VISUAL IMPACT ASSESSMENT FOR THE PROPOSED 66KV MSENGE EMOYENI OVERHEAD POWERLINE, A DEVIATION OF THE AUTHORISED MSENGE EMOYENI 132KV OVERHEAD POWERLINE, EASTERN CAPE

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PREPARED FOR:

NALA Environmental Consulting Firm

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Report date:	01 June 2022
Report number:	03

DECLARATION

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

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

Tosca Grünewald
Landscape Architect & Environmental Assessment Practitioner
SACLAP Reg nr: 20421
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1. INTRODUCTION

1.1. QUALIFICATION AND EXPERIENCE OF THE PROFESSIONAL TEAM

Nuleaf Planning and Environmental (Pty) Ltd, specialising in Visual Impact Assessments, undertook the visual assessment for the proposed development.

The team undertaking the visual assessment has extensive practical knowledge in spatial analysis, environmental modelling and digital mapping, and applies this knowledge in various scientific fields and disciplines. The expertise of these practitioners is often utilised in Environmental Impact Assessments, State of the Environment Reports and Environmental Management Plans.

The visual assessment team 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. Although the guidelines have been developed with specific reference to the Western Cape Province of South Africa, the core elements are more widely applicable.

Nuleaf Planning and Environmental have been appointed as an independent specialist consultant to undertake the visual impact assessment. Neither the author, nor Nuleaf Planning and Environmental will benefit from the outcome of the project decision-making.

1.2. LEGAL FRAMEWORK

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

- The Environmental Impact Assessment Amendment Regulations, 2017;
- Guideline on Generic Terms of Reference for EAPs and Project Schedules (DEADP, Provincial Government of the Western Cape, 2011).
- Guideline for Involving Visual and Aesthetic Specialists in EIA Processes (DEADP, Provincial Government of the Western Cape, 2005).

1.3. INFORMATION BASE

This assessment was based on information from the following sources:

- Topographical maps and GIS generated data were sourced from the Surveyor General, Surveys and Mapping in Mowbray, Cape Town;
- Observations made and photographs taken during site visits;
- Professional judgement based on experience gained from similar projects; and
- Literature research on similar projects.

1.4. ASSUMPTIONS AND LIMITATIONS

This Report has been prepared by Nuleaf on behalf, and at the request, of NALA to provide them with an independent specialist assessment and review. Unless otherwise agreed by Nuleaf in writing, Nuleaf does not accept responsibility or legal liability to any person other than the NALA for the contents of, or any omissions from, this Report.

To prepare this Report, Nuleaf utilised only the documents and information provided by NALA or any third parties directed to provide information and documents by NALA. Nuleaf has not consulted any other documents or information in relation to this Report, except where otherwise indicated. The findings, recommendations and conclusions given in this report are based on the author's best scientific and professional knowledge, as well as, the available information. This report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken. Nuleaf and its staff reserve the right to modify aspects of the report including the recommendations if and when new information may become available from on-going research or further work in this field, or pertaining to this investigation.

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

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

This assessment was undertaken during the planning stage of the project and is based on information available at that time. It is assumed that all information regarding the project details provided by NALA and the Applicant is correct and relevant to the proposed project. Some assumptions have to be made about the project as the layout is only indicative at this stage. Approximate building footprints have been provided, but architectural details of the buildings would only become available over time as the project proceeds. As such, this Visual Impact Assessment and all associated mapping has been undertaken according to the worst-case scenario.

1.5. LEVEL OF CONFIDENCE

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

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

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

These values are applied as follows:

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

Table 1: Level of confidence

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

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

[1] Adapted from Oberholzer (2005).

2. METHODOLOGY

The study was undertaken using Geographic Information Systems (GIS) software as a tool to generate viewshed analyses and to apply relevant spatial criteria to the proposed development. A detailed Digital Terrain Model (DTM) for the study area was created from 5m interval contours from the National Geo-spatial Information data supplied by the Department: Rural Development and Land Reform.

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

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

This report (visual impact assessment) sets out to identify and quantify the possible visual impacts related to the proposed Msenge Emoyeni 66kV Overhead Powerline corridor and associated grid infrastructure as well as, offer potential mitigation measures, where required. It must be noted that the proposed infrastructure assessed is a deviation of the already authorised Msenge Emoyeni 132kV Overhead Powerline corridor and associated grid infrastructure. The methodology as described below has been followed for the assessment of visual impact.

UNDERTAKE A SITE VISIT

A site visit was undertaken 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. The season was not a consideration, nor had any effect on the carrying out of the visual assessment. A photographic survey was made of the site and surrounding potentially affected area from several selected viewpoints. The site visit was undertaken on the 04 April 2022.

DETERMINE THE POTENTIAL VISUAL EXPOSURE

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

Viewshed analyses of the proposed development indicates the potential visibility.

DETERMINE THE VISUAL DISTANCE AND OBSERVER PROXIMITY

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

Proximity radii for the proposed alignment corridors are created in order to indicate the scale and viewing distance of the development and to determine the prominence thereof in relation to their environment.

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

DETERMINE VIEWER INCIDENCE, PERCEPTION AND SENSITIVITY

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

It would be impossible not to generalise the viewer incidence and sensitivity to some degree, as there are many variables when trying to determine the perception of the observer; regularity of sighting, cultural background, state of mind, and purpose of sighting which would create a myriad of options.

DETERMINE THE VISUAL ABSORPTION CAPACITY (VAC)

This is the capacity of the receiving environment to absorb the potential visual impact of the proposed development. The digital terrain model utilised in the calculation of the visual exposure of the development does not incorporate the potential visual absorption capacity (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 and other landscape characteristics.

DETERMINE THE VISUAL IMPACT INDEX OF THE PROPOSED INFRASTRUCTURE

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 extent, duration, magnitude and probability.

FORMULATION OF MITIGATION MEASURES

Recommendation of mitigation measures (if possible) to avoid or minimise potential negative visual impacts of the proposed development, for inclusion in the EMPr and authorisation conditions.

3. PROJECT DESCRIPTION

The **Applicant, Msenge Emoyeni Wind Farm (Pty) Ltd,** is proposing the deviation of the authorised overhead powerline for the authorised Msenge Emoyeni Wind Energy Facility ("Msenge Emoyeni WEF") from the authorised Msenge Emoyeni WEF onsite substation to the Poseidon Main Transmission Substation (MTS). The proposed 66kV Overhead Powerline will be approximately 22.7 km in length in a 300m wide assessment corridor (150m on either side), from the proposed Msenge Emoyeni WEF onsite substation to the Poseidon MTS. This route is a deviation from the already authorised route associated with this WEF. It is expected that the tower structures will be in the range of 20m to 30m above ground level (refer to Figure 1).

Other key components will include:

- Access tracks of up to 7m in width following the powerline route from the proposed Msenge Emoyeni WEF onsite substation to the Poseidon MTS to enable construction and maintenance activities.
- Water course crossings along the powerline route from the proposed Msenge Emoyeni WEF onsite substation to the Poseidon MTS.
- 33kV/132kV on-site substation with a footprint occupying an area of 250m x 200m, within a 300m radius to allow movement where possible.

The grid connection infrastructure related to the authorised WEF is located within the Cookhouse Renewable Energy Development Zone ("REDZ") and Eastern Power Corridor. No alternatives are proposed for the proposed 66kV powerline corridor and on-site substation location as it follows the existing Poseidon / Albany 132kV Powerline to the Poseidon MTS.

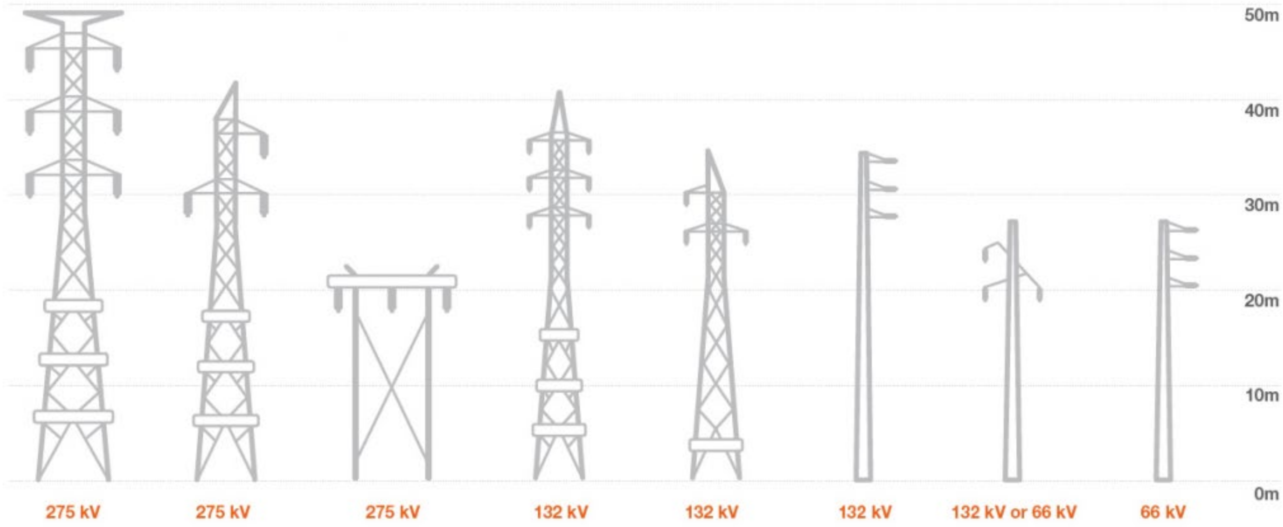

Figure 1: Illustration of a 66kV Powerline Tower in relation to other Powerline Towers[2]

Figure 2: Image of a typical 66kV Powerline Tower[3]

4. SCOPE OF WORK

The scope of work for this assessment includes the determination of the potential visual impacts in terms of nature, extent, duration, magnitude, probability and significance of the construction and operation of the proposed infrastructure. Mitigation measures are recommended where appropriate. Anticipated issues related to the potential visual impact of the powerline include the following:

- The visibility of the proposed infrastructure to, and potential visual impact on, users of secondary roads.

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[2] *llustration courtesy of BEETEE Projects https://beeteeprojects.co.za/with-the-variety-of-power-lines-are-there-a-variety-of-bird-guards/*

[3] *llustration courtesy of https://commons.wikimedia.org/wiki/File:Bathurst_66kv_Transmission_Line.JPG*

- The visibility of the proposed infrastructure to, and potential visual impact on residents of farmsteads and settlements.
- The potential visual impact of associated infrastructure (i.e., access roads, substation and cleared servitudes) on sensitive visual receptors.
- Potential visual impacts associated with the construction phase on observers in close proximity to the proposed power line.
- The potential visual impact of operational, safety and security lighting of the facility at night.
- The potential visual impact of the proposed infrastructure on the visual quality of the landscape and sense of place of the region.
- Potential residual visual impacts after the decommissioning of the proposed power lines.
- 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 scale.

5. THE AFFECTED ENVIRONMENT

The proposed Msenge Emoyeni 66kV Overhead Powerline is located approximately 20km south of the town of Bedford within the Blue Crane Route Local Municipality in the Eastern Cape Province.

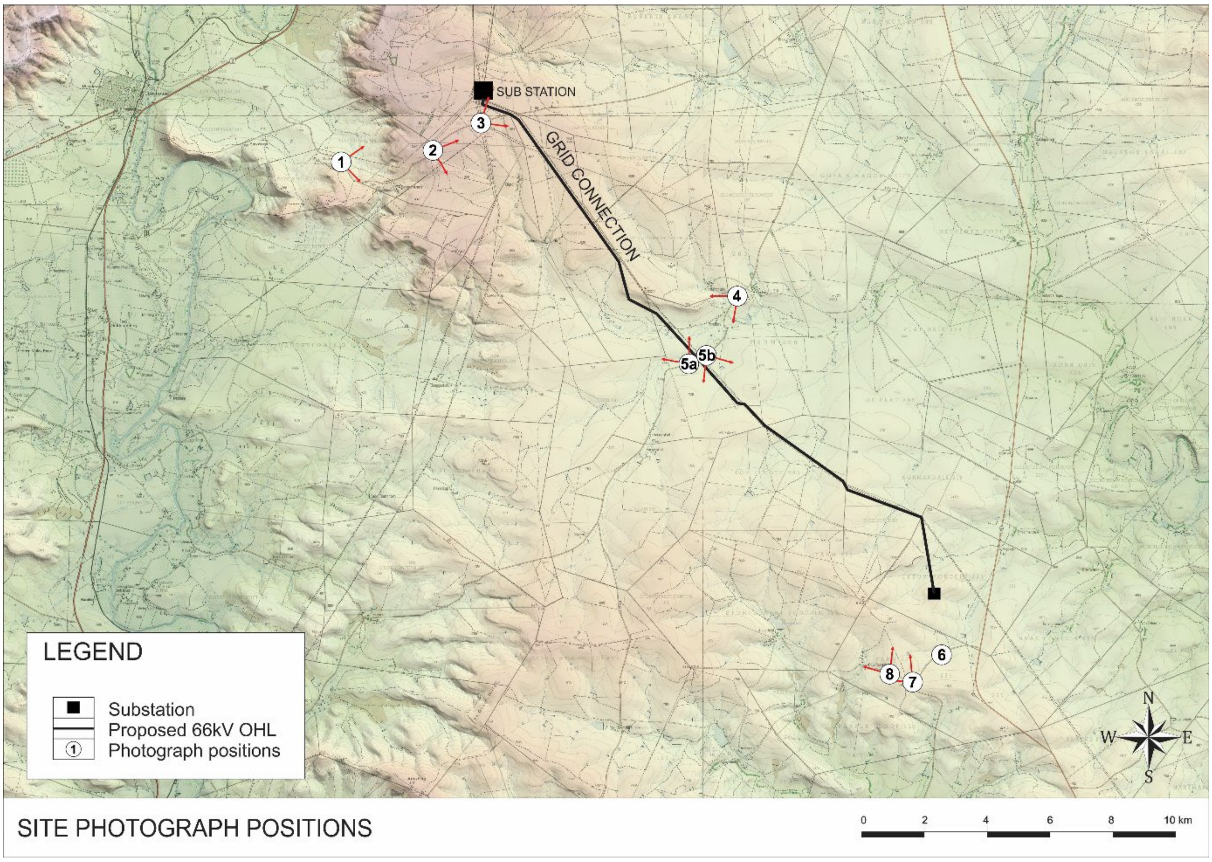


Figure 3: Site photograph positions

The study area occurs on land that ranges in elevation from about 620m above sea level (a.s.l.) to 960m a.s.l. The topography consists of flats and gently undulating plains interspersed with hills and rocky outcrops. Refer to **Map 1**

The vegetation in the study area is relatively homogeneous. The broader study area is situated predominately within the Bedford Dry Grassland vegetation type. Therefore, land cover consists primarily of open, dry grassland interspersed with Acacia karroo woodland vegetation (especially along the drainage lines). Visually, the plants comprise low growing, small arid shrubs and tufted grasses, with scattered slightly taller shrubs and trees.

Given the predominately dry grassland vegetation, the vegetation cover is sparse. The natural vegetation occurring, therefore, provides little to no visual cover for any built structures but the clusters or rows of trees (usually close to farm houses and roads) may provide height and effective visual screening for sensitive receptors at these sites. Refer to **Map 2**.

This region receives approximately 310 – 550 mm of precipitation per annum and is devoid of any rain fed agriculture or cultivation. The predominant land uses occurring throughout the region are livestock (sheep, goats and cattle) farming.

Figure 4: Site photography position 1

Figure 5: Site photography position 2 – Existing Wind Energy Facilities in the area

Figure 6: Site photography position 3 – Existing overhead power lines in the study area

Figure 7: Site photography position 4

Figure 8: Site photography position 5a – Typical vegetation cover of the study area

Figure 9: Site photography position 5b

Infrastructure present in the greater study area is closely associated and stems from the farming and Wind Energy Facility activities occurring in the region. Prominent visual features resulting from these activities typical include structures such as farm houses, fences, wind turbines, overhead masts and lines, substations, as well as, the occasional clusters of shade trees. Farm houses and buildings vary but tend to be located in the warmer valleys and are most often surrounded by gardens and sheltering trees.

Figure 10: Site photography position 6a – Typical landcover of the study area

Figure 11: Site photography position 6b

It is uncertain whether all of the potentially affected homesteads / farmsteads are inhabited or not. It stands to reason that the 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.

Figure 12: Site photography position 7 – Secondary road in the study area

Figure 13: Site photography position 8

Several secondary and internal farm roads cross the study area. It must be noted that all secondary roads and internal farm roads are gravel roads unlikely to carry much traffic.

There are no formally protected or conservation areas present within the study area, but the greater environment has a vast, undeveloped and rugged character. Settlements, where these occur, are very limited in extent and domestic in scale.

The greater environment with its wide open, undeveloped landscapes is considered to have a high visual quality and this study area is not known as tourist destination.

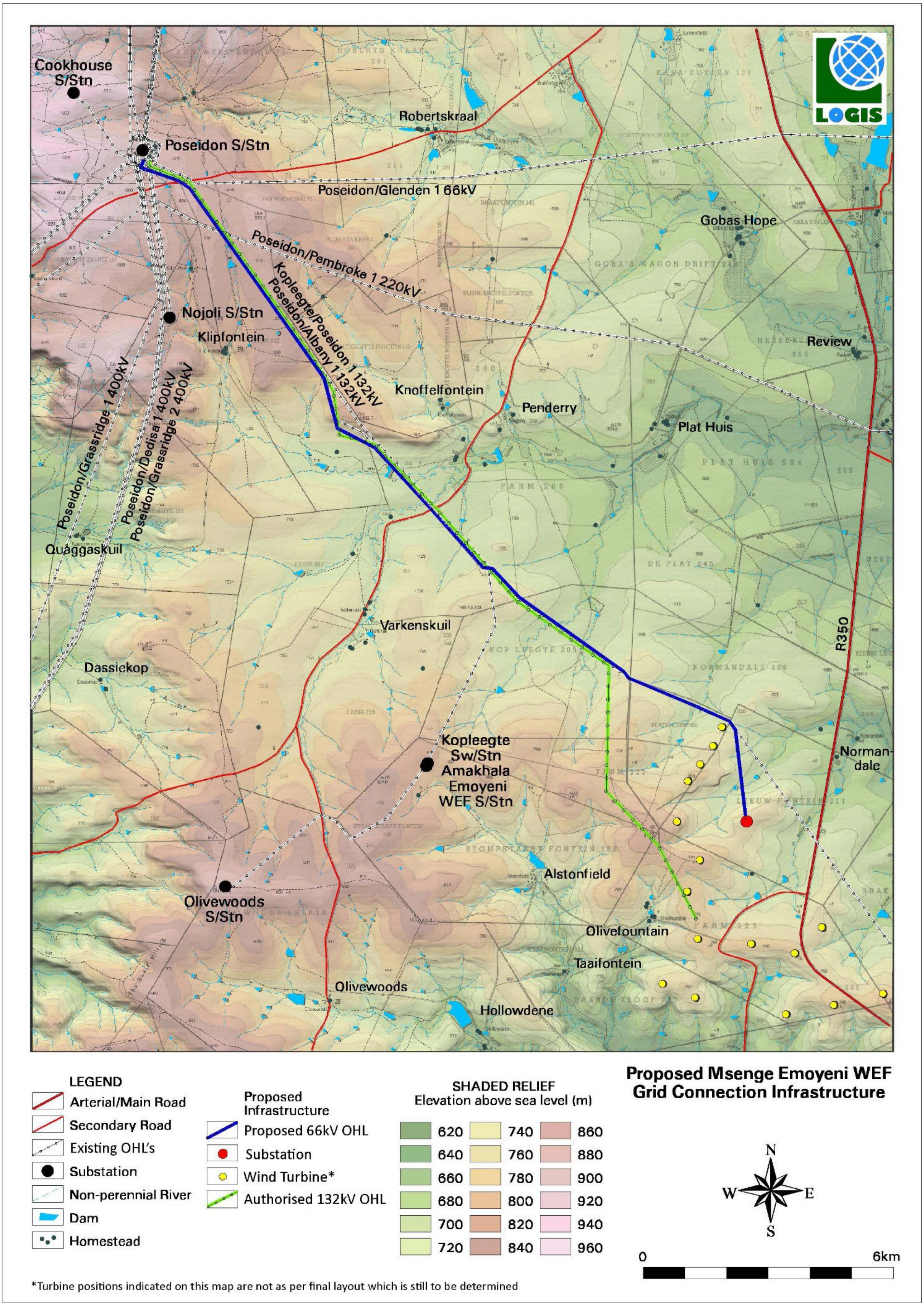
6. VIEWSHED ANALYSIS

6.1. VISUAL DISTANCE AND OBSERVER PROXIMITY

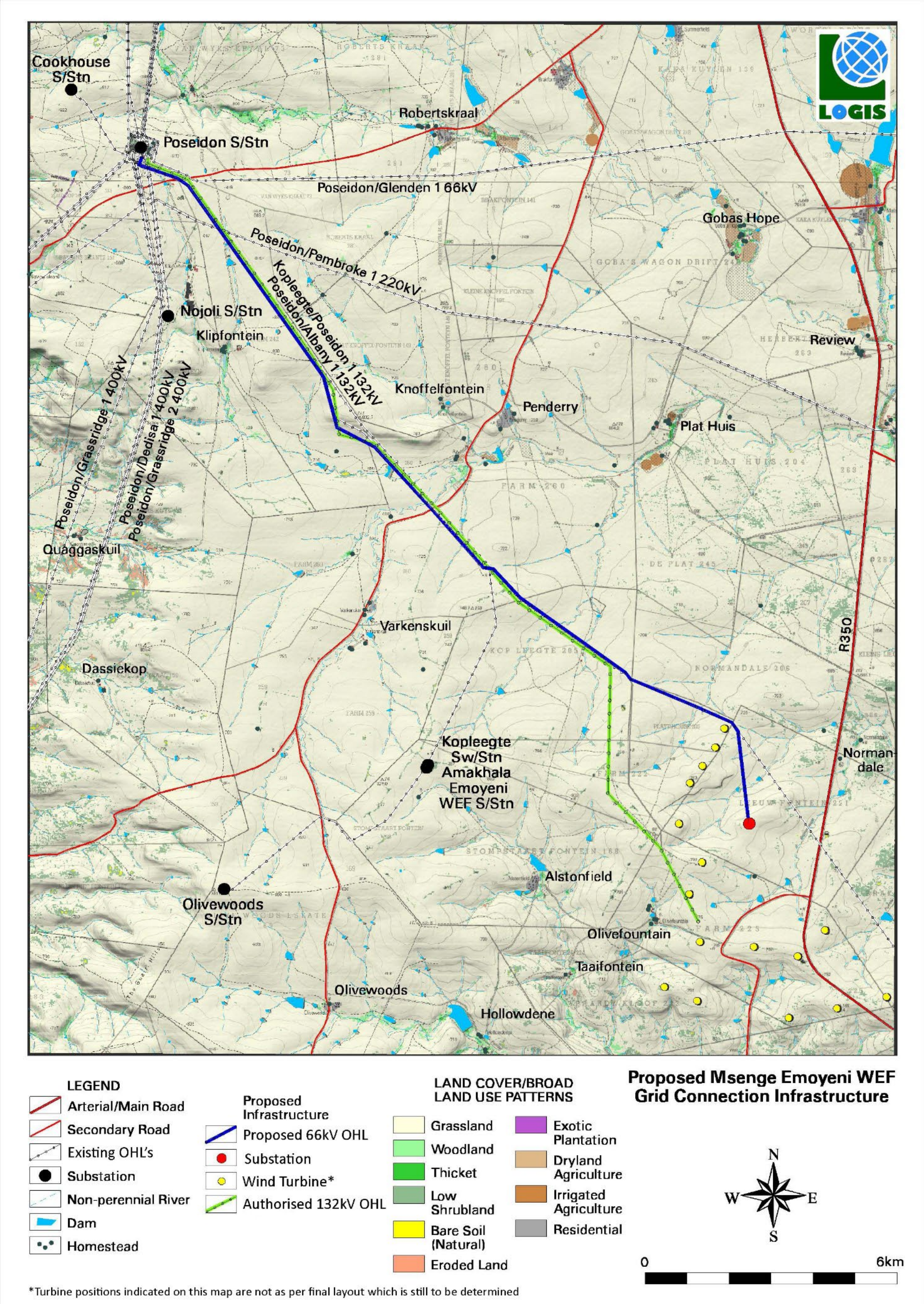
Nuleaf Planning and Environmental determined proximity offsets based on the anticipated visual experience of the observer over varying distances. In general, the severity of the visual impact on visual receptors decreases with increased distance from the proposed infrastructure. Therefore, in order to refine the visual exposure of the facility on surrounding areas/receptors, the principle of reduced impact over distance is applied in order to determine the core area of visual influence for the Msenge Emoyeni 66kV Overhead Powerline. Proximity offsets for the proposed development footprint are thus established in order to indicate the scale and viewing distance of the facility and to determine the prominence of the structures in relation to their environment.

These proximity offsets are based on the anticipated visual experience of the observer over varying distances. The distances are adjusted upwards for larger facilities and downwards for smaller facilities (i.e., depending on the size and nature of the proposed infrastructure). Therefore, for the purpose of this study, proximity offsets have been calculated from the centre line of the power line alignment, as indicated on **Map 3** and as follows:

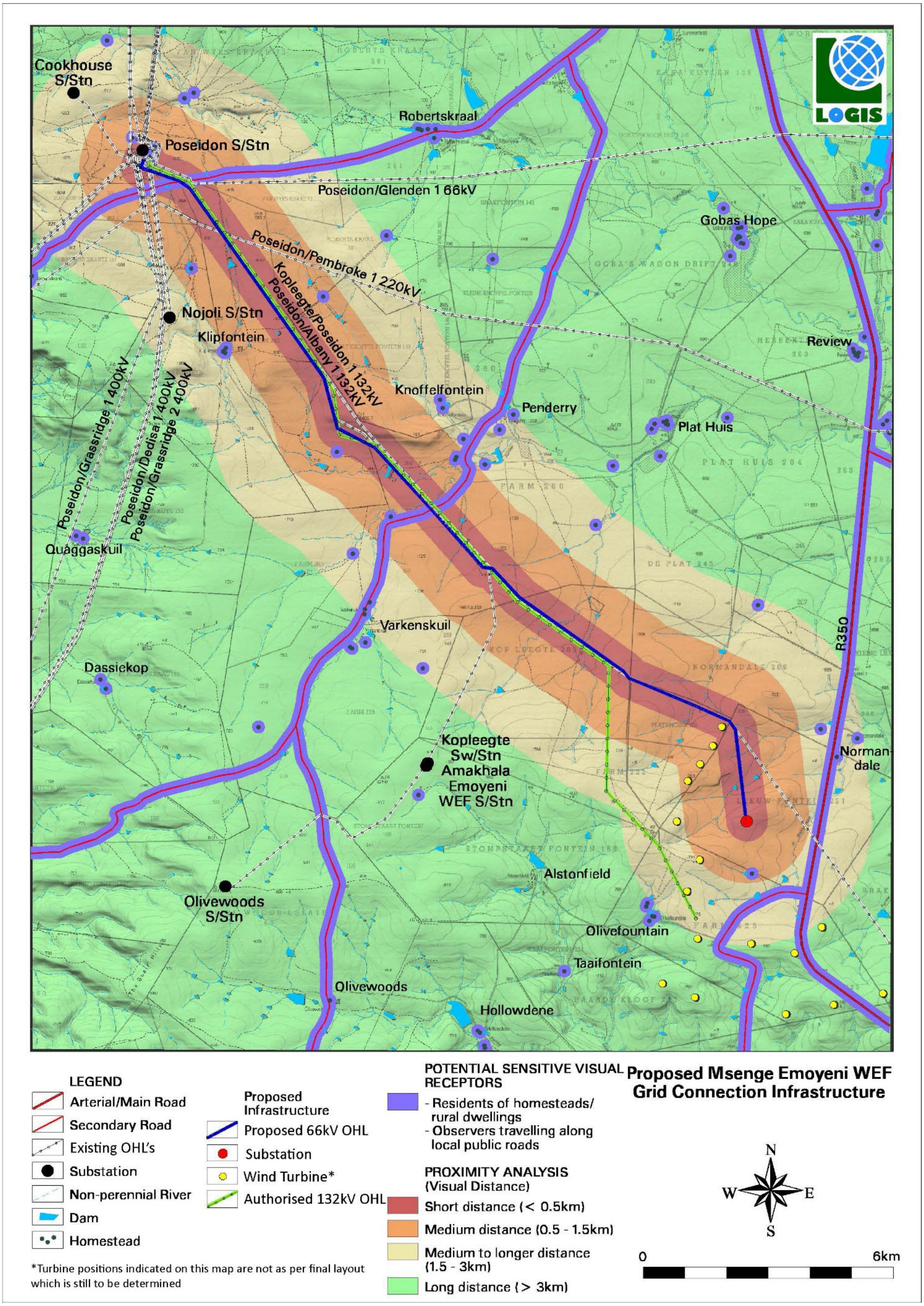
- 0 – 0.5km. Short distance view where the infrastructure would dominate the frame of vision and constitute a very high to high visual prominence.
- 0.5 – 1.5km. Medium distance view where the infrastructure would be easily and comfortably visible and constitute a high to moderate visual prominence.
- 1.5 – 3km. Medium to longer distance view where the infrastructure 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 line.



Map 1: Shaded relief map of the study area



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



Map 3: Visual proximity analysis, observer sensitivity and proximity of the proposed Msenge Emoyeni 66 kV Overhead Powerline

6.2. VIEWER INCIDENCE, PERCEPTION AND SENSITIVITY

Since the number of potential sensitive receptors and their perception of the development in question ultimately determines the concept of a visual impact (i.e., without receptors there would be no impact), the visual distance theory and the receptors proximity to the development works hand in hand, and is especially relevant, when considered from areas with a high viewer incidence and a potentially negative visual perception of the proposed facility. 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.

Viewer incidence is calculated to be the highest along the secondary roads within the study area, as well as homesteads/dwellings within the area. Commuters and possible tourists (though unlikely) using these roads may be negatively impacted upon by the visual exposure to the proposed infrastructure.

Homesteads and farmsteads, by virtue of their visually exposed nature, are also considered to be sensitive visual receptors. Residential receptors in natural contexts are more sensitive than those in more built-up contexts, due to the absence of visual clutter in these undeveloped and undisturbed areas. Receptors within built up areas are less sensitive to potential visual impact due to the presence of structures, infrastructure and general visual clutter. However, due to the extremely low density of homesteads/dwellings within the immediate area (within 1 Km), it is highly unlikely that any residents would be negatively impacted.

No specific report can be made on viewer perception regarding the proposed Msenge Emoyeni 66kV Overhead Powerline, as no reported stakeholder feedback has been received by the specialist. However, considering there are existing high voltage power lines traversing the study area, a number of existing and proposed Wind Energy Facilities already present and a low number of sensitive visual receptors, it can be expected that the overall viewer perception will be neutral.

The potential sensitive visual receptors within a 0.5km, 1.5km and 3km radius as identified on **Map 3** are as follows:

- < 0.5km – Short Distance
  Observers travelling along the secondary roads and residents of unknown dwellings/homesteads.

- 0.5 – 1.5km – Short to Medium Distance
  Residents of Klipfontein and observers travelling along the secondary roads.

- 1.5 - 3km – Medium to Long Distance
  Residents of Normandale, Varkenskuil, Penderry, Knoffelfontein and Klipfontein, as well as, observers travelling along the secondary roads and a small portion of the R350.

- > 3km – Long Distance
  Residents of homesteads/dwellings within the area, along with observers travelling along the secondary roads.

6.3. VISUAL ABSORPTION CAPACITY

Visual Absorption Capacity (VAC) is the capacity of the receiving environment to absorb the potential visual impact of the proposed infrastructure. 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 development in terms of texture, colour, form and light / shade characteristics. On the other hand, the VAC for a development 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 development decreases.

The land cover within the study area is predominately low grassland with small scattered areas of tree clumps. As a result, the landscape is characterised by wide-open expanses of landscape. Overall, the Visual Absorption Capacity (VAC) of the receiving environment is deemed to be low by virtue of the low growing vegetation and sparsely populated/limited development overall.

The significant height of power line structures adds to the potential visual intrusion of the power lines, with the tall towers (pylons) against the background of the horizon. In addition, the scale and form of the structures mean that it is unlikely that the environment will visually absorb them in terms of texture, colour, form and light/shade characteristics.

Overall, the Visual Absorption Capacity (VAC) of the receiving environment and the areas in close proximity to the proposed substation and powerline alignment is deemed to be low by virtue of the low-growing vegetation.

Where homesteads do occur, some more significant vegetation and trees may have been planted, which would contribute to the visual absorption. As this is not a consistent occurrence and majority of the settlements are informal in nature, VAC will not be taken into account for any of the homesteads or settlements, again assuming a worst-case scenario.

As a result of the low-lying vegetation, undeveloped nature of the study area, and the high contrast of the infrastructure within the surrounding receiving environment, VAC will not be taken into account for the visual impact assessment of the Msenge Emoyeni 66kV Overhead Powerline.

6.4. POTENTIAL VISUAL EXPOSURE

The result of the viewshed analyses for the proposed Msenge Emoyeni 66kV Overhead Powerline is shown on **Map 4** that follows. An analysis has been undertaken within the proposed infrastructure alignment in order to determine the general visual exposure (visibility) of the area under investigation. A height of 30m was used in order to illustrate the anticipated visual exposure of the proposed infrastructure (i.e., the approximate maximum height of the power line structures of a 66kV power line). This also represents the absolute worst-case scenario. The visibility analysis for each alignment was generated from a number of points along the alignment, spaced at intervals of approximately 400m. Receptor height was set at eye level.

The height of the substation will not exceed two storeys (i.e., 6m), therefore the visual exposure of this component will fall within the viewshed generated for the power line alignment.

The viewshed analysis does not include the effect of vegetation cover or existing structures on the exposure of the proposed facility, therefore signifying a worst-case scenario.

Map 4 indicates that the proposed grid connection infrastructure will be visually exposed to some extent within the study area, due to the tall power line infrastructure. It is thus anticipated that the infrastructure would be visible to observers (i.e. people travelling along roads, residing in homesteads or visiting the region), and could potentially constitute a high visual prominence, potentially resulting in a visual impact.

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

- The potential visual exposure of the infrastructure is contained to a core area on the site itself and within a 0.5 km radius thereof.

  Sensitive visual receptors are observers travelling along the secondary road and residents of unknown dwellings/homesteads.

- Potential visual exposure in the short to medium distance (i.e., between 0.5 and 1.5km), is concentrated throughout this radius with small pockets of visually screened areas located beyond areas of higher elevation owing to hills. These screened areas are located in the south, east and north west of the site.

  Sensitive visual receptors include residents of Klipfontein and observers travelling along the secondary roads.

- In the medium to long distance (i.e., between 1.5 and 3km offset), the extent of potential visual exposure is reduced largely owing to the hilly topography. Visually exposed areas are found to the east and west of the site in the central portion of the alignment, with scattered exposure and visually screened areas lying in the southern and northern ends of the site.

  Sensitive visual receptors include residents of Normandale, Varkenskuil, Penderry, Knoffelfontein and Klipfontein, as well as, observers travelling along the secondary roads and a small portion of the R350.

- Beyond the 3km offset from the proposed facility, potential visual exposure becomes very low. Sensitive visual receptors are not likely to be visually exposed to the proposed infrastructure.

In general, as a result of the scattered and lower population density of the study area, the Msenge Emoyeni 66kV Overhead Powerline may constitute a visual prominence, potentially resulting in a moderate to low visual impact.

6.5. VISUAL IMPACT INDEX

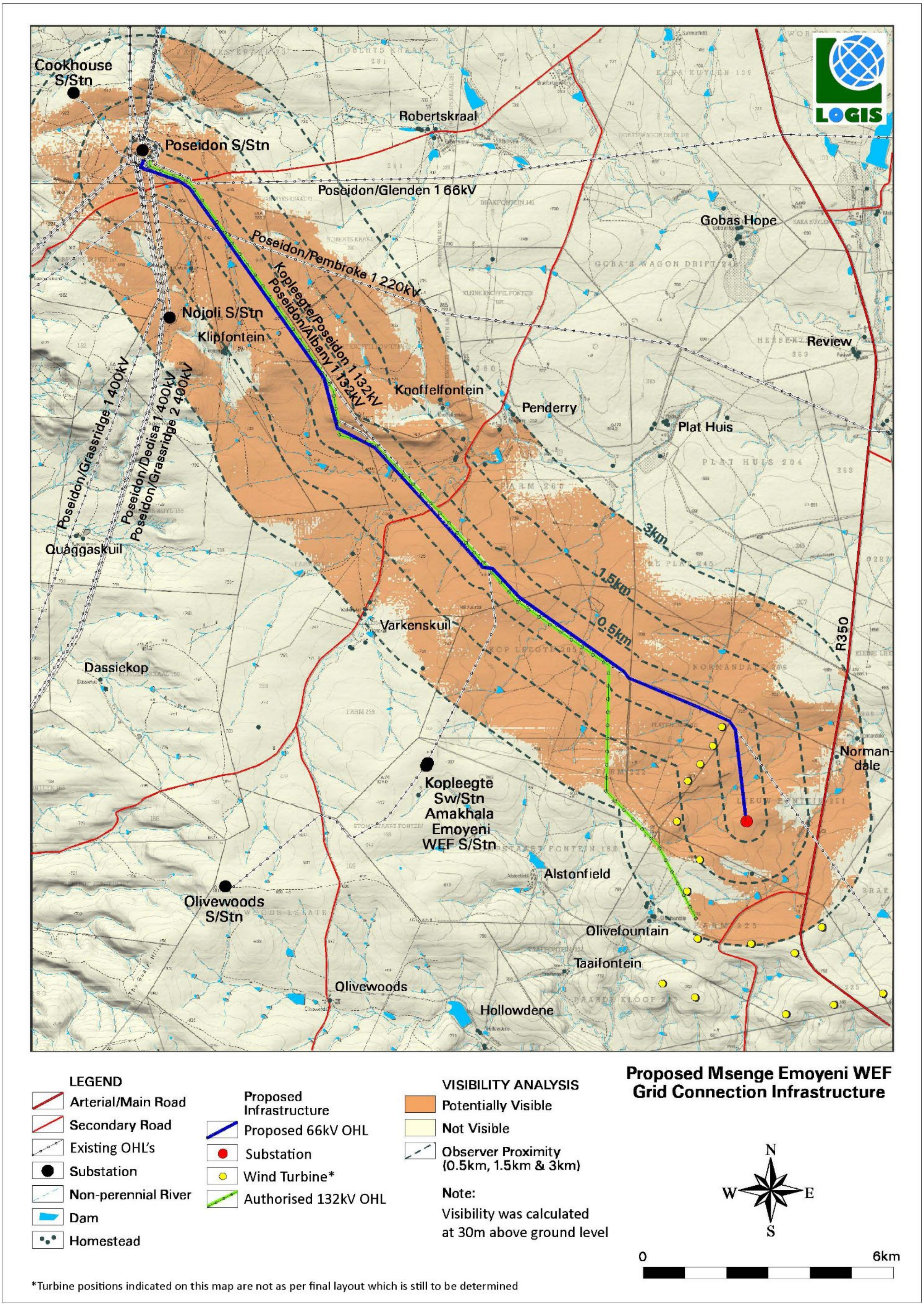
The results of visual exposure, viewer incidence / perception and visual distance of the proposed facility are displayed on **Map 5**. Here the weighted impact and the likely areas of impact have been indicated as a visual impact index. Values have been assigned for each potential visual impact per data category and merged in order to calculate the visual impact index. An area with short distance, a high viewer incidence and a predominantly 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 when evaluating the issues related to the visual impact. The visual impact index for the proposed infrastructure is further described as follows.

- The visual impact index map indicates a core zone of **high** visual impact within 0.5km of the proposed infrastructure. Users of the secondary road (1 & 2) and residents of unknown dwellings/homesteads are likely to experience a **very high** visual impact.

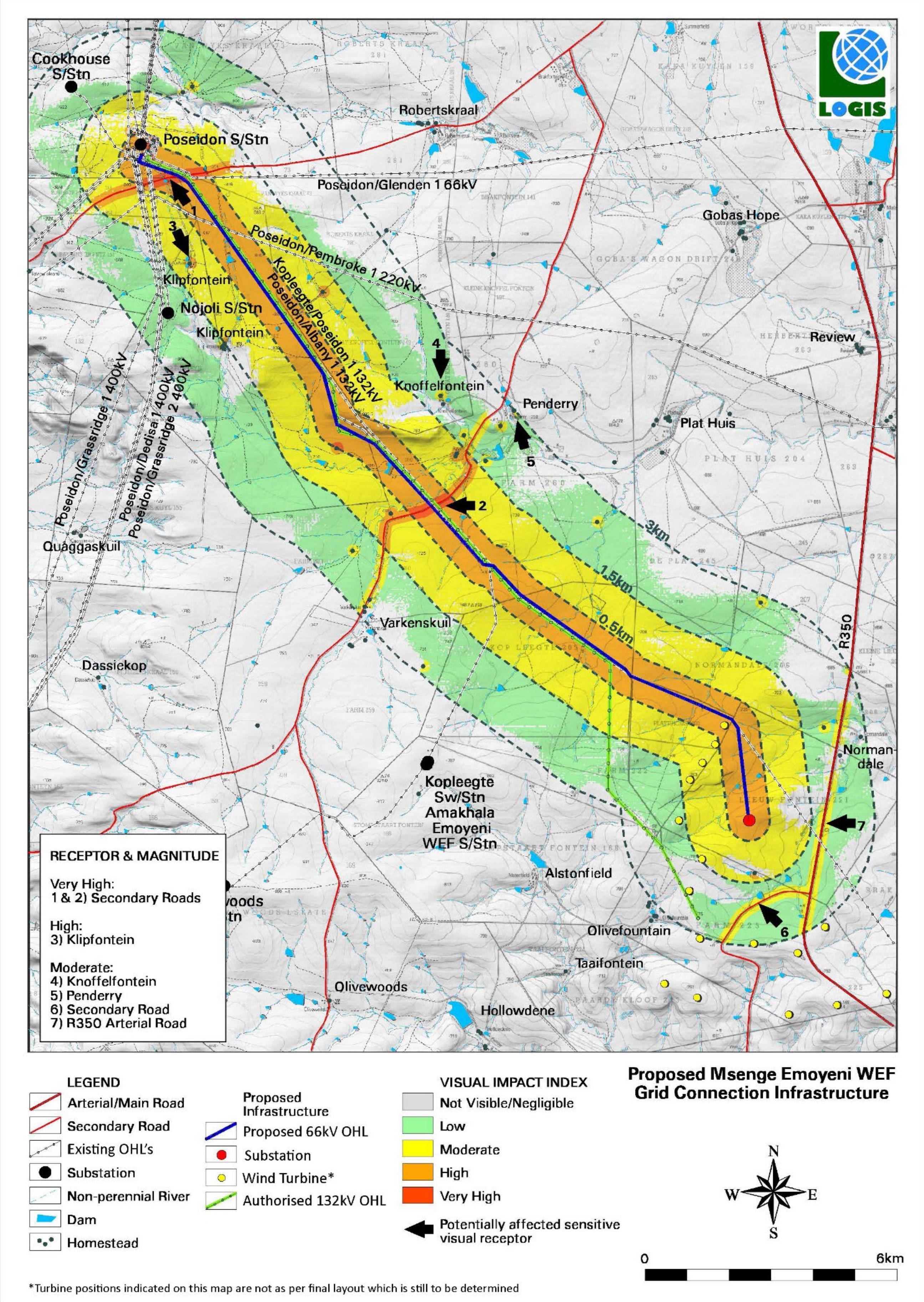
- Visual impact is predominantly **moderate** between 0.5km and 1.5km of the proposed infrastructure. The identified receptors between 0.5km and 1.5km of the proposed infrastructure, as listed below, are likely to experience **high** visual impact should no mitigation be undertaken. Sensitive visual receptors within this zone comprise mainly of the following:
  - Users traveling along a small portion of the three secondary roads (1, 2), it is expected that the visual intrusion where possible will be brief
  - Residents of Klipfontein (3) located to the north

- Visual impact is prominently **low** between 1.5 km and 3 km of the proposed infrastructure. The identified receptors between 1.5km and 3km of the proposed infrastructure, as listed below, are likely to experience **moderate** visual impact, should no mitigation be undertaken. Sensitive visual receptors within this zone comprise mainly of the following users:
  - Users traveling along the arterial road R350 (7) and various secondary roads (1, 2 & 6), potential visibility is however scattered along the length of the roads and visual intrusion where possible will be brief
  - Residents of Knoffelfontein (4) and Penderry (5)

- Beyond the 3 km of the proposed infrastructure, the extent of potential visual impact is greatly reduced, and the magnitude is predominantly **very low** to negligible. It is not expected that sensitive receptors, if any, will be impacted visually by the proposed infrastructure.



Map 4: Potential visual exposure (viewshed analysis) of the proposed Msenge Emoyeni 66kV Overhead Powerline



Map 5: Visibility Index illustrating the frequency of exposure of the proposed Msenge Emoyeni 66 kV Overhead Powerline

7. VISUAL IMPACT ASSESSMENT

7.1. 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 related to the visual impact.

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

Extent - How far the visual impact is going to extend and to what extent it will have the highest impact. In the case of this type of development the extent of the visual impact is most likely to have a higher impact on receptors closer to the development and decrease as the distance increases.

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

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

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

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

- (0) None
- (2) Minor
- (4) Low
- (6) Moderate
- (8) High
- (10) Very High

Probability - The likelihood of the impact actually occurring.

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

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

- (0-12) Negligible:
  Where the impact would have no direct influence on the decision to develop in the area. The impact would be of a very low order. In the case of negative impacts, almost no mitigation and or remedial activity would be needed, and any minor steps, which might be needed, would be easy, cheap, and simple.
- (13-30) Low:
  Where the impact would have a very limited direct influence on the decision to develop in the area. The impact would be of a low order and with little real effect. In the case of negative impacts, mitigation and / or remedial activity would be either easily achieved or little would be required, or both.
- (31-60) Moderate:
  Where the impact could influence the decision to develop in the area. The impact would be real but not substantial. In the case of negative impacts, mitigation and / or remedial activity would be both feasible and fairly easily possible.
- (61-80) High:

Where the impact must have an influence on the decision to develop in the area. The impacts are of a substantial order. In the case of negative impacts, mitigation and / or remedial activity would be feasible but difficult, expensive, time-consuming or some combination of these.

- (81-100) Very High:
  Where the impact will definitely have an influence on the decision to develop in the area. The impacts are of the highest order possible. In the case of negative impacts, there would be no possible mitigation and / or remedial activity possible.

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

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

- Positive
- Negative
- Neutral

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

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

7.2. PRIMARY IMPACTS

The primary visual impacts of the proposed Msenge Emoyeni 66kV Overhead Powerline are assessed as follows:

7.2.1 POTENTIAL VISUAL IMPACT ON SENSITIVE VISUAL RECEPTORS IN CLOSE PROXIMITY TO THE PROPOSED INFRASTRUCTURE

The visual impacts on sensitive visual receptors (i.e., residents of homesteads and users of secondary roads) in close proximity to the proposed infrastructure (i.e., within 0.5km) is expected to be of **moderate** significance.

A mitigating factor within this scenario is the very low occurrence of receptors within the receiving environment. Additionally, observers traveling along the secondary road will only be exposed to the visual intrusion for a short period of time. This reduces the probability of this impact occurring.

No mitigation is possible within this environment or for this type of infrastructure, but measures have been included as best practice guidelines. The table below illustrates this impact assessment.

Table 2: Impact table summarising the significance of sensitive visual receptors in close proximity to the proposed infrastructure

Nature of Impact: Visual impact on the users of secondary roads and residents of homesteads in close proximity to the proposed infrastructure.		
	No mitigation	***Mitigation considered***
Extent	High **(4)**	High **(4)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Very high **(10)**	Very high **(10)**
Probability	Probable **(3)**	Probable **(3)**
Significance	Moderate **(54)**	Moderate **(54)**
Status (positive or negative)	Negative	Negative
Reversibility	Recoverable **(3)**	Recoverable **(3)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	
Mitigation / Management: Planning: ➢ Respond to the natural environment during the planning of buildings and infrastructure.		

➢ Consolidate development and make use of already disturbed sites rather than pristine areas. ➢ Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint. ➢ Wherever possible, use materials, coatings, or paints that have little or no reflectivity. ➢ Commercial messages, symbols and/logos are not permitted on structures. <u>Construction:</u> ➢ Ensure that vegetation is not unnecessarily removed during the construction period. ➢ Reduce the construction period through careful logistical planning and productive implementation of resources. ➢ 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. ➢ Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. ➢ Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities. ➢ Reduce and control construction dust using approved dust suppression techniques as and when required (i.e., whenever dust becomes apparent). ➢ Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts. ➢ Rehabilitate all disturbed areas immediately after the completion of construction works.
Cumulative impacts: The construction of the infrastructure will increase the cumulative visual impact of electrical type infrastructure within the region. This is specifically relevant in light of the existing power lines in the area and the Poseidon Substation present in the study area.
Residual impacts: The visual impact will be removed after decommissioning, provided the power line infrastructure is removed. Failing this, the visual impact will remain

7.2.2 POTENTIAL VISUAL IMPACT ON SENSITIVE VISUAL RECEPTORS WITHIN THE REGION

The visual impact on sensitive visual receptors (i.e., residents of homesteads and users of roads.) within the region (i.e., beyond the 0.5km offset) is expected to be of **moderate** significance. The low occurrence of visual receptors reduces the probability of this impact occurring.

No mitigation is possible within this environment and for a facility of this scale, but measures have been included as best practice guidelines. The table below illustrates this impact assessment.

Table 3: Impact table summarising the significance of visual impacts on sensitive receptors within the region

Nature of Impact: Visual impact on the residents of farm and homesteads and users of secondary road on the periphery of the 0.5km offset and within the region beyond		
	No mitigation	***Mitigation considered***
Extent	Low **(2)**	Low **(2)**
Duration	Long **(4)**	Long **(4)**
Magnitude	Moderate **(6)**	Moderate **(6)**
Probability	Probable **(3)**	Probable **(3)**
Significance	Moderate **(36)**	Moderate **(36)**
Status (positive or negative)	Negative	Negative
Reversibility	Recoverable **(3)**	Recoverable **(3)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	
Mitigation / Management: <u>Planning:</u> ➢ Respond to the natural environment during the planning of buildings and infrastructure. ➢ Consolidate development and make use of already disturbed sites rather than pristine areas. ➢ Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint. ➢ Wherever possible, use materials, coatings, or paints that have little or no reflectivity. ➢ Commercial messages, symbols and/logos are not permitted on structures. <u>Operations:</u> ➢ Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint.		

➢ Maintain the general appearance of the facility as a whole. ➢ Monitor rehabilitated areas, and implement remedial action as and when required. Decommissioning: ➢ Remove infrastructure not required for the post-decommissioning use of the site. ➢ Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications. ➢ Monitor rehabilitated areas post-decommissioning and implement remedial actions.
Cumulative impacts: The construction of the infrastructure will increase the cumulative visual impact of electrical type infrastructure within the region. This is specifically relevant in light of the existing power lines in the area and the Poseidon Substation present in the study area.
Residual impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.

7.2.3 POTENTIAL VISUAL IMPACT OF ASSOCIATED INFRASTRUCTURE (ON-SITE SUBSTATION, ACCESS TRACK AND WATERCOURSE CROSSINGS) ON SENSITIVE VISUAL RECEPTORS IN CLOSE PROXIMITY

The height of the proposed new on-site substation will not exceed two storeys (i.e., 6m), therefore the visual exposure of this component will fall within the viewsheds generated for the power line infrastructure (which is not expected to exceed 32m). Other associated infrastructure would include access roads and cleared servitudes along the alignments.

Servitudes will need to be maintained along the length of the proposed power lines for their entire operational life and access roads will be required both to construct the power lines, and to maintain the servitudes (operational phase). These servitudes and access roads have the potential of manifesting as landscape scarring, and thus represent a potential visual impact within the viewshed areas. This is especially relevant for steep slopes where erosion could occur over time. Such erosion and landscape scarring could represent a visual impact.

As access roads, watercourse crossings and servitudes have no elevation or height, so the visual impact of this associated infrastructure will be absorbed by the visual impact of the primary infrastructure.

The potential visual impact of the associated infrastructure on sensitive visual receptors in close proximity thereto is expected to be of **moderate** significance pre-mitigation ad may be mitigated to **low** post mitigation**.** The table illustrates the assessment of this anticipated impact.

Note: The proximity of existing infrastructure (i.e., existing power line infrastructure) reduces the probability of this impact occurring.

Table 4: Impact table summarising the significance of the visual impacts of associated infrastructure on sensitive visual receptors in close proximity

Nature of Impact: Visual impact of the associated infrastructure located on site on residents of farm and homesteads and users of the secondary road within close proximity to the proposed facility (within the 0.5 Km offset)		
	No mitigation	***Mitigation considered***
Extent	High **(4)**	High **(4)**
Duration	Long **(4)**	Long **(4)**
Magnitude	Very High **(10)**	Moderate **(3)**
Probability	Probable **(3)**	Improbable **(2)**
Significance	Moderate **(54)**	Low **(22)**
Status (positive or negative)	Negative	Negative
Reversibility	Recoverable **(3)**	Recoverable **(3)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation / Management: Site development & Operation: ➢ Retain / re-establish and maintain large trees, natural features and noteworthy natural vegetation in all areas outside of the activity footprint. ➢ Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint.		

➢ Plan ancillary infrastructure in such a way and in such a location that clearing of vegetation is minimised. Consolidate existing infrastructure as much as possible, and make use of already disturbed areas rather than pristine sites wherever possible. ➢ Use existing roads wherever possible. Where new roads are required, these should be planned carefully, taking due cognisance of the local topography. All efforts should be employed to try and align roads along the landscape contours wherever possible. Construction of roads should be undertaken properly, with adequate drainage structures in place to forego potential erosion problems. ➢ Keeping infrastructure at minimum heights. ➢ Introducing landscaping measures such as vegetating berms. ➢ Avoid the use of highly reflective material. ➢ Maintain the general appearance of the site as a whole. <u>Lighting</u> ➢ Lighting should be kept to a minimum wherever possible. ➢ Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of the activity – this is especially relevant where the edge of the activity is exposed to residential properties. ➢ Wherever possible, lights should be directed downwards to avoid illuminating the sky. ➢ Avoid high pole top security lighting along the periphery of the site and use only lights that are activated on movement. <u>Construction:</u> ➢ Rehabilitate all construction areas, when no longer required. ➢ Keep vegetation clearing to a minimum. <u>Operations:</u> ➢ Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint. ➢ Maintain the general appearance of the facility as a whole. ➢ Monitor rehabilitated areas, and implement remedial action as and when required. <u>Decommissioning:</u> ➢ Remove infrastructure not required for the post-decommissioning use of the site. ➢ Rehabilitate all areas as per the rehabilitation plan undertaken. Consult an ecologist regarding rehabilitation specifications. ➢ Monitor rehabilitated areas post-decommissioning and implement remedial actions as required.
Cumulative impacts: The construction of the infrastructure will increase the cumulative visual impact of electrical type infrastructure within the region. This is specifically relevant in light of the existing power lines in the area and the Poseidon Substation present in the study area.
Residual impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.

7.2.4 POTENTIAL VISUAL IMPACT OF CONSTRUCTION ON SENSITIVE VISUAL RECEPTORS IN CLOSE PROXIMITY TO THE PROPOSED INFRASTRUCTURE

During the construction period, there will be an increase in heavy vehicles utilising the roads to the construction site that may cause, at the very least, a visual nuisance to other road users and landowners in the area in close proximity. Mitigation entails proper planning, management and rehabilitation of all construction sites to forego visual impacts.

The table below illustrates the assessment of the anticipated visual impact of construction on sensitive visual receptors in close proximity to the proposed infrastructure. Visual impacts are likely to be of **moderate** significance for all proposed lines and may be mitigated to **low.**

Table 5: Impact table summarising the significance of visual impact of construction on visual receptors in close proximity

Nature of Impact: Visual impact of construction on sensitive visual receptors in close proximity to the proposed facility		
	No mitigation	***Mitigation considered***
Extent	High **(4)**	High **(4)**
Duration	Short term **(1)**	Short term **(1)**
Magnitude	Very High **(10)**	Low **(4)**
Probability	Probable **(3)**	Improbable **(2)**
Significance	Moderate **(45)**	Low **(18)**

Status (positive or negative)	Negative	Negative
Reversibility	Recoverable **(3)**	Recoverable **(3)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation / Management: Lighting ➢ Lighting should be kept to a minimum wherever possible. ➢ Install light fixtures that provide precisely directed illumination to reduce light “spillage” beyond the immediate surrounds of the activity – this is especially relevant where the edge of the activity is exposed to residential properties. ➢ Wherever possible, lights should be directed downwards to avoid illuminating the sky. ➢ Avoid high pole top security lighting along the periphery of the site and use only lights that are activated on movement. Construction: ➢ Keep vegetation removal to a minimum where possible. ➢ If possible, keep the construction period to a minimum. ➢ 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. ➢ Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. ➢ Ensure that rubble, litter, and disused construction materials are appropriately stored and then disposed regularly at licensed waste facilities. ➢ Employ dust suppression techniques as and when required (i.e., whenever dust becomes apparent). ➢ Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts. ➢ Rehabilitate all disturbed areas as per the rehabilitation plan and schedule. Decommissioning: ➢ Remove infrastructure not required for the post-decommissioning use of the site. ➢ Rehabilitate all areas as per the rehabilitation plan undertaken. Consult an ecologist regarding rehabilitation specifications. ➢ Monitor rehabilitated areas post-decommissioning and implement remedial actions as required.		
Cumulative impacts: N/A		
Residual impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.		

7.2.5 POTENTIAL VISUAL IMPACT OF LIGHTING AT NIGHT ON SENSITIVE VISUAL RECEPTORS IN THE REGION

The receiving environment has a relatively small number of populated places, and it can be expected that any light trespass and glare from the security and after-hours operational lighting for the facility will have some significance. In addition, the remote sense of place and rural ambiance of the local area increases its sensitivity to such lighting intrusions.

The potential lighting impact is known as sky glow. Sky glow is the condition where the night sky is illuminated when light reflects off particles in the atmosphere such as moisture, dust or smog. The sky glow intensifies with the increase in the number of light sources. Each new light source, especially upwardly directed lighting, contributes to the increase in sky glow. The general lighting of the collector substation may contribute to the effect of sky glow in an otherwise dark environment.

The visual impacts as a result of lighting at night on sensitive visual receptors in the region is likely to be of **moderate** significance and may be mitigated to **low**. Best practice guidelines for general site lighting that may occur on the site has been taken into consideration. The table below illustrates this impact assessment.

Note: The number of farmsteads and settlements exposed to visual impact influences the probability rating.

Table 6: Impact table summarising the significance of operational lightening at night on visual receptors within the region

Nature of Impact: Visual impact of lighting at night on sensitive visual receptors in close proximity to the proposed facility		
	No mitigation	***Mitigation considered***
Extent	High **(4)**	High **(4)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Moderate **(6)**	Low **(4)**
Probability	Probable **(3)**	Improbable **(2)**
Significance	Moderate **(42)**	Low **(24)**
Status (positive or negative)	Negative	Negative
Reversibility	Recoverable **(3)**	Recoverable **(3)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: Planning & operation: ➢ Shield the sources of light by physical barriers (walls, vegetation, or the structure itself). ➢ Limit mounting heights of lighting fixtures, or alternatively use foot-lights or bollard level lights. ➢ Make use of minimum lumen or wattage in fixtures. ➢ Make use of down-lighters, or shielded fixtures. ➢ Make use of Low-Pressure Sodium lighting or other types of low impact lighting. ➢ Make use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.		
Cumulative impacts: The light generated at night locally is minimal. The impact of the proposed substation infrastructure although in line with current development and land use trends in the region, will certainly will contribute to a regional increase in lighting impact.		
Residual impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.		

7.3. SECONDARY IMPACTS

7.3.1 POTENTIAL VISUAL IMPACT ON THE VISUAL CHARACTER OF THE LANDSCAPE AND 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 and specifically the visual character of an area (informed by a combination of aspects such as topography, level of development, vegetation, noteworthy features, cultural / historical features, etc.) play a significant role.

A visual 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.

In general, the landscape character of the greater study area and site itself presents as mostly natural in character. The visual quality of the region is generally high by virtue of the vast and undeveloped nature of the environment. This lends a distinct sense of place to the area, but the landscape is not unique. As such, the entire study area is considered sensitive to visual impacts due to its generally low levels of transformation. However, as a result of the presence of existing electrical infrastructure and Wind Energy Facilities within the region this is likely to reduce the probability of this impact occurring.

The anticipated visual impact on the visual character and sense of place of the study area is expected to be of **moderate** significance. The presence of existing electrical infrastructure and Wind Energy Facilities within the region this is likely to reduce the probability of this impact occurring. Additionally, the low occurrence of visual receptors and the remote location of the study area relative to tourism areas further reduces the probability of this impact occurring.

No mitigation is possible within this environment and for a facility of this scale, but measures have been included as best practice guidelines. The table below illustrates this impact assessment.

Table 7: Impact table summarising the significance of visual impacts on landscape character and sense of place within the region

Nature of Impact: Visual impact of the proposed development on the visual quality of the landscape and sense of place of the region		
	No mitigation	***Mitigation considered***
Extent	Low **(2)**	Low **(2)**
Duration	Long **(4)**	Long **(4)**
Magnitude	High **(8)**	High **(8)**
Probability	Probable **(3)**	Probable **(3)**
Significance	Moderate **(42)**	Moderate **(42)**
Status (positive or negative)	Negative	Negative
Reversibility	Recoverable **(3)**	Recoverable **(3)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation / Management: Planning: ➢ Respond to the natural environment during the planning of buildings and infrastructure. ➢ Consolidate development and make use of already disturbed sites rather than pristine areas. ➢ Retain vegetation in all areas outside of actual built footprints wherever possible. ➢ Visually break up large bulky buildings into smaller, subtler, less prominent shapes and planes. ➢ Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint. ➢ Plan ancillary infrastructure in such a way and in such a location that clearing of vegetation is minimised. ➢ Use existing roads wherever possible. Where new roads are required to be constructed, these should be planned carefully, taking due cognisance of the local topography. Roads should be laid out along the contour wherever possible, and should never traverse slopes at 90 degrees. Construction of roads should be undertaken properly, with adequate drainage structures in place to forego potential erosion problems. ➢ Wherever possible, use materials, coatings, or paints that have little or no reflectivity. ➢ Commercial messages, symbols and/logos are not permitted on structures. Construction: ➢ Rehabilitate all construction areas. ➢ Ensure that vegetation is not cleared unnecessarily to make way for infrastructure. Operations: ➢ Maintain the general appearance of the facility as a whole. ➢ Monitor rehabilitated areas, and implement remedial action as and when required. Decommissioning: ➢ Remove infrastructure not required for the post-decommissioning use of the site. ➢ Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications. ➢ Monitor rehabilitated areas post-decommissioning and implement remedial actions.		
Cumulative impacts: The construction of the infrastructure will increase the cumulative visual impact of electrical type infrastructure within the region. This is specifically relevant in light of the existing power lines in the area and the Poseidon Substation present in the study area.		
Residual impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.		

7.3.2 POTENTIAL CUMULATIVE VISUAL IMPACT WITHIN THE REGION

There are already existing high voltage power lines that traverse the study area, namely the Poseidon/Grassridge 400 kV, Poseidon / Dedisa 400kV, Poseidon / Grassridge 400kV, Kopleegte / Poseidon 132kV, Poseidon / Albany 132kV Poseidon / Pembroke 220kV, Poseidon / Glenden 66kV overhead lines. The addition of the proposed Msenge Emoyeni 66kV Overhead Powerline will result in an increase in this type of infrastructure within the region and could result in a cumulative visual impact.

The table below illustrates the assessment of the anticipated cumulative visual impact of infrastructure on sensitive visual receptors within the region. Visual impacts are likely to be of **low** significance with no mitigation possible. The fact that the proposed 66kV OHL routing will follow the existing Poseidon / Albany 132kV powerline servitude is likely to reduce the probability of this impact occurring.

Table 8: Impact table summarising the potential cumulative visual impact on sensitive visual receptors within the region

Nature of Impact: Potential cumulative visual impact of infrastructure on visual receptors within the region		
	No mitigation	***Mitigation considered***
Extent	Low **(2)**	Low **(2)**
Duration	Long **(4)**	Long **(4)**
Magnitude	Moderate **(6)**	Moderate **(6)**
Probability	Improbable **(2)**	Improbable **(2)**
Significance	Low **(24)**	Low **(24)**
Status (positive or negative)	Negative	Negative
Reversibility	Recoverable **(3)**	Recoverable **(3)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation / Management: Planning: ➢ Respond to the natural environment during the planning of buildings and infrastructure. ➢ Consolidate development and make use of already disturbed sites rather than pristine areas. ➢ Retain vegetation in all areas outside of actual built footprints wherever possible. ➢ Visually break up large bulky buildings into smaller, subtler, less prominent shapes and planes. ➢ Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint. ➢ Plan ancillary infrastructure in such a way and in such a location that clearing of vegetation is minimised. ➢ Use existing roads wherever possible. Where new roads are required to be constructed, these should be planned carefully, taking due cognisance of the local topography. Roads should be laid out along the contour wherever possible, and should never traverse slopes at 90 degrees. Construction of roads should be undertaken properly, with adequate drainage structures in place to forego potential erosion problems. ➢ Wherever possible, use materials, coatings, or paints that have little or no reflectivity. ➢ Commercial messages, symbols and/logos are not permitted on structures. Construction: ➢ Rehabilitate all construction areas. ➢ Ensure that vegetation is not cleared unnecessarily to make way for infrastructure. Operations: ➢ Maintain the general appearance of the facility as a whole. ➢ Monitor rehabilitated areas, and implement remedial action as and when required. Decommissioning: ➢ Remove infrastructure not required for the post-decommissioning use of the site. ➢ Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications. ➢ Monitor rehabilitated areas post-decommissioning and implement remedial actions.		
Residual impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.		

7.3 THE POTENTIAL TO MITIGATE VISUAL IMPACTS

The primary visual impact, namely the presence of the proposed Msenge Emoyeni 66kV Overhead Powerline, is not possible to mitigate especially in this receiving environment. Low lying vegetation, the undeveloped nature of the study area, and the high contrast of the infrastructure within the surrounding receiving environment results in a low VAC.

The following is, however possible and is recommended as general good practice:

- Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint.
- Plan ancillary infrastructure (i.e., substation and workshop) in such a way and in such a location that clearing of vegetation is minimised. Consolidate existing infrastructure as much as possible and make use of already disturbed areas rather than pristine sites wherever possible.
- Use existing roads wherever possible. Where new roads are required to be constructed, these should be planned carefully, taking due cognisance of the local topography. Roads should be laid out along the contour wherever possible and should never traverse slopes at 90 degrees. Construction of roads should be undertaken properly, with adequate drainage structures in place to forego potential erosion problems.
- Access roads, which are not required post-construction, should be ripped and rehabilitated.

- Mitigation of visual impacts associated with the construction phase, albeit temporary, entails proper planning, management and rehabilitation of all construction sites. Construction should be managed according to the following principles:

  - Ensure that vegetation is not unnecessarily cleared or removed during the construction period.
  - Reduce the construction period through careful logistical planning and productive implementation of resources.
  - Plan the placement of lay-down areas and any potential temporary construction camps along the corridor in order to minimise vegetation clearing.
  - Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.
  - Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.
  - Reduce and control construction dust through the use of approved dust suppression techniques as and when required (i.e., whenever dust becomes apparent).
  - Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting.
  - Ensure that all infrastructure and the site and general surrounds are maintained and kept neat.
  - Rehabilitate all disturbed areas, construction areas, roads, slopes etc. immediately after the completion of construction works. If necessary, an ecologist should be consulted to assist or give input into rehabilitation specifications.
  - Monitor all rehabilitated areas for at least a year for rehabilitation failure and implement remedial action as required. If necessary, an ecologist should be consulted to assist or give input into rehabilitation specifications.

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

  - Shielding the sources of light by physical barriers (walls, vegetation, or the structure itself).
  - Limiting mounting heights of lighting fixtures, or alternatively using foot-lights or bollard level lights;
  - Making use of minimum lumen or wattage in fixtures.
  - Making use of down-lighters, or shielded fixtures.
  - Making use of Low-Pressure Sodium lighting or other types of low impact lighting.
  - Making use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.

- During Operations, monitor the general appearance of the facility as a whole, as well as, all rehabilitated areas.
  - The maintenance of the buildings and ancillary structures and infrastructure will ensure that the facility does not degrade, thus aggravating visual impact. Implement remedial action where required.
  - Roads must be maintained to forego erosion and to suppress dust, and rehabilitated areas must be monitored for rehabilitation failure. Remedial actions must be implemented as a when required.
- Secondary impacts anticipated as a result of the proposed infrastructure (i.e., impacts on landscape character and sense of place) are not possible to mitigate.

- After decommissioning, all infrastructure should be removed and all disturbed areas appropriately rehabilitated. Monitor rehabilitated areas post-decommissioning and implement remedial actions and consult an ecologist regarding rehabilitation specifications if necessary.

The possible mitigation of both primary and secondary visual impacts as listed above should be implemented and maintained on an on-going basis.

8. SUMMARY OF VISUAL IMPACTS ASSESSED

In light of the results and findings of the Visual Impact Assessment undertaken for the Msenge Emoyeni 66kV Overhead Powerline proposed, it is acknowledged that the receiving environment will be visually transformed for the entire operational lifespan of the facility.

The following is a summary of the impacts assessed:

- The potential visual impact of the facility on sensitive visual receptors within 0.5km (residents of homesteads/dwellings and users of the secondary roads), in close proximity to the proposed facility is likely to be **high.**
- The possible visual impact of the facility on the residents' homesteads and users of secondary road on the periphery of the 0.5km offset and within the region beyond is likely to be of **moderate** significance.
- The potential visual impact of associated infrastructure (on-site substation, access track and watercourse crossings) on residents of homesteads/dwellings and users of the secondary road within close proximity of the proposed facility is likely to be of **moderate** significance and may be mitigated to **low** should the possible best practice mitigation measures be implemented.
- The potential visual impact of construction on sensitive visual receptors in close proximity to the facility is likely to be of **moderate** significance before mitigation and **low** post mitigation.
- The anticipated visual impact of operational lighting at night on sensitive visual receptors within the study area is likely to be of **moderate** significance and may be mitigated to **low** should the possible best practice mitigation measures be implemented.
- The potential visual impact of the proposed development on the visual quality of the landscape and sense of place of the region is likely to be of **moderate** significance both before and after mitigation.
- The potential cumulative visual impact on sensitive visual receptors within the region is likely to be of **moderate** significance.

The following table provides an overall impact significance rating for the proposed OHL based on the average total score using the following formula:

Sum of the significance ratings scored in each category assessed / highest possible total * 100 = overall impact significance rating

Example of how the overall impact significance rating for each alternative OHL was determined:
76 + 64 + 12 + 64 + 56 + 48 + 39 = 359
*(359 / 700) * 100 = 51.28 (overall impact significance rating)*

Table 9: Overall impact significance rating for the proposed OHL

IMPACTS ASSESSED	No mitigation	Mitigation considered
Sensitive visual receptors in close proximity	Moderate (54)	Moderate (54)
Sensitive visual receptors within the region	Moderate (36)	Moderate (36)
Associated infrastructure on sensitive visual receptors in close proximity	Moderate (54)	Low (22)
Construction on visual receptors in close proximity	Moderate (45)	Low (18)
Operational lighting at night on sensitive visual receptors within the study area	Moderate (42)	Low (24)
On the landscape character and sense of place within the region	Moderate (42)	Moderate (42)
Cumulative visual impact within the region	Low (24)	Low (24)
Overall Impact Significance Rating per Alternative based on the average score	**Moderate (42)**	**Moderate (31)**

Overall, the significance of the visual impacts expected is **Moderate (42)** significance before mitigation and a low **Moderate (31)** post mitigation.

9. CONCLUSION AND RECOMMENDATIONS

The visual assessment of the proposed Msenge Emoyeni 66kV Overhead Powerline indicates that the construction and operation of the proposed infrastructure will have a visual effect on both the rural landscape and on sensitive receptors in the study area.

The proposed infrastructure will be visible within an area that is generally characterized by low growing shrubland and wide-open undeveloped spaces. The infrastructure would thus be highly visible and impossible to hide within an area that incorporates potentially various sensitive visual receptors that may consider visual exposure to this type of infrastructure to be intrusive.

The low occurrence of such sensitive visual receptors within this environment, specifically in close proximity to the proposed infrastructure, as well as, the presence of existing high voltage overhead powerlines and Wind Energy Facilities, is of relevance however, and has affected the significance rating of the anticipated visual impacts.

In general, the post mitigation significance of the visual impacts is predominately **moderate** to **low.** As per Table 9, overall, the significance of the visual impacts expected is **Moderate (42)** significance before mitigation and a low **Moderate (31)** post mitigation. No **high** significance ratings are anticipated.

Notwithstanding the above, there are not many options as to the mitigation of the visual impact of the proposed infrastructure. No amount of vegetation screening or landscaping would be able to hide structures of these dimensions, especially within this receiving environment.

In order to ensure that all the spatial analyses and mapping undertaken in this report is as accurate as possible, a transparent and scientifically defensible approach in line with best practice methodology for this type of assessment, has been utilised. The objective of this process is to quantify the potential visual impacts associated with the proposed Msenge Emoyeni 66kV Overhead Powerline, using visibility analyses, proximity analyses and the identification of sensitive receptors. However, it must be noted that visual impact is a very subjective concept, personal to each individuals' backgrounds, opinions and perceptions. The subjects in this case are the identified sensitive receptors such as the residents of homesteads/dwellings and users of roads.

According to the Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning (DEA&DP) Guideline for Involving Visual and Aesthetic Specialists in the EIA Process (Oberholzer, 2005) [4], the criteria that determine whether or not a visual impact constitutes a potential fatal flaw are categorised as follows:

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

In terms of the above and to the knowledge of the author, the proposed development is compliant with all Acts, Ordinances, By-laws and adopted policies relating to visual pollution, scenic routes, special areas or proclaimed heritage sites, as well as, conditions of existing Records of Decisions and only one impact of high significance have been evaluated post mitigation though it is not deemed to be unacceptable.

This assessment has adopted a risk averse approach by assuming that the perception of most (if not all) of the sensitive visual receptors (bar the landowners of the properties earmarked for the development), would be predominantly neutral / negative towards the Msenge Emoyeni 66kV Overhead Powerline and associated infrastructure in the region. While still keeping in mind that there are also likely to be supporters of the infrastructure (as a possible employer and income generator in the region) amongst the population of the larger region, but they are largely expected to be indifferent to the construction of the facility and not as vocal in their support for the facility as the detractors thereof.

[4] In the absence of any other Visual Impact Assessment guideline documents published in South Africa the Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning (DEA&DP) Guideline for Involving Visual and Aesthetic Specialists in the EIA Process (Oberholzer, 2005) is the only guideline document currently available and its principles have therefore been applied in all provinces as best practice.

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

Therefore, the likelihood that the proposed development will be met with concern and objections from some of the affected sensitive receptors in the region, this report cannot categorically state that any of the above conditions were transgressed. As such these visual impacts are not considered to be fatal flaws for a development of this nature from a visual perspective, particularly due to the remote location of the study area and very low density of visual receptors, as well as, the presence of existing infrastructure of this nature in the study area. It is, therefore, suggested that the proposed Msenge Emoyeni 66kV Overhead Powerline, on-site substation, associated access track and watercourse crossings, as per the assessed layout be supported from a visual perspective, subject to the implementation of the suggested best practice mitigation measures provided in this report.

10. REFERENCES

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

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