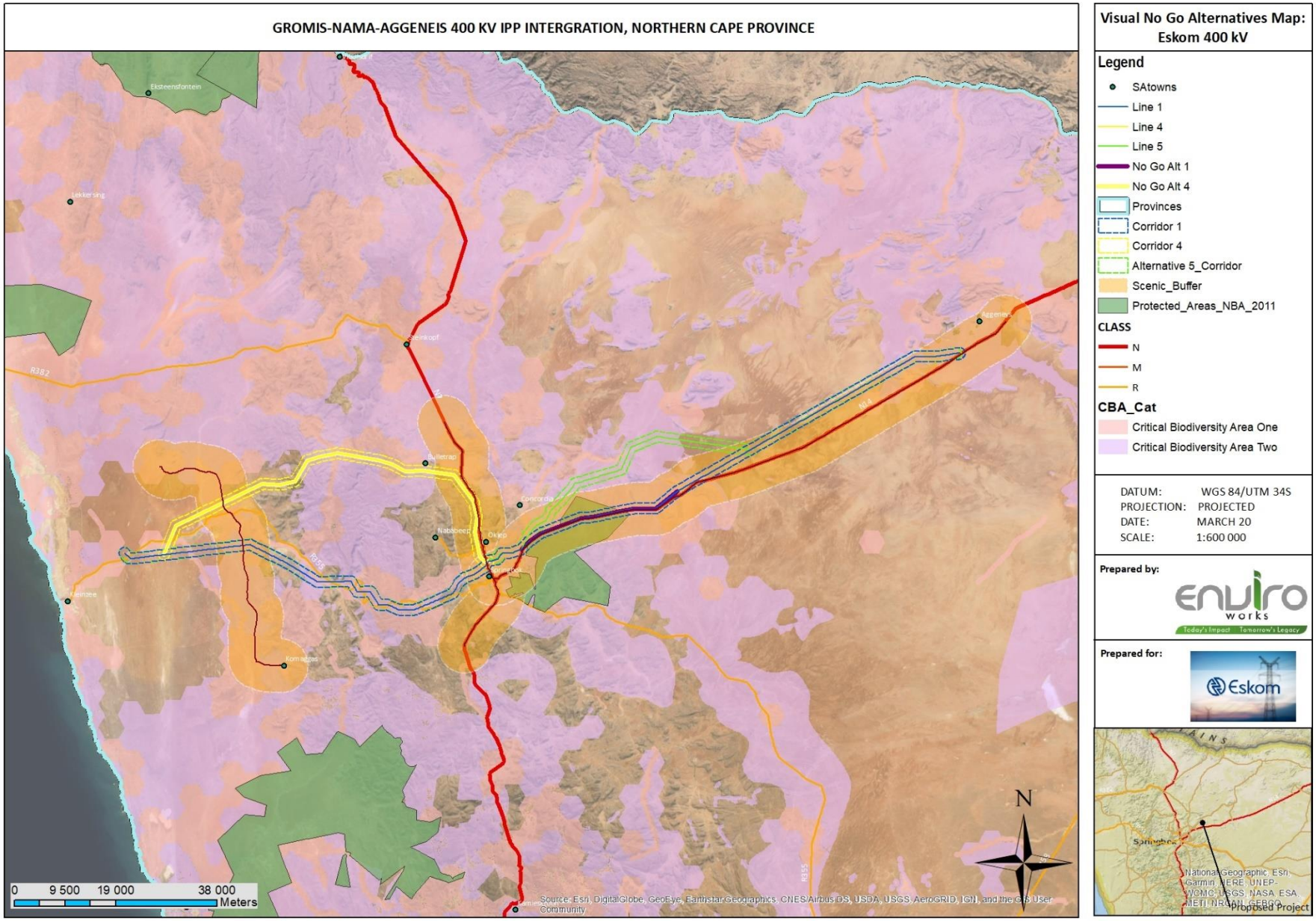


Figure 42: Sensitive (no-go) areas as identified.

17 VISUAL IMPACT ASSESSMENT: IMPACT RATING METHODOLOGY

The previous section outlines all areas visible from the proposed 400 kV Powerline (viewshed analysis). This section will attempt to quantify these potential visual impacts in their respective geographical locations and in terms of the identified issues related to the visual impact. The methodology for the assessment of potential visual impacts states the nature of the potential visual impact (e.g. the visual impact on individuals who travel along the N7, R316 and R320 as well as those residing within and visiting the project extent) and includes a table quantifying the potential significance of visual impact according to the following criteria:

- Duration of the impact (time scale);
- Extent of the impact (spatial scale);
- Degree to which the impact may cause irreplaceable loss of resources;
- Degree to which the impact can be reversed;
- Magnitude (or nature) of negative or positive impacts;
- Probability of the impact occurring;
- Cumulative Impacts; and the,
- Degree to which the impact can be mitigated.

The scales to be used to assess these variables and to define the rating categories are tabulated in the tables below.

Table 7: Evaluation components, ranking scales and descriptions (criteria).

Evaluation component	Ranking scale and description (criteria)
DURATION	**5 - Permanent** **4 - Long term**: Impact ceases after operational phase/life of the activity (> 20 years). **3 - Medium term**: Impact might occur during the operational phase/life of the activity (5 to 20 years). **2 - Short term**: Impact might occur during the construction phase (< 5 years). **1 - Immediate**
EXTENT (or spatial scale / influence of impact)	**0 - None** **5 - International**: Beyond National boundaries. **4 - National**: Beyond Provincial boundaries and within National boundaries. **3 - Regional**: Beyond 5 km of the proposed development and within Provincial boundaries. **2 - Local**: Within 5 km of the proposed development. **1 - Site-specific**: On site or within 100 m of the site boundary.
IRREPLACEABLE loss of resources	**5 - Definite** loss of irreplaceable resources. **4 - High** potential for loss of irreplaceable resources. **3 - Moderate** potential for loss of irreplaceable resources. **2 - Low** potential for loss of irreplaceable resources. **1 - Very low** potential for loss of irreplaceable resources. **0 - None**
REVERSIBILITY of impact	**5 -** Impact **cannot** be reversed. **4 - Low** potential that impact might be reversed. **3 - Moderate** potential that impact might be reversed. **2 - High** potential that impact might be reversed. **1 -** Impact **will be** reversible. **0 -** No impact.

Evaluation component	Ranking scale and description (criteria)
MAGNITUDE of negative impact (at the indicated spatial scale)	**10 - Very high**: Bio-physical and/or social functions and/or processes might be *severely* altered. **8 - High**: Bio-physical and/or social functions and/or processes might be *considerably* altered. **6 - Medium**: Bio-physical and/or social functions and/or processes might be *notably* altered. **4 - Low** : Bio-physical and/or social functions and/or processes might be *slightly* altered. **2 - Very Low**: Bio-physical and/or social functions and/or processes might be *negligibly* altered. **0 - Zero**: Bio-physical and/or social functions and/or processes will remain *unaltered.*
MAGNITUDE of POSITIVE IMPACT (at the indicated spatial scale)	**10 - Very high (positive)**: Bio-physical and/or social functions and/or processes might be *substantially* enhanced. **8 - High (positive)**: Bio-physical and/or social functions and/or processes might be *considerably* enhanced. **6 - Medium (positive)**: Bio-physical and/or social functions and/or processes might be *notably* enhanced. **4 - Low (positive)**: Bio-physical and/or social functions and/or processes might be *slightly* enhanced. **2 - Very Low (positive)**: Bio-physical and/or social functions and/or processes might be *negligibly* enhanced. **0 - Zero (positive)**: Bio-physical and/or social functions and/or processes will remain *unaltered.*
PROBABILITY (of occurrence)	**5 - Definite**: >95% chance of the potential impact occurring. **4 - High probability**: 75% - 95% chance of the potential impact occurring. **3 - Medium probability**: 25% - 75% chance of the potential impact occurring **2 - Low probability**: 5% - 25% chance of the potential impact occurring. **1 - Improbable**: <5% chance of the potential impact occurring.
CUMULATIVE impacts	**High**: The activity is one of several similar past, present or future activities in the same geographical area, and might contribute to a very significant combined impact on the natural, cultural, and/or socio-economic resources of local, regional or national concern. **Medium**: The activity is one of a few similar past, present or future activities in the same geographical area, and might have a combined impact of moderate significance on the natural, cultural, and/or socio-economic resources of local, regional or national concern. **Low**: The activity is localised and might have a negligible cumulative impact. **None**: No cumulative impact on the environment.

Once the evaluation components have been ranked for each potential impact, the significance of each potential impact will be assessed (or calculated) using the following formula:

SP (Significance Points) = (**Duration** + **Extent** + **Irreplaceability** + **Reversibility** + **Magnitude**) x **Probability**

The maximum value is 150 significance points (SP). The unmitigated and mitigated scenarios for each potential environmental impact should be rated as per the table below.

Table 8: Definition of significance ratings (positive and negative).

Significance Points	Environmental Significance	Definition
100 – 150	**High (H)**	An impact of high significance which could influence a decision about whether or not to proceed with the proposed project, regardless of available mitigation options.

Significance Points	Environmental Significance	Definition
		Cumulative Impact: The activity is one of several similar past, present or future activities in the same geographical area, and might contribute to a very significant combined impact on the natural, cultural, and/or socio-economic resources of local, regional or national concern.
40 – 99	**Moderate (M)**	If left unmanaged, an impact of moderate significance could influence a decision about whether or not to proceed with a proposed project. **Cumulative Impact:** The activity is one of a few similar past, present or future activities in the same geographical area, and might have a combined impact of moderate significance on the natural, cultural, and/or socio-economic resources of local, regional or national concern.
<40	**Low (L)**	An impact of low is likely to contribute to positive decisions about whether or not to proceed with the project. It will have little real effect and is unlikely to have an influence on project design or alternative motivation. **Cumulative impact:** The activity is localised and might have a negligible cumulative impact.
+	**Positive impact (+)**	A positive impact is likely to result in a positive consequence/effect, and is likely to contribute to positive decisions about whether or not to proceed with the project.

18 VISUAL IMPACT ASSESSMENT

The primary visual impacts of the proposed 400 kV Powerline are further assessed as follow:

18.1 Potential visual impact on sensitive visual receptors, located within a 5 km radii of the Proposed 400 kV Powerline.

The Operational Phase of the proposed development could have a moderate visual impact (significance rating= 45) on observers within a five kilometer (5 km) radius should mitigation measures not be implemented.

Table 9: Impact Ratings of the Operational Phase within a 5 km radius of Corridor 1.

Planning, design and construction phase	Design Alternative 1		No-Go Alternative
	Before Mitigation	After Mitigation	
POTENTIAL VISUAL IMPACTS:			
Nature of impact: Impact on the sense of place for surrounding users.	**Activity:** The development of Corridor 1 can cause a visual intrusion to observers within a five kilometre (5km) radius from the proposed development.		No construction phase impacts are associated with the no-go alternative thus no assessment has been undertaken.
Magnitude:	6	6	-
Duration:	4	4	-
Extent:	3	2	-
Irreplaceable:	3	2	-
Reversibility:	3	3	-
Probability:	5	4	-
Total SP:	95	68	-
Significance rating:	MH	M	-
Cumulative impact:	H	M	-

Table 10: Impact Ratings of the Operational Phase within a 5 km radius of Corridor 4.

Planning, design and construction phase	Design Alternative 1		No-Go Alternative
	Before Mitigation	After Mitigation	
POTENTIAL VISUAL IMPACTS:			
Nature of impact: Impact on the sense of place for surrounding users.	**Activity:** The development of Corridor 4 can cause a visual intrusion to observers within a five kilometre (5km) radius from the proposed development.		No construction phase impacts are associated with the no-go alternative thus no assessment has been undertaken.
Magnitude:	10	8	-
Duration:	4	4	-
Extent:	3	3	-
Irreplaceable:	4	3	-

Planning, design and construction phase	Design Alternative 1		No-Go Alternative
	Before Mitigation	After Mitigation	
Reversibility:	3	3	-
Probability:	5	4	-
Total SP:	120	84	-
Significance rating:	H	MH	-
Cumulative impact:	-	-	-

Table 11: Impact Ratings of the Operational Phase within a 5 km radius of Corridor 5.

Planning, design and construction phase	Design Alternative 1		No-Go Alternative
	Before Mitigation	After Mitigation	
POTENTIAL VISUAL IMPACTS:			
Nature of impact: Impact on the sense of place for surrounding users.	**Activity:** The development of Corridor 5 can cause a visual intrusion to observers within a five kilometre (5km) radius from the proposed development.		No construction phase impacts are associated with the no-go alternative thus no assessment has been undertaken.
Magnitude:	4	4	-
Duration:	4	4	-
Extent:	2	2	-
Irreplaceable:	3	2	-
Reversibility:	3	3	-
Probability:	4	3	-
Total SP:	64	45	-
Significance rating:	M	M	-
Cumulative impact:	M	M	-

19 CONCLUSION AND RECOMMENDATIONS

After careful consideration of Alternative 1, 4 and 5, it is advised from a visual perspective that Alternative 5 be developed. Although there is not a lot of difference between Alternative 1 and 5 the following points can be considered as motivation for the development of Alternative 5:

1. National Route 14 is avoided near Springbok where it deviates from Alternative 1;
2. Alternative 5 will not traverse through the Goegap National Park as Alternative 1 but will traverse towards the north of the National Park.

Alternative 4 is not considered to be a viable option due to the pristine natural area and lack of development along the route. Numerous tourist attractions are situated within the area which consist of hiking trails, 4 x 4 routes and guest lodges.

Alternative 5 will have the lowest visual impact of all listed Alternatives. If all mitigation measures are implemented by Eskom the visual impact will be moderate to residence of Aggeneys, Springbok and Buffelsrivier, commuters making use of National Route 14 (N14) as well as to tourist visiting the surrounding tourist attractions.

Construction Phase:

- All areas disturbed by construction activities must be subject to landscaping and rehabilitation;
- All spoil and waste will be disposed to a registered waste site and certificates of disposal provided;
- All slopes in excess of 2% (1:50) must be contoured in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983;
- All slopes in excess of 12% (1:8.3) must be terraced in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983;
- Berms that have been created should have a slope of 1:4 and be replanted with indigenous species and grasses;
- The project must be timed so that rehabilitation can take place at the optimal time for vegetation establishment;
- Access roads are to be kept clean;
- Site offices and structures should be limited to one location and carefully situated to reduce visual intrusions. Roofs should be grey and non-reflective;
- Construction camps as well as development areas should be screened with netting;
- Lights within the construction camp should face directly down (angle of 90˚);
- Vegetation clearance should be limited to the development footprint only;
- Litter should be strictly controlled, as the spread thereof through wind could have a very negative visual impact;
- Avoid shiny materials in structures. Where possible shiny metal structures should be darkened or screened to prevent glare; and,

- Mitigation of visual impacts associated with the construction phase would entail proper planning, management and rehabilitation of the construction site. Mitigation measures include the following:
- Reduce the time of construction through careful planning of logistics and ensure the productive implementation of resources;
- Limit disturbance of the environment to the development footprint; and,
- Limit construction activities to business hours (07:00 – 17:00).
- The use of different pylon types should be avoided, where possible, particularly where these are in visual proximity to each other;
- Maintenance roads required for transmission lines should use existing access roads or farm roads as far as possible;
- Signage, if essential, should be discrete and confined to entrance gates. No corporate or advertising signage should be permitted.

Operation Phase:

There are no special visual management actions that are applicable during the operational phase once the transmission infrastructure has been installed, except for the standard maintenance of revegetation work as part of an Environmental Management Programme (EMPr).

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