

**PROPOSED ESIZAYO 132kV TRANSMISSION INTEGRATION  
PROJECT**

**Western and Northern Cape Provinces**

**VISUAL IMPACT ASSESSMENT**

**Produced for:**

**BioTherm Energy (Pty) Ltd**

**On behalf of:**

**WSP Group Africa (Pty) Ltd**



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## **1. STUDY APPROACH**

### **1.1. Qualification and experience of the practitioner**

Lourens du Plessis, a specialist in visual impact assessment and Geographical Information Systems (GIS), undertook the Visual Impact Assessment (VIA).

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

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

WSP Group Africa (Pty) Ltd appointed Lourens du Plessis as an independent specialist consultant to undertake the visual impact assessment for the Proposed Esizayo 132kV Transmission Integration Project. He will not benefit from the outcome of the project decision-making.

### **1.2. Assumptions and limitations**

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

### **1.3. Level of confidence**

Level of confidence<sup>1</sup> is determined as a function of:

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

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<sup>1</sup> Adapted from Oberholzer (2005).

- The information available, understanding of the project area (and the larger study area) and experience of this type of project by the practitioner:
  - 3: A high level of information and knowledge is available of the project and the visual impact assessor is well experienced in this type of project and level of assessment.
  - 2: A moderate level of information and knowledge is available of the project and/or the visual impact assessor is moderately experienced in this type of project and level of assessment.
  - 1: Limited information and knowledge is available of the project and/or the visual impact assessor has a low experience level in this type of project and level of assessment.

These values are applied as follows:

**Table 1:** Level of confidence.

	<b>Information on the project &amp; experience of the practitioner</b>			
<b>Information on the study area</b>	<b>3</b>	<b>2</b>	<b>1</b>	
<b>3</b>	9	6	3	
<b>2</b>	6	4	2	
<b>1</b>	3	2	1	

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

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

#### **1.4. Methodology**

The study was undertaken using Geographical Information Systems (GIS) software as a tool to generate viewshed analyses and to apply relevant spatial criteria to the proposed infrastructure. A detailed Digital Terrain Model (DTM) for the study area was created from topographical data provided by the Japan Aerospace Exploration Agency (JAXA), Earth Observation Research Centre, in the form of the ALOS Global Digital Surface Model "ALOS World 3D - 30m" (AW3D30) elevation model.

#### **Visual Impact Assessment (VIA)**

The VIA is determined according to the nature, extent, duration, intensity or magnitude, probability and significance of the potential visual impacts, and will propose management actions and/or monitoring programs, and may include recommendations related to the Proposed Esizayo 132kV Transmission Integration Project.

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

The VIA considers potential cumulative visual impacts, or alternatively the potential to concentrate visual exposure/impact within the region.

The following VIA-specific tasks were undertaken:

- **Determine potential visual exposure**

The visibility or visual exposure of any structure or activity is the point of departure for the visual impact assessment. It stands to reason that if the proposed grid infrastructure was not visible, no impact would occur.

Viewshed analyses from the proposed infrastructure indicate the potential visibility.

- **Determine visual distance/observer proximity to the grid connection infrastructure**

In order to refine the visual exposure of the grid connection infrastructure 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 infrastructure 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 grid infrastructure 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 (sensitive visual receptors)**

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 the observers, then 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 landscape**

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

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

markedly with one or more of the characteristics of the environment would be low.

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

The digital terrain model utilised in the calculation of the visual exposure of the grid connection infrastructure does 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 observations.

- **Calculate 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 determine the magnitude of each impact.

- **Determine impact significance**

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

- **Propose mitigation measures**

Mitigation measures will be proposed in terms of the planning, construction, operation and decommissioning phases of the project.

- **Reporting and map display**

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

- **Site visit**

Undertake a site visit (July 2021) in order to verify the results of the spatial analyses and to identify any additional site specific issues that may need to be addressed in the VIA report.

## **2. BACKGROUND**

**BioTherm Energy (Pty) Ltd** (BioTherm) is proposing the establishment of transmission integration infrastructure for their proposed Esizayo Wind Energy Facility (WEF) in the Northern and Western Cape. The Esizayo WEF will have a maximum generation capacity of 140MW (250MW in previous revisions of plan) and is one of three wind energy projects being proposed by BioTherm in the greater area. These projects include: Esizayo, Maralla West and Maralla East.

The Esizayo WEF site lies within the Moordenaars Karoo in the Northern and Western Cape, in the Karoo Hoogland and Lainsburg Local Municipalities. It is situated approximately 21km (at the closest) north of the N1 and 60km south of the town of Sutherland. It is bordered to the west by the R354 arterial road, which runs between Matjiesfontein and Sutherland (see **Figure 1**).

This is the second transmission integration project undertaken for the Esizayo WEF. A previous study was undertaken in 2017 where two collector substation and four power line alternatives were assessed in order to connect the Esizayo WEF with the national grid via the existing Eskom Komsberg Main Transmission Substation (MTS). The outcome of this project favoured the Substation 1 and Route Alternative 2 option that has subsequently been authorised.

In order to further strengthen their grid integration options, Biotherm has opted to undertake an additional transmission integration project whereby the Esizayo WEF will be connected to the Komsberg MTS from the Substation Alternative 2.

The proposed additional transmission strengthening option (addressed in this report) includes a single alternative, spanning in between the Esizayo Substation Alternative 2 to Komsberg MTS (very similar to the Substation 2 Route Alternative 1 option, as assessed in abovementioned project in 2017).

The power line will be 6.5km long and will span from the south (from the Substation Option 2) northwards past the Skaapberg hill to the Komsberg MTS. The transmission line will traverse the following farm portions:

- Standvastigheid 210 (C07200000000021000000)
- Aanstoot 72 (C04300000000007200000)

These farms are situated within the Gazetted Central Electricity Grid Infrastructure (EGI) Corridor, one of five corridors earmarked for electricity infrastructure development within South Africa. The project also falls within the Komsberg Renewable Energy Development Zone (REDZ), one of the eight areas that have been identified through an extensive process for the development of renewable energy installations.

The National Environmental Management Act (NEMA) and Environmental Impact Assessment (EIA) Regulations require that a Basic Assessment (BA) be undertaken for the proposed power line infrastructure, since it includes listed activities in terms of these regulations. A separate assessment is being conducted for the Esizayo 132kV Transmission Integration Project.

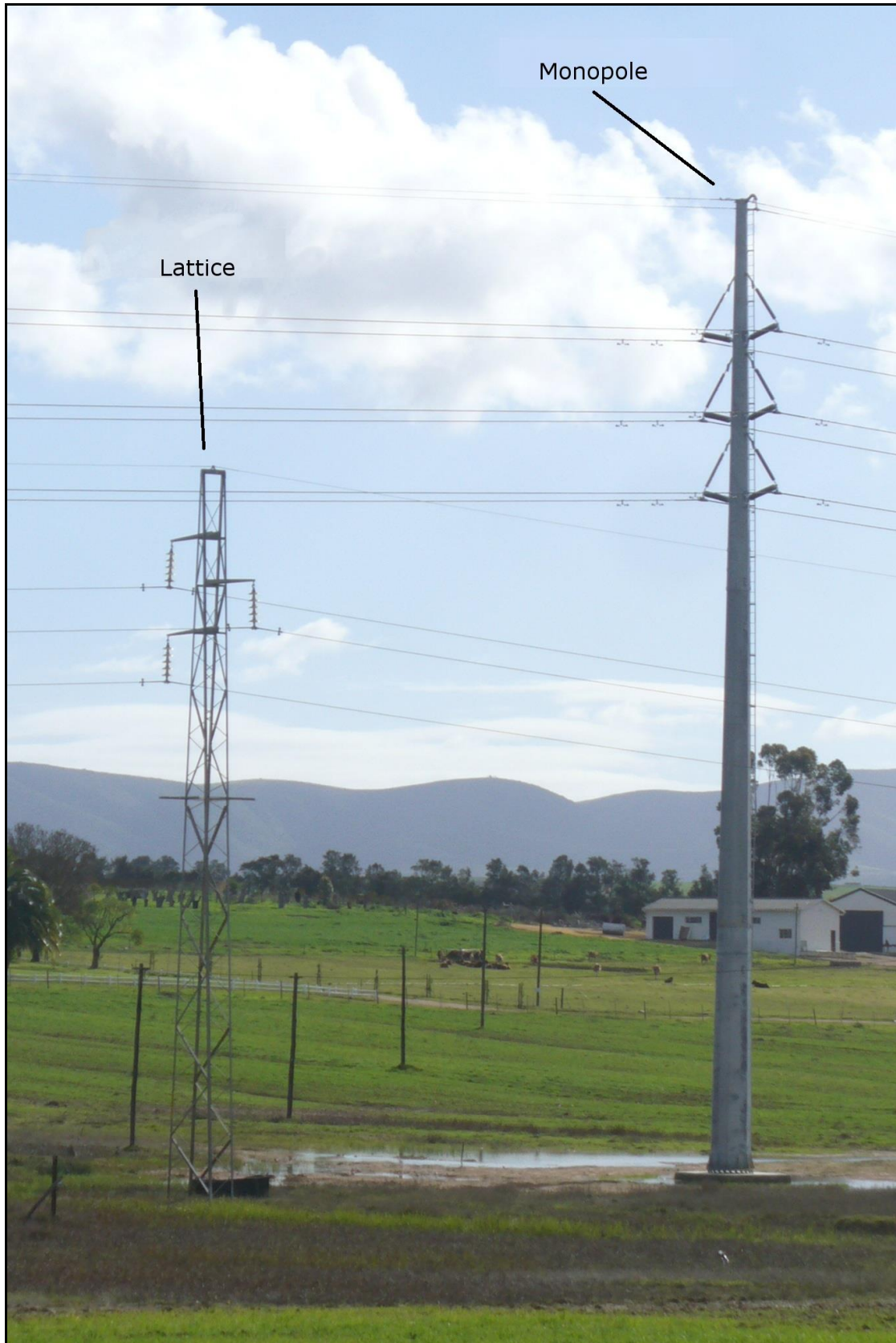
The power line towers will either be steel lattice or monopole structures with a maximum height up to 36m above ground level. The servitude generally associated with 132kV power lines will be up to 40m wide and it is expected that the construction phase will be up to 24 months long.

The proposed grid connection infrastructure is indicated on the maps displayed within this report. Sample images of lattice and monopole tower structures are displayed below.





**Figure 1:** Regional locality of the study area.



**Figure 2:** Conventional lattice power line tower compared to a steel monopole structure.



**Figure 3:** Longer distance view of power line towers.

### **3. SCOPE OF WORK**

This report is the undertaking of a VIA of the proposed grid connection infrastructure as mentioned above.

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

The study area for the visual impact assessment encompasses a geographical area of 209km<sup>2</sup> (the extent of the full page maps displayed in this report) and includes a minimum 3km buffer zone (area of potential visual influence) from the power line alignments.

Anticipated issues related to the potential visual impact of the proposed grid connection infrastructure include the following:

- The visibility of the infrastructure to, and potential visual impact on, observers travelling along the R354 arterial road or secondary roads within the study area.
- The visibility of the infrastructure to, and potential visual impact on residents of homesteads within the study area.
- The potential visual impact of the infrastructure on the visual character or sense of place of the region.
- The potential visual impact of the infrastructure on tourist routes or tourist destinations (if present).
- The visual absorption capacity of the natural vegetation (if applicable).

- Potential cumulative visual impacts (or consolidation of visual impacts), with specific reference to the location of the proposed infrastructure within the Komsberg REDZ, the Central Power Corridor and within close proximity to authorized WEF infrastructure.
- Potential visual impacts associated with the construction phase.
- The potential to mitigate visual impacts and inform the design process.

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

#### **4. RELEVANT LEGISLATION AND GUIDELINES**

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

- The Environmental Impact Assessment Regulations, 2014 (as amended);
- Guideline on Generic Terms of Reference for EAPS and Project Schedules (DEADP, Provincial Government of the Western Cape, 2011).

#### **5. THE AFFECTED ENVIRONMENT**

The proposed Esizayo 132kV Transmission Integration Project lie within the Moordenaars (Murderer's) Karoo; a dry, barren and desolate region south of the Great Escarpment, approximately 22km (at the closest) north of Matjiesfontein. Even though the Esizayo WEF is located within the Western Cape, the grid connection infrastructure will span across two provinces (i.e. the Western and Northern Cape Provinces), as the Komsberg MTS is located within the latter province.

The Moordenaars Karoo does not include any major towns or settlements and is very remote. The project site is accessible via the R354 arterial road that traverses between Matjiesfontein and Sutherland.

##### **Topography, hydrology and vegetation**

The study area is situated on land that ranges in elevation from approximately 948m (in the south-east of the study area) to 1,405m at the top of the hill west of Skaapberg. The proposed project infrastructure will span across terrain identified as *strongly undulating plains and hills*, with the Skaapberg hill and ridge located prominently in between the Esizayo WEF Substation Option 2 and the Komsberg MTS.

There are no perennial rivers in the study area, with only a few weakly defined non-perennial or seasonal water courses appearing within this arid region (*Karoo Renosterveld Bioregion*). One of these is the Roggeveld River, a tributary of the Buffels River that ultimately flows past Lainsburg. There are a limited number of farm dams within the study area which receives a mean annual rainfall of 290mm.

The vegetation cover in the study area is predominantly *Central Mountain Shale Renosterveld* and *Koedoesberge-Moordenaars Karoo*. The land cover types are low shrubland (Fynbos) for most of the study area, with bare sand and rock surfaces primarily associated with the mountainous terrain to the south. It should be noted that the vegetation cover in the region e.g. bare sand and rock surfaces can change according to the season and the amount of rainfall.

Refer to **Maps 1** and **2** for the shaded relief and land cover maps of the study area.

### **Land use and settlement patterns**

The majority of the study area is sparsely populated with a population density of less than 1 person per km<sup>2</sup>. The study area consists of a landscape that can be described as remote due to its considerable distance from any major metropolitan centres or populated areas. The scarcity of water and other natural resources has influenced settlement within this region, keeping numbers low, and distribution limited to the availability of water. Settlements, where they occur, are usually rural homesteads and farmsteads.

Very few homesteads and settlements are present within the study area. These include:

- Swartland
- Bon Espirance
- Leeufontein
- Aanstoot
- Nuwerus
- Fortuin
- Araura
- Die Bron

*It is uncertain whether all of these farmsteads are inhabited or not. It stands to reason that farmsteads that are not currently inhabited will not be visually impacted upon at present. These farmsteads do, however retain the potential to be affected visually should they ever become inhabited again in the future. For this reason, the author of this document operates under the assumption that they are all inhabited.*

The predominant land use in the area is stock farming (predominantly sheep, game or goat farming). Since rainfall is low and water is scarce, crop farming accounts for only a small portion of the land use and is largely confined to the more fertile valleys. Due to the low carrying capacity, farms are large and usually at least about 5km apart.

The R354 arterial road provides motorised access to the region from the N1 national road near Matjiesfontein, the quaint historical town closest to the site (approximately 22km by road to the project site). This road is a local tourism route ultimately leading to Sutherland, the home of the Southern African Large Telescope (SALT). This town and Matjiesfontein are considered to be local tourist attractions/destinations within the region. The Komsberg/Kareedoringkraal secondary or district gravel road provides access to the Komsberg MTS from the R354 arterial road.

Besides the two towns mentioned above, there are no other identified tourist attractions of designated protected areas within the study area.<sup>2</sup>

In spite of the rural and natural character of the study area, there are a number existing overhead power lines in the study area. These include:

- Droërivier-Kappa (Komsberg) 1 x 400kV

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<sup>2</sup> Sources: DEAT (ENPAT Northern and Western Cape), Gebhardt (2017), NBI (Vegetation Map of South Africa, Lesotho and Swaziland), NLC2018 (ARC/CSIR), REEA\_OR\_2021\_Q1 and SAPAD2021 (DFFE).



- Droërivier-Kappa (Komsberg) 2 x 400kV
- Gamma-Kappa 1 x 765kV

These power lines all congregate at the Komsberg MTS.

There are also a number of future power lines that have been authorised and/or surveyed, but not yet constructed. Of relevance to this study are the surveyed Hidden Valley-Komsberg 1 and 2 power lines and the authorised Maralla WEF-Komsberg MTS and Esizayo WEF-Komsberg MTS. These power lines are indicated on the maps in this report.

Further to this, the proposed Esizayo WEF grid connection infrastructure is located within the Komsberg Renewable Energy Development Zone (REDZ) and Central Strategic Transmission Corridor. Refer to **Figure 5** for the regional locality of the site in relation to the Komsberg REDZ. REDZ are described as:

*"areas where large scale wind and solar PV energy facilities can be developed in terms of SIP 8 and in a manner that limits significant negative impacts on the environment, while yielding the highest possible socio-economic benefits to the country."*

Source: <https://redzs.csir.co.za>

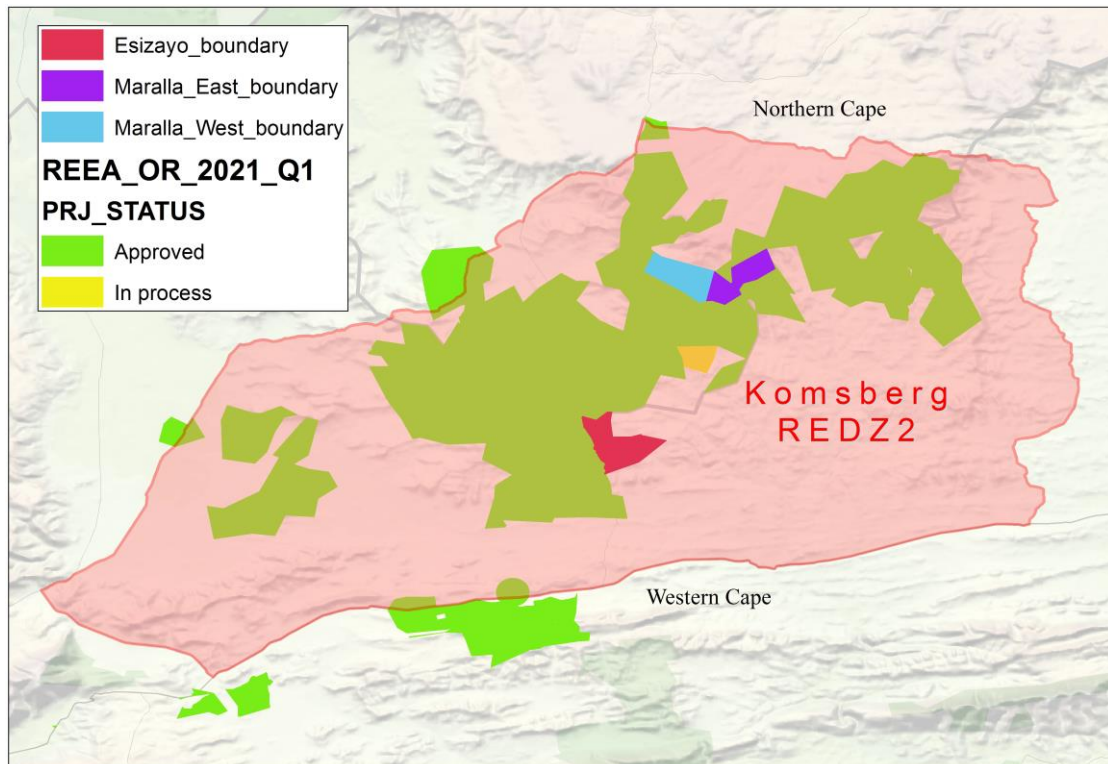
**Figure 5** further indicates the status of Renewable Energy Environmental Applications (REEA) within the Komsberg REDZ (dated 2021 1<sup>st</sup> quarter).

Applications that have been approved (additional to the Esizayo WEF) in the region include:

- Rietrug WEF
- Hidden Valley WEF (Karusa, Great Karoo & Soetwater)
- Roggeveld WEF
- Gunstfontein WEF
- Komsberg WEF
- Maralla East and West WEFs
- Karreebosch WEF
- Sutherland WEF

*Note: Some of these applications include more than one phase.*

It is clear that the region will come under increasing development pressure, and visual intrusion from WEF infrastructure, should all (or most) of the proposed WEFs be constructed.



**Figure 4:** Regional locality of the Esizayo WEF in relation to the Komsberg Renewable Energy Development Zone (REDZ).

*Note: The data above (Figure 4) is provided by the Department: Forestry, Fisheries and the Environment (DFFE). The author accepts no responsibility for the accuracy thereof.*

The photographs below aid in describing the general environment within the study area and surrounding the proposed project infrastructure.



**Figure 5:** View along the R354 arterial road looking north towards the Great Escarpment and Sutherland.



**Figure 6:** The R354 (local tourist route) within the study area.





**Figure 7:** Typical dry riverbed within the study area.



**Figure 8:** The Komsberg/Kareedoringkraal secondary road.



**Figure 9:** Existing power lines in the study area.



**Figure 10:** Low shrubland in the study area.





**Figure 11:** Wide open expanse of the study area.



**Figure 12:** A typical Karoo farmstead/homestead.



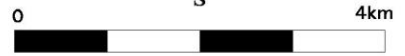
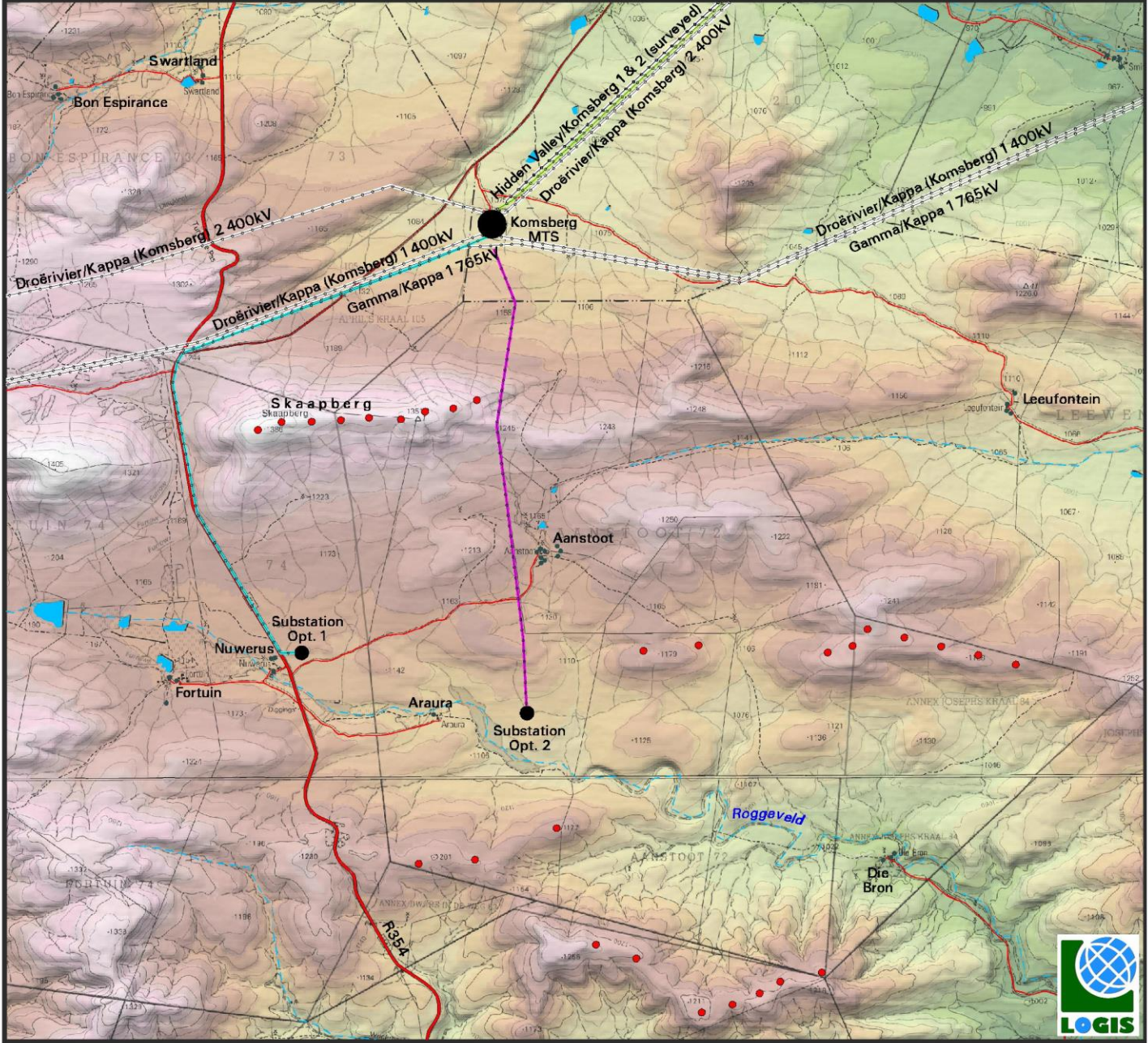
### Grid Connection Infrastructure for the Esizayo Wind Energy Facility

- Arterial/Main Road
- Secondary Road
- Access Road
- Existing/Surveyed Power Line
- Authorised Maralla WEF to Komsberg SS 132kV Power Line
- Authorised Esizayo WEF (SS Opt. 1) to Komsberg SS 132kV Power Line
- Komsberg Main Transmission Substation
- Proposed Esizayo Substation (Options 1 & 2)
- Dam
- Non-perennial River
- Homestead/Farm Dwelling
- Authorised Esizayo Wind Turbines
- Proposed Grid Connection Infrastructure

#### SHADED RELIEF

Elevation above sea level (m)

	960		1200
	980		1220
	1000		1240
	1020		1260
	1040		1280
	1060		1300
	1080		1320
	1100		1340
	1120		1360
	1140		1380
	1160		1400
	1180		



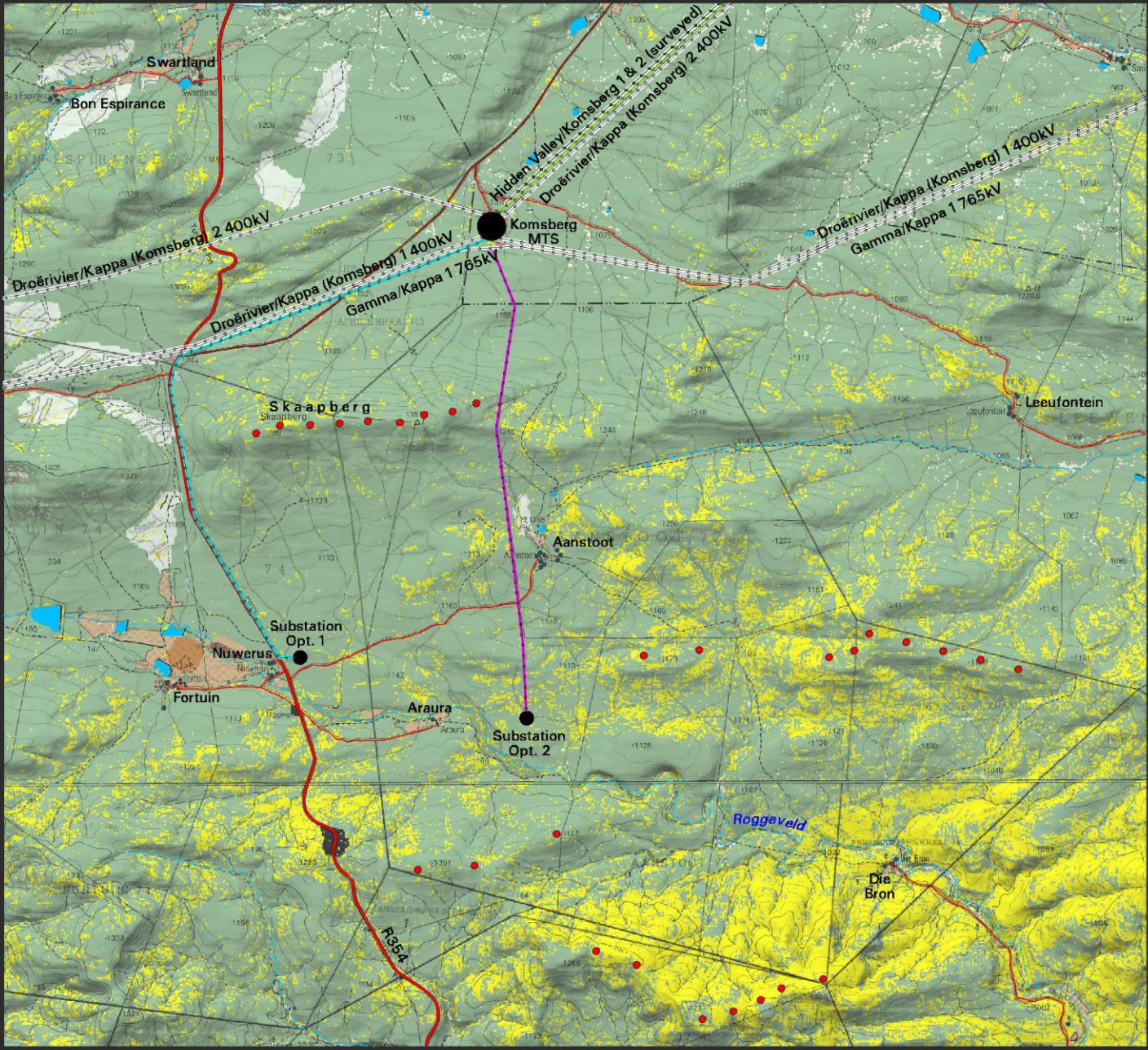
Map 1: Shaded relief map of the study area.



### Grid Connection Infrastructure for the Esizayo Wind Energy Facility

- Arterial/Main Road
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- Homestead/Farm Dwelling
- Authorised Esizayo Wind Turbines
- Proposed Grid Connection Infrastructure

- #### LAND COVER / BROAD LAND USE PATTERNS
- Low Shrubland (Fynbos)
  - Natural Rock Surfaces
  - Grassland
  - Fallow Land & Old Fields (Low Shrub)
  - Orchards
  - Irrigated Agriculture
  - Dryland Agriculture
  - Quarry



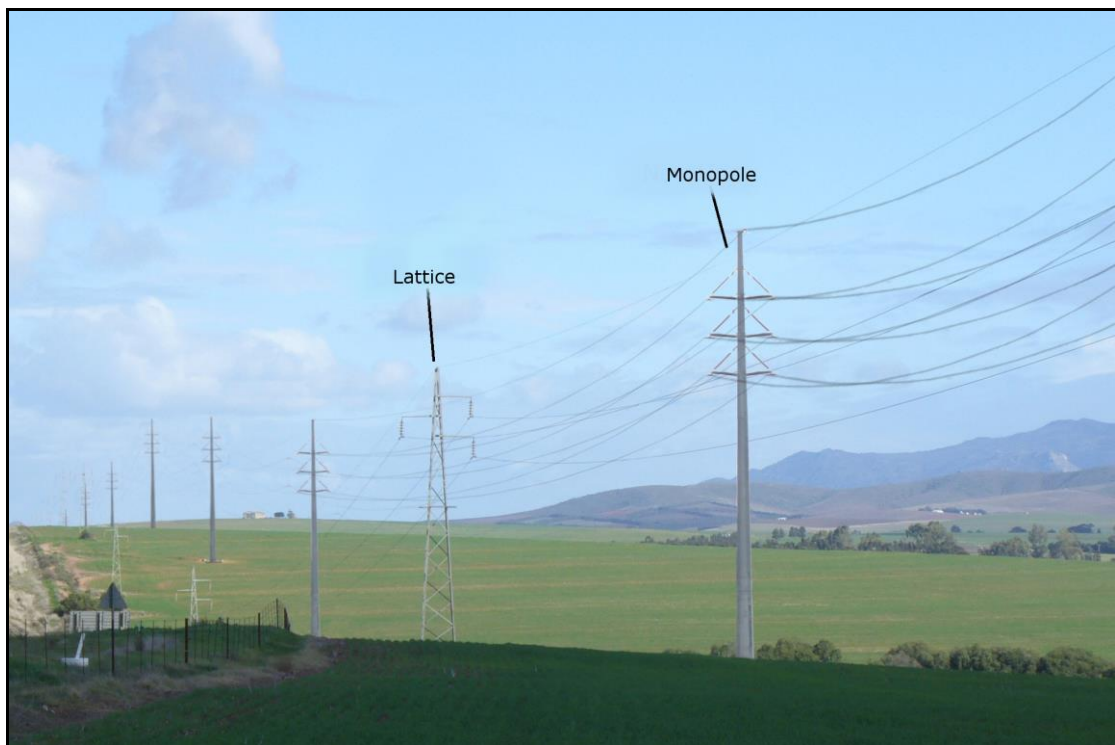
**Map 2:** Land cover and broad land use patterns.



## 6. RESULTS

### 6.1. Potential visual exposure

The potential visual exposure (visibility) of the grid connection infrastructure is shown on **Map 3**. The visibility analysis was undertaken from the proposed Esizayo WEF Substation Option 2, along the power line alignment (up to the Komsberg MTS) at an offset of 36m above average ground level (i.e. the approximate height of the grid connection infrastructure), for a distance of 3km from the infrastructure. The viewshed analysis was restricted to a 3km radius due to the fact that visibility beyond this distance is expected to be negligible/highly unlikely for the relatively constrained vertical dimensions of this type of power line (i.e. a 132kV power line).



**Figure 13:** Examples of 132kV overhead power lines.

It is expected that the grid connection infrastructure may theoretically be visible within a 3km radius and potentially highly visible within a 0.5 – 1.5km radius of the structures. Beyond 1.5km the visibility becomes more scattered due to the undulating nature of the topography as well as the presence of hills and ridges. The grid connection structures are unlikely to be visible beyond a 3km radius of the structures.

The majority of the exposed areas fall within vacant open space, generally devoid of observers or potential sensitive visual receptors. Due to the remote location of the project infrastructure and the generally uninhabited nature of the region, there are only two identified receptor sites within a 3km radius of the proposed project infrastructure. These include the Araura and Aanstoot homesteads.

The grid connection infrastructure is unlikely to be exposed to the R354 arterial road, but may be visible from the Komsberg/Kareedoringkraal secondary road north-west of the Komsberg MTS. The visual exposure will however not be in isolation, but will occur in conjunction with the existing Komsberg MTS and a

significant amount of existing power line infrastructure at this locality. It is unlikely that observers travelling along this road would be able to distinguish the proposed Esizayo WEF power line from the existing grid connection infrastructure.

## **Conclusion**

In general terms it is envisaged that the grid connection infrastructure, where visible from shorter distances (e.g. less than 1.5km), and where sensitive visual receptors may find themselves within this zone, may constitute a high visual prominence, potentially resulting in a visual impact. The incidence rate of sensitive visual receptors is however expected to be quite low, due to the generally remote location of the proposed infrastructure and the low number of potential observers.

Additional to the statement above, the Araura homestead is located on the farm identified for the proposed Esizayo WEF and the Aanstoot homestead on the farm for the INCA Komsberg WEF. The latter application appears to have lapsed (or was withdrawn), but it is assumed that the landowners/residents of these homesteads are generally in favour of WEF infrastructure within the region. This may potentially negate these receptors' sensitivity to the grid line infrastructure.

## **6.2. Potential cumulative visual exposure**

Cumulative visual impacts can be defined as the additional changes caused by a proposed development in conjunction with other similar developments or as the combined effect of a set of developments. In this case the 'development' would be a new 132kV power line located within an area earmarked for future WEF infrastructure.

Cumulative visual impacts may be:

- Combined, where several power lines are within the observer's arc of vision at the same time;
- Successive, where the observer has to turn his or her head to see the various structures of a power line; and
- Sequential, when the observer has to move to another viewpoint to see different power line structures, or different views of the same power line (such as when travelling along a route).

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

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

The cumulative impact of the proposed grid connection infrastructure on the landscape and visual amenity is a product of:

- The distance between the power lines;
- The distance over which the structures are visible;

- The overall character of the landscape and its sensitivity to the structures;
- The siting and design of the power line; and
- The way in which the landscape is experienced.

The specialist is required to conclude if the proposed 'development' will result in any unacceptable loss of visual resource considering the industrial infrastructure proposed in the area.

## **Results**

The area of visual influence for the proposed 132kV power line is expected to be largely transformed by the appearance of much larger wind turbine structures, once constructed. It is expected that the much larger wind turbines would overshadow most of the power line infrastructure as proposed. This does not only apply to the Esizayo WEF, but also to the other authorised WEF applications within the region (e.g. the Maralla and Hidden Valley WEFs further north). Refer to **Section 5** of this report for the applications according to the South African Renewable Energy EIA Application Database (REEA\_OR\_2021\_Q1).

*It must be noted that the database is not always updated regularly and therefore some projects may no longer be considered for development, or no longer have valid Environmental Authorisations (EAs). The data is displayed as provided and the author does not accept responsibility for the accuracy thereof.*

## **Conclusion**

The large number of approved renewable energy generation applications within the Komsberg REDZ and this area in particular, is expected to increase the cumulative visual impact should all of these projects be constructed, both for the primary project components and for the ancillary components (i.e. grid connection infrastructure). However, considering the purpose of the establishment of the Komsberg REDZ (i.e. to concentrate renewable energy applications within this area) the cumulative visual impact is considered to be within acceptable limits. It is further recommended that proposed future developments should be contained within this zone, rather than be located further afield and ultimately spreading the visual impacts over larger areas.

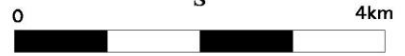
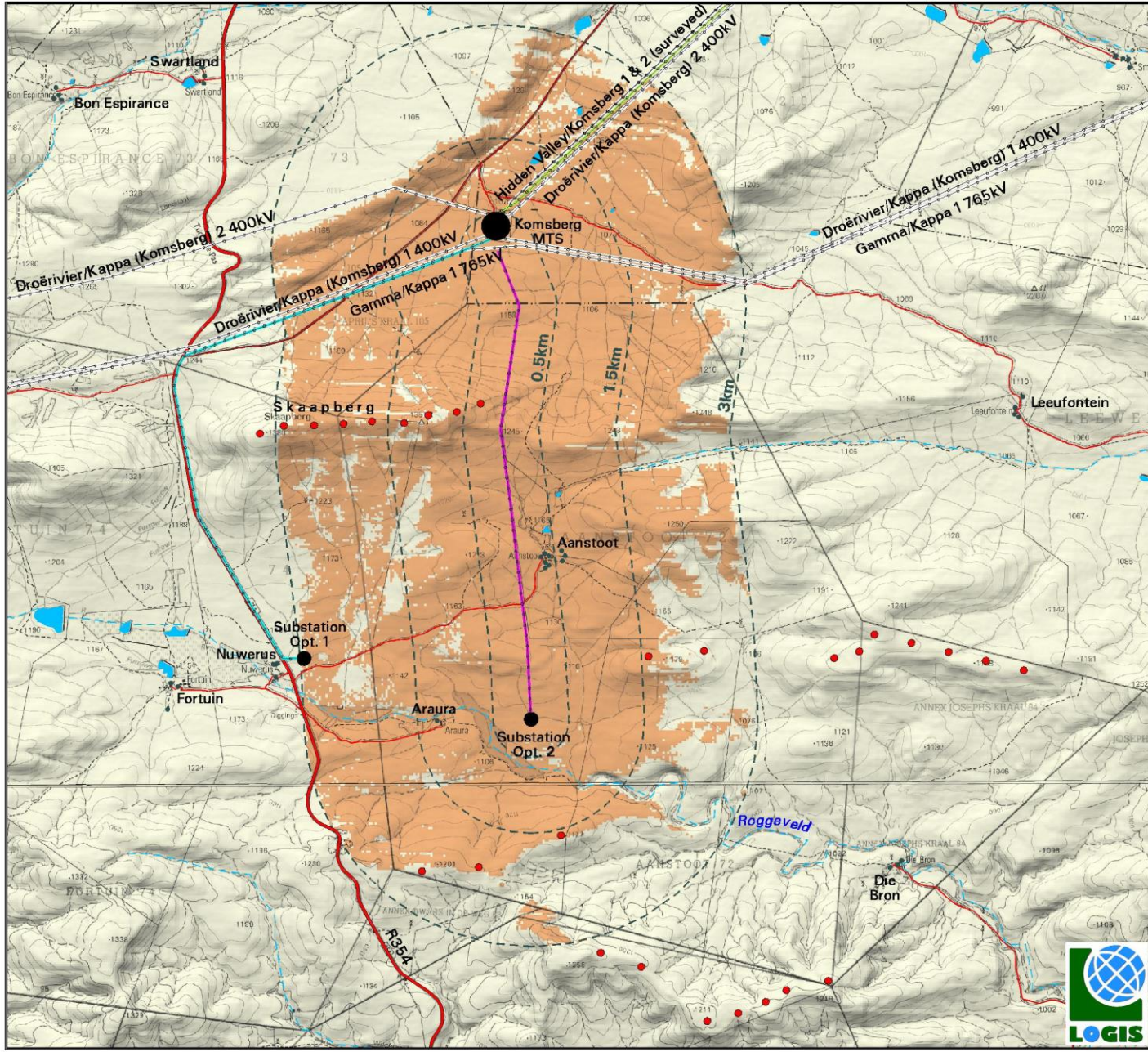


### Grid Connection Infrastructure for the Esizayo Wind Energy Facility

- Arterial/Main Road
- Secondary Road
- Access Road
- Existing/Surveyed Power Line
- Authorised Maralla WEF to Komsberg SS 132kV Power Line
- Authorised Esizayo WEF (SS Opt. 1) to Komsberg SS 132kV Power Line
- Komsberg Main Transmission Substation
- Proposed Esizayo Substation (Options 1 & 2)
- Dam
- Non-perennial River
- Homestead/Farm Dwelling
- Authorised Esizayo Wind Turbines
- Proposed Grid Connection Infrastructure

- VISIBILITY ANALYSIS**
- Potentially visible
  - Not visible
  - Observer Proximity (0.5km, 1.5km & 3km)

**Notes:**  
 Visibility was calculated at a maximum offset of 36m above ground level (i.e. the approx. maximum height of the power line structures).



**Map 3:** Viewshed analysis of the proposed Esizayo grid connection infrastructure.

### **6.3. Visual distance / observer proximity to the grid connection infrastructure**

The proximity radii are based on the anticipated visual experience of the observer over varying distances. The distances are adjusted upwards for larger grid connection infrastructure (e.g. 400kV) and downwards for smaller structures (e.g. 132kV) due to variations in height. This methodology was developed in the absence of any known and/or accepted standards for South African power line infrastructure.

The proximity radii (calculated from the grid connection infrastructure) are indicated on **Map 4**, and include the following:

- 0 – 0.5km - Short distance view where the structures would dominate the frame of vision and constitute a very high visual prominence.
- 0.5 – 1.5km - Medium distance views where the structures would be easily and comfortably visible and constitute a high visual prominence.
- 1.5 - 3km - Medium to longer distance view where the structures would become part of the visual environment, but would still be visible and recognisable. This zone constitutes a medium visual prominence.
- Greater than 3km - Long distance view where the structures may still be visible though not as easily recognisable. This zone constitutes a low visual prominence for the power lines.

The visual distance theory and the observer's proximity to the 132kV power line and substation extension are closely related, and especially relevant, when considered from areas with a higher viewer incidence and a potentially negative visual perception of the proposed infrastructure.

### **6.4. Viewer incidence / viewer perception**

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

It is necessary to identify areas of high viewer incidence and to classify certain areas according to the observer's visual sensitivity towards the proposed grid connection infrastructure. It would be impossible not to generalise the viewer incidence and sensitivity to some degree, as there are many variables when trying to determine the perception of the observer: regularity of sighting, cultural background, state of mind, purpose of sighting, etc. which would create a myriad of options.

The proposed project infrastructure may briefly be visible from the R354 arterial road at a distance of just under 3km. The proposed power line structures are not expected to visually impact this road. The only public road with a potentially higher viewer incidence is the Komsberg/Kareedoringkraal secondary road. Travellers using this road may be negatively impacted upon by visual exposure to the grid connection infrastructure.

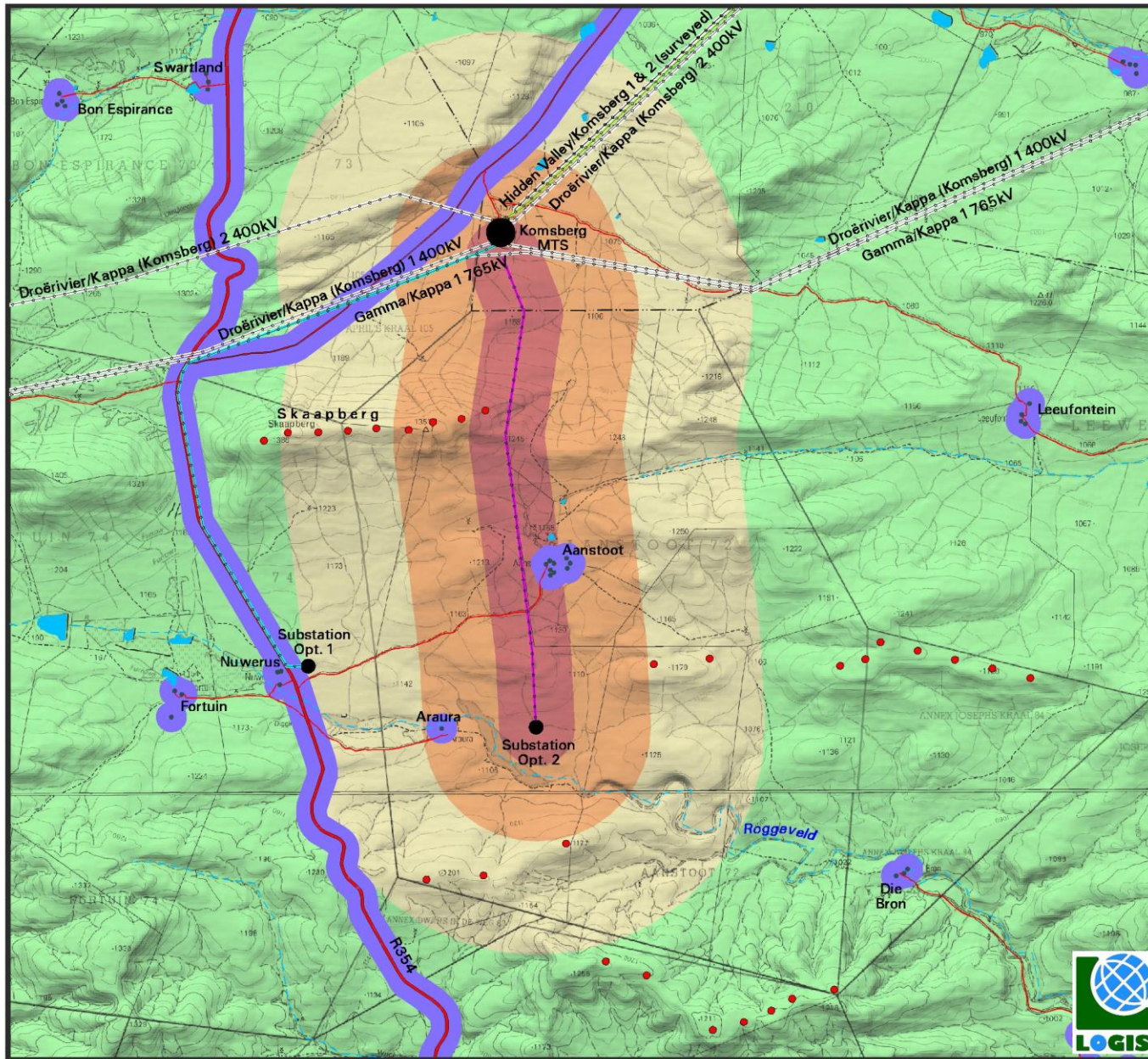
Additional sensitive visual receptors are located at the farm residences (homesteads) throughout the study area. It is expected that the viewer's perception, unless the observer is associated with (or supportive of) the grid connection infrastructure, would generally be negative.

Due to the very remote location of the proposed power line and the ill populated nature of the receiving environment, there are only eight potential sensitive visual receptor sites located within the study area. These are the residents of, or visitors to:

- Swartland
- Bon Espirance
- Leeufontein
- Nuwerus
- Fortuin
- Die Bron
- Aanstoot
- Araura

Only the latter two homesteads are within the zone of expected visual influence, with the rest all beyond 3km of the proposed infrastructure. Refer to **Map 4**.





### Grid Connection Infrastructure for the Esizayo Wind Energy Facility

- Arterial/Main Road
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- Authorised Esizayo WEF (SS Opt. 1) to Komsberg SS 132kV Power Line
- Komsberg Main Transmission Substation
- Proposed Esizayo Substation (Options 1 & 2)
- Dam
- Non-perennial River
- Homestead/Farm Dwelling
- Authorised Esizayo Wind Turbines
- Proposed Grid Connection Infrastructure

- POTENTIAL SENSITIVE VISUAL RECEPTORS**
- Residents of homesteads/dwellings on farms
  - Observers travelling along local public roads

- PROXIMITY ANALYSIS (Visual Distance)**
- Short distance (< 0.5km)
  - Medium distance (0.5 - 1.5km)
  - Medium to longer distance (1.5 - 3km)
  - Long distance (> 3km)



**Map 4:** Proximity analysis and potential sensitive visual receptors.



### 6.5. Visual absorption capacity

The vegetation cover within the study area is predominantly *Central Mountain Shale Renosterveld* and *Koedoesberge-Moordenaars Karoo*. The land cover types are low shrubland (Fynbos) for most of the study area, with bare sand and rock surfaces in places.

Overall, the Visual Absorption Capacity (VAC) of the receiving environment is low by virtue of the limited height (or absence) of the vegetation and the overall low occurrence of buildings, structures and infrastructure. In addition, the scale and form of the proposed structures mean that it is unlikely that the environment will visually absorb them in terms of texture, colour, form and light/shade characteristics. Within this area the VAC of vegetation will not be taken into account, thus assuming a worst case scenario in the impact assessment.

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



**Figure 14:** Low shrubland within the study area – low VAC.

### 6.6. Visual impact index

The combined results of the visual exposure, viewer incidence/perception and visual distance of the proposed grid connection infrastructure culminate in a visual impact index. Here the weighted impact and the likely areas of impact have been indicated as a visual impact index. Values have been assigned for

each potential visual impact per data category and merged in order to calculate the visual impact index.

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

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

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

The index indicates that **potentially sensitive visual receptors** within a 500m radius of the project infrastructure may experience a **high** visual impact. The magnitude of visual impact on sensitive visual receptors subsequently subsides with distance to; **moderate** within a 0.5 – 1.5km radius (where/if sensitive receptors are present) and **low** within a 1.5 – 3km radius (where/if sensitive receptors are present). Receptors beyond 3km are expected to have a **very low** or **insignificant** potential visual impact.

### **Magnitude of the potential visual impact**

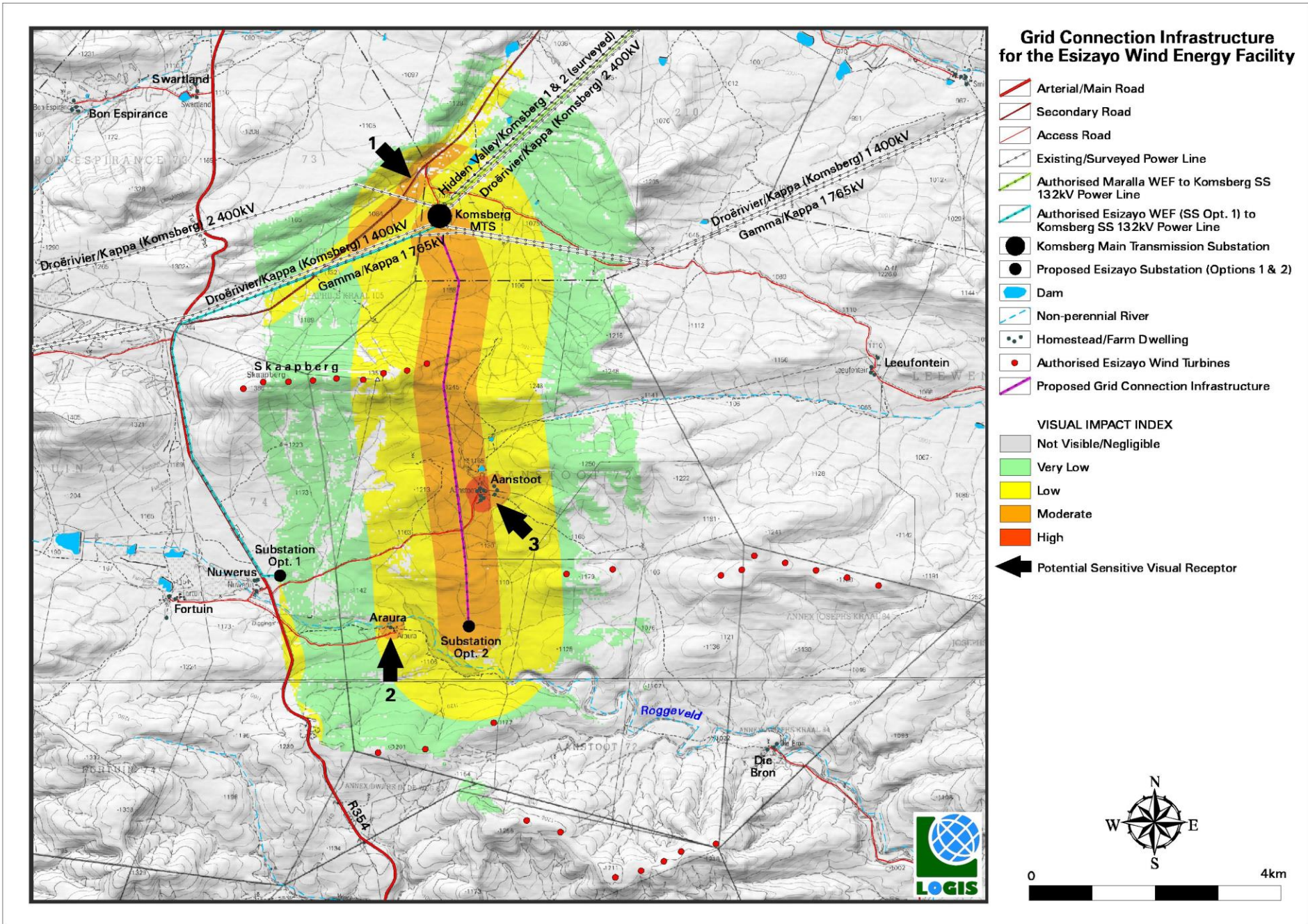
The visual impact index and potentially affected sensitive visual receptors are indicated on **Map 5**. In general, there are only a few receptor sites within closer proximity (3km) to the proposed project infrastructure, namely:

1. A section of the Komsberg/Kareedoringkraal secondary road
2. Araura
3. Aanstoot

The magnitude of visual impact on a 2.3km stretch of the Komsberg/-Kareedoringkraal secondary road is expected to be **moderate**.

Potentially affected dwellings/homesteads include Araura, where the magnitude of impact may be **moderate**, and Aanstoot where the magnitude of impact may be **high**. These homesteads are located respectively 1.2km and 0.3km from the proposed grid connection infrastructure (at the closest).





**Map 5:** Visual impact index and potentially affected sensitive visual receptors.

## 6.7. Visual impact assessment: impact rating methodology

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

The assessment of impacts and mitigation evaluates the likely extent and significance of the potential impacts on identified receptors and resources against defined assessment criteria, to develop and describe measures that will be taken to avoid, minimise or compensate for any adverse environmental impacts, to enhance positive impacts, and to report the significance of residual impacts that occur following mitigation.

The key objectives of the risk assessment methodology are to identify any additional potential environmental issues and associated impacts likely to arise from the proposed project, and to propose a significance ranking. Issues / aspects will be reviewed and ranked against a series of significance criteria to identify and record interactions between activities and aspects, and resources and receptors to provide a detailed discussion of impacts. The assessment considers direct<sup>3</sup>, indirect<sup>4</sup>, secondary<sup>5</sup> as well as cumulative<sup>6</sup> impacts.

A standard risk assessment methodology is used for the ranking of the identified environmental impacts pre-and post-mitigation (i.e. residual impact). The significance of environmental aspects is determined and ranked by considering the criteria<sup>7</sup> presented in **Table 2**.

**Table 2:** Impact assessment criteria and scoring system.

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
<b>Impact Magnitude (M)</b> The degree of alteration of the affected environmental receptor <sup>8</sup>	Very low: No impact on processes	Low: Slight impact on processes	Medium: Processes continue but in a modified way	High: Processes temporarily cease	Very High: Permanent cessation of processes
<b>Impact Extent (E)</b> The geographical extent of the impact on a given environmental receptor <sup>9</sup>	Site: Site only	Local: Inside activity area	Regional: Outside activity area	National: National scope or level	International: Across borders or boundaries

<sup>3</sup> Impacts that arise directly from activities that form an integral part of the Project.

<sup>4</sup> Impacts that arise indirectly from activities not explicitly forming part of the Project.

<sup>5</sup> Secondary or induced impacts caused by a change in the Project environment.

<sup>6</sup> Cumulative impacts are those impacts arising from the combination of multiple impacts from existing projects, the Project and/or future projects.

<sup>7</sup> The definitions given are for guidance only, and not all the definitions will apply to all the environmental receptors and resources being assessed. Impact significance was assessed with and without mitigation measures in place.

<sup>8</sup> This value is read from the visual impact index. Where more than one value is applicable, the higher of these will be used as a worst case scenario.

<sup>9</sup> Local = within 0.5km of the grid connection infrastructure. Regional = between 0.5 - 3km from the infrastructure.



CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
<b>Impact Reversibility (R)</b> The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	Reversible: Recovery without rehabilitation		Recoverable: Recovery with rehabilitation		Irreversible: Not possible despite action
<b>Impact Duration (D)</b> The length of permanence of the impact on the environmental receptor	Immediate: On impact	Short term: 0-5 years	Medium term: 5-15 years	Long term: Project life	Permanent: Indefinite
<b>Probability of Occurrence (P)</b> The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	Improbable	Low Probability	Probable	Highly Probability	Definite
<b>Significance (S)</b> is determined by combining the above criteria in the following formula:	$[S = (E + D + R + M) \times P]$ $Significance = (Extent + Duration + Reversibility + Magnitude) \times Probability$				

IMPACT SIGNIFICANCE RATING					
Total Score	4 -15	16 – 30	31 - 60	61 to 80	81 – 100
<b>Environmental Significance Rating (Negative (-))</b>	Very Low	Low	Moderate	High	Very High
<b>Environmental Significance Rating (Positive (+))</b>	Very Low	Low	Moderate	High	Very High

## 6.8. Visual impact assessment

The primary visual impacts of the proposed grid connection infrastructure for the Esizayo 132kV Transmission Integration Project are assessed below.

### 6.8.1. Construction impacts

**Potential visual impact of construction activities on sensitive visual receptors in close proximity to the proposed grid connection infrastructure.**

During construction, there may be an increase in heavy vehicles utilising the roads to the power line and substation that may cause, at the very least, a visual nuisance to other road users and landowners in the area.

Construction activities may potentially result in a **low** (significance ratings = 18 and 16) temporary visual impact both before and after mitigation.

**Table 3:** Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed grid connection infrastructure.

Potential Impact	Magnitude	Extent	Reversibility	Duration	Probability	Significance	Character	Confidence
Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed grid connection infrastructure.								
<b>Without Mitigation</b>	2	2	3	2	2	<b>18</b>	<b>Low</b>	(-) High
<b>With Mitigation</b>	1	2	3	2	2	<b>16</b>	<b>Low</b>	(-) High
<b>Mitigation and Management Measures</b>	<p><u>Planning:</u></p> <ul style="list-style-type: none"> <li>Retain and maintain natural vegetation immediately adjacent to the development footprint/servitude.</li> </ul> <p><u>Construction:</u></p> <ul style="list-style-type: none"> <li>Ensure that vegetation is not unnecessarily removed during the construction phase.</li> <li>Plan the placement of lay-down areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible.</li> <li>Restrict the activities and movement of construction workers and vehicles to the immediate construction area and existing access roads.</li> <li>Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at licensed waste facilities.</li> <li>Reduce and control construction dust using approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent).</li> <li>Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts.</li> <li>Rehabilitate all disturbed areas immediately after the completion of construction works.</li> </ul>							

**6.8.2. Potential visual impact on sensitive visual receptors located within a 0.5km radius of the grid connection infrastructure during the operational phase**

The power line is expected to have a **low** visual impact (significance rating = 26) on observers within a 0.5km radius of the power line structures. This is due to the general absence of potentially sensitive visual receptors brought about by the remote location of the infrastructure. The area of potential visual impact (i.e. the homesteads mentioned in **Section 6.6**) is unlikely to be affected, as these dwellings are both located on properties earmarked for either the Esizayo or INCA Komsberg WEFs, implying their approval of the WEF infrastructure. The project

proponent should however still consult with the landowners/residents of these homesteads to confirm this assumption.

The Komsberg/Kareedoringkraal secondary road may be marginally affected by the power line infrastructure, but this road does not carry a large amount of traffic, and is not considered as a regional tourist route. It is further expected that once the wind turbine structures are constructed, the much larger wind turbines would distract attention away from the more constrained power line structures.

No mitigation of this impact is possible (i.e. the structures will be visible regardless), but general mitigation and management measures are recommended as best practice. The table below illustrates this impact assessment.

**Table 4:** Visual impact on observers in close proximity to the proposed grid connection infrastructure.

Potential Impact	Magnitude	Extent	Reversibility	Duration	Probability	Significance	Character	Confidence
Visual impact on observers travelling along the roads and residents at homesteads in close proximity to the power line structures.								
<b>Without Mitigation</b>	4	2	3	4	2	<b>26</b>	<b>Low</b>	(-) High
<b>With Mitigation</b>	4	2	3	4	2	<b>26</b>	<b>Low</b>	(-) High
<b>Mitigation and Management Measures</b>	<p><u>Planning:</u></p> <ul style="list-style-type: none"> <li>Retain/re-establish and maintain natural vegetation immediately adjacent to the power line servitude.</li> </ul> <p><u>Operations:</u></p> <ul style="list-style-type: none"> <li>Maintain the general appearance of the infrastructure.</li> </ul> <p><u>Decommissioning:</u></p> <ul style="list-style-type: none"> <li>Remove infrastructure not required for the post-decommissioning use.</li> <li>Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.</li> </ul>							

### 6.8.3. Potential visual impact on sensitive visual receptors within the region (0.5 – 3km radius) during the operation of the grid connection infrastructure

The grid connection infrastructure will have a **low** visual impact (significance rating = 26) on observers traveling along the roads and residents of homesteads within a 1.5 - 3km radius of the infrastructure.

No mitigation of this impact is possible (i.e. the structures will be visible regardless), but general mitigation and management measures are recommended as best practice. The table below illustrates this impact assessment.

**Table 5:** Visual impact of the proposed grid connection infrastructure within the region.

Potential Impact	Magnitude	Extent	Reversibility	Duration	Probability	Significance	Character	Confidence
Visual impact on observers travelling along the roads and residents at homesteads within a 0.5 - 3km radius of the grid connection infrastructure.								
<b>Without Mitigation</b>	3	3	3	4	2	<b>26</b>	<b>Low</b>	(-) High
<b>With Mitigation</b>	3	3	3	4	2	<b>26</b>	<b>Low</b>	(-) High
<b>Mitigation and Management Measures</b>	<p><u>Planning:</u></p> <ul style="list-style-type: none"> <li>Retain/re-establish and maintain natural vegetation immediately adjacent to the power line servitude.</li> </ul> <p><u>Operations:</u></p> <ul style="list-style-type: none"> <li>Maintain the general appearance of the infrastructure.</li> </ul> <p><u>Decommissioning:</u></p> <ul style="list-style-type: none"> <li>Remove infrastructure not required for the post-decommissioning use.</li> <li>Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.</li> </ul>							

### 6.9. Visual impact assessment: secondary impacts

#### The potential visual impact of the proposed grid connection infrastructure on the sense of place of the region.

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

An impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light.

The greater environment has a predominantly rural, undeveloped character and a natural appearance. These generally undeveloped landscapes are considered to have a high visual quality, except where urban development and power generation/distribution infrastructure represents existing visual disturbances.

The anticipated visual impact of the proposed grid connection infrastructure on the regional visual quality (i.e. beyond 3km of the proposed infrastructure), and by implication, on the sense of place, is difficult to quantify, but is generally expected to be of **low** significance.

**Table 6:** The potential impact on the sense of place of the region.

Potential Impact	Magnitude	Extent	Reversibility	Duration	Probability	Significance	Character	Confidence
The potential impact of the development of the proposed grid connection infrastructure on the sense of place of the region.								
<b>Without Mitigation</b>	2	3	3	4	2	<b>24</b>	<b>Low</b>	(-) High
<b>With Mitigation</b>	2	3	3	4	2	<b>24</b>	<b>Low</b>	(-) High
<b>Mitigation and Management Measures</b>	<p>Planning:</p> <ul style="list-style-type: none"> <li>Retain/re-establish and maintain natural vegetation immediately adjacent to the power line servitude.</li> </ul> <p>Operations:</p> <ul style="list-style-type: none"> <li>Maintain the general appearance of the infrastructure.</li> </ul> <p>Decommissioning:</p> <ul style="list-style-type: none"> <li>Remove infrastructure not required for the post-decommissioning use.</li> <li>Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.</li> </ul>							

**The potential cumulative visual impact of the proposed grid connection infrastructure on the visual quality of the landscape.**

The construction of the grid connection infrastructure for the Esizayo 132kV Transmission Integration Project may increase the cumulative visual impact of industrial type infrastructure within the region.

The anticipated cumulative visual impact of the proposed grid connection infrastructure is expected to be of **moderate** significance, which is considered to be acceptable from a visual perspective. This is once again due to the relatively low viewer incidence within close proximity to the proposed infrastructure and the presence of the existing/authorised electricity distribution infrastructure, and the potential future wind turbine structures.

**Table 7:** The potential cumulative visual impact on the visual quality of the landscape.

<b>Nature of Impact:</b>		
The potential cumulative visual impact of the grid connection infrastructure on the visual quality of the landscape.		
	<b>Overall impact of the proposed project considered in isolation (with mitigation)</b>	<b>Cumulative impact of the project and other projects within the area (with mitigation)</b>
<b>Extent</b>	Local (2)	Local (2)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	High (4)	High (4)
<b>Probability</b>	Improbable (2)	Highly Probable (4)
<b>Significance</b>	<b>Low (26)</b>	<b>Moderate (52)</b>
<b>Status (positive, neutral)</b>	Negative	Negative

<i>or negative)</i>		
<b>Reversibility</b>	Reversible <b>(3)</b>	Reversible <b>(3)</b>
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impacts be mitigated?</b>	No, only best practise measures can be implemented	
<b>Generic best practise mitigation/management measures:</b>	<u>Planning:</u> <ul style="list-style-type: none"> <li>Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint/servitude.</li> </ul> <u>Operations:</u> <ul style="list-style-type: none"> <li>Maintain the general appearance of the servitude as a whole.</li> </ul> <u>Decommissioning:</u> <ul style="list-style-type: none"> <li>Remove infrastructure not required for the post-decommissioning use.</li> <li>Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.</li> </ul>	
<b>Residual impacts:</b>	The visual impact will be removed after decommissioning, provided the grid infrastructure is removed. Failing this, the visual impact will remain.	

### 6.10. The potential to mitigate visual impacts

The primary visual impact, namely the appearance of the proposed grid connection infrastructure is not possible to mitigate. The functional design of the structures cannot be changed in order to reduce visual impacts.

Secondary impacts anticipated as a result of the proposed grid connection infrastructure (i.e. visual character and sense of place) are also not possible to mitigate.

The following mitigation is, however possible:

- Retain/re-establish and maintain natural vegetation in all areas immediately adjacent to the development footprint/servitude. This measure will help to soften the appearance of the grid connection infrastructure within its context.
- Mitigation of visual impacts associated with the construction phase, albeit temporary, would entail proper planning, management and rehabilitation of the construction site. Recommended mitigation measures include the following:
  - Ensure that vegetation is not unnecessarily cleared or removed during the construction period.
  - Plan the placement of laydown areas and any potential temporary construction camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible.
  - Restrict the activities and movement of construction workers and vehicles to the immediate construction area and existing access roads.
  - Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.
  - Reduce and control construction dust through the use of appropriate and effective dust suppression techniques as and when required (i.e. whenever dust becomes apparent).

- Restrict construction activities to daylight hours as far as possible, in order to negate or reduce the visual impacts associated with lighting.
  - Rehabilitate all disturbed areas, construction areas, roads, slopes etc. immediately after the completion of construction works. If necessary, an ecologist must be consulted to assist or give input into rehabilitation specifications.
- During operation, the maintenance of the grid connection infrastructure will ensure that the infrastructure does not degrade, therefore aggravating visual impact.
  - Roads must be maintained to forego erosion and to suppress dust, and rehabilitated areas must be monitored for rehabilitation failure. Remedial actions must be implemented as and when required.
  - Once the grid connection infrastructure has exhausted its life span, all associated infrastructure not required for the post rehabilitation use of the site/servitude should be removed and all disturbed areas appropriately rehabilitated. An ecologist should be consulted to give input into rehabilitation specifications.
  - All rehabilitated areas should be monitored for at least a year following decommissioning, and remedial actions implemented as and when required.

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

## **7. CONCLUSION AND RECOMMENDATIONS**

The construction and operation of the proposed grid connection infrastructure for the Esizayo 132kV Transmission Integration Project, may have a visual impact on the study area, especially within (but potentially not restricted to) a 0.5 – 1.5km radius of the power line structures. The visual impact will differ amongst places, depending on the distance from the infrastructure.

Overall, the significance of the visual impacts is expected to range from **moderate** to **low** as a result of the generally undeveloped character of the landscape and the low number of potentially affected sensitive visual receptors. No visual impacts of a high significance are expected to occur.

A number of mitigation measures have been proposed (**Section 6.10**). Regardless of whether or not mitigation measures will reduce the significance of the anticipated visual impacts, they are considered to be good practice and should all be implemented and maintained throughout the construction, operation and decommissioning phases of the proposed grid connection infrastructure.

If mitigation is implemented as recommended, it is concluded that the significance of most of the anticipated visual impacts will remain at or be managed to acceptable levels. As such, the grid connection infrastructure for the Esizayo 132kV Transmission Integration Project is considered to be acceptable from a visual impact perspective.

## 8. IMPACT STATEMENT

The findings of the Visual Impact Assessment undertaken for the proposed grid connection infrastructure for the Esizayo 132kV Transmission Integration Project indicate that the visual environment surrounding the power line, especially within a 1.5km radius, may be visually impacted upon for the anticipated operational lifespan of the grid connection infrastructure.

This impact is applicable to the proposed grid connection infrastructure and to the potential cumulative visual impact of the infrastructure in association with existing power line infrastructure (and future power generation infrastructure) within the region.

The following is a summary of impacts remaining, assuming mitigation as recommended is implemented:

- During the construction, there may be an increase in heavy vehicles utilising the roads to the power line that may cause, at the very least, a visual nuisance to other road users and landowners in the area. Construction activities may potentially result in a **low** temporary negative visual impact after mitigation.
- The grid connection infrastructure is expected to have a **low** negative visual impact on observers traveling along the roads and residents of homesteads within a 0.5km radius of the structures.
- The grid connection infrastructure is expected to have a **low** negative visual impact on observers traveling along the roads and residents of homesteads within a 0.5 - 3km radius of the structures.
- The anticipated visual impact of the proposed grid connection infrastructure on the regional visual quality, and by implication, on the sense of place, is difficult to quantify, but is generally expected to be of **low** negative significance. This is due to the relatively low viewer incidence within close proximity to the proposed grid connection infrastructure.
- The anticipated cumulative visual impact of the proposed grid connection infrastructure is expected to be of **moderate** negative significance, which is considered to be acceptable from a visual perspective. This is once again due to the relatively low viewer incidence within close proximity to the power line and the presence of the existing electricity infrastructure.

The anticipated visual impacts listed above (i.e. post mitigation impacts) range from **moderate** to **low** significance. No visual impacts of a high significance are expected to occur. Anticipated visual impacts on sensitive visual receptors in close proximity to the power line are not considered to be fatal flaws for the proposed project.

Considering all factors, it is recommended that the development of the grid connection infrastructure as proposed be supported; subject to the implementation of the recommended mitigation measures (**Section 6.10.**) and management programme (**Section 9.**).



## 9. MANAGEMENT PROGRAMME

The following management plan tables aim to summarise the key findings of the visual impact report and suggest possible management actions in order to mitigate the potential visual impacts. Refer to **Tables 8 – 11** below.

**Table 8:** Management Programme: Planning.

<b>OBJECTIVE:</b> The mitigation and possible negation of visual impacts associated with the planning of the proposed grid connection infrastructure.		
<b>Project component/s</b>	The Esizayo 132kV Transmission Integration Project.	
<b>Potential Impact</b>	Primary visual impact due to the presence of the grid connection infrastructure in the landscape.	
<b>Activity/risk source</b>	The viewing of the grid connection infrastructure by observers near the infrastructure as well as within the region.	
<b>Mitigation: Target/Objective</b>	Optimal planning of infrastructure so as to minimise visual impact.	
<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Implement an environmentally responsive planning approach for the development of roads and infrastructure to limit cut and fill requirements. Plan with due cognisance of the topography.	Project proponent / design consultant	Planning phase.
Consolidate infrastructure and make use of already disturbed sites rather than natural areas, as far as practically feasible.	Project proponent / design consultant	Planning phase.
<b>Performance Indicator</b>	No visible degradation of access roads and other associated infrastructure from surrounding areas.	
<b>Monitoring</b>	Not applicable.	

**Table 9:** Management Programme: Construction.

<b>OBJECTIVE:</b> The mitigation and possible negation of visual impacts associated with the construction of the proposed grid connection infrastructure.		
<b>Project component/s</b>	Construction activities associated with the development of the 132kV power line.	
<b>Potential Impact</b>	Visual impact of general construction activities, and the potential scarring of the landscape due to vegetation clearing.	
<b>Activity/risk source</b>	The viewing of general construction activities by observers near the development areas.	
<b>Mitigation: Target/Objective</b>	Minimal visual intrusion by construction activities and intact vegetation cover outside of immediate works areas.	
<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Ensure that vegetation is not unnecessarily cleared or removed during the construction period.	Project proponent / contractor	Early in the construction phase.
Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible.	Project proponent / contractor	Early in and throughout the construction phase.
Restrict the activities and movement of construction workers and vehicles to the immediate construction area and existing access roads.	Project proponent / contractor	Throughout the construction phase.

Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.	Project proponent / contractor	Throughout the construction phase.
Reduce and control construction dust through the use of appropriate and effective dust suppression techniques as and when required (i.e. whenever dust becomes apparent).	Project proponent / contractor	Throughout the construction phase.
Restrict construction activities to daylight hours, as far as possible, in order to negate or reduce the visual impacts associated with lighting.	Project proponent / contractor	Throughout the construction phase.
Rehabilitate all disturbed areas, construction areas, servitudes etc. immediately after the completion of construction works. If necessary, consult an ecologist to give input into rehabilitation specifications.	Project proponent / contractor	Throughout and at the end of the construction phase.
<b>Performance Indicator</b>	Vegetation cover within the servitudes and in the vicinity of the grid connection infrastructure has been maintained as far as possible and disturbed areas have been rehabilitated with no evidence of erosion.	
<b>Monitoring</b>	Monitoring of vegetation clearing during construction. Monitoring of rehabilitated areas post construction.	

**Table 10:** Management Programme: Operation.

<b>OBJECTIVE:</b> The mitigation and possible negation of visual impacts associated with the operation of the proposed grid connection infrastructure.		
<b>Project component/s</b>	The Esizayo 132kV Transmission Integration Project.	
<b>Potential Impact</b>	Visual impact of vegetation rehabilitation failure.	
<b>Activity/risk source</b>	The viewing of the above mentioned by observers near the infrastructure.	
<b>Mitigation: Target/Objective</b>	Well-rehabilitated and maintained servitudes.	
<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Maintain roads to forego erosion and to suppress dust.	Project proponent / operator	Throughout the operation phase.
Monitor rehabilitated areas, and implement remedial action as and when required.	Project proponent / operator	Throughout the operation phase.
<b>Performance Indicator</b>	Intact vegetation within servitudes and in the vicinity of the infrastructure.	
<b>Monitoring</b>	Monitoring of rehabilitated areas.	

**Table 11:** Management Programme: Decommissioning.

<b>OBJECTIVE:</b> The mitigation and possible negation of visual impacts associated with the decommissioning of the proposed grid connection infrastructure.		
<b>Project component/s</b>	The Esizayo 132kV Transmission Integration Project.	
<b>Potential Impact</b>	Visual impact of residual visual scarring and vegetation rehabilitation failure.	
<b>Activity/risk source</b>	The viewing of the residual scarring and vegetation rehabilitation failure by observers along or near the areas where the grid connection infrastructure was constructed.	
<b>Mitigation:</b>	Rehabilitated vegetation in all disturbed areas.	

<b>Target/Objective</b>		
<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Remove infrastructure not required for the post-decommissioning use of the site/servitude.	Project proponent / operator	During the decommissioning phase.
Rehabilitate access roads and servitudes not required for the post-decommissioning use of the sites. If necessary, consult an ecologist to give input into rehabilitation specifications.	Project proponent / operator	During the decommissioning phase.
Monitor rehabilitated areas quarterly for at least a year following decommissioning, and implement remedial action as and when required.	Project proponent / operator	Post decommissioning.
<b>Performance Indicator</b>	Intact vegetation along and in the vicinity of the servitude.	
<b>Monitoring</b>	If rehabilitation is successful, then no further monitoring is required.	

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