

**PROPOSED AMENDMENT OF ENVIRONMENTAL AUTHORISATION FOR
THE CONSTRUCTION OF A 131KM FOSKOR-MERENSKY POWERLINE
FROM 275KV TO 400KV AND ASSOCIATED SUBSTATION WORKS
WITHIN THE JURISDICTION OF MOPANI DISTRICT MUNICIPALITY,
WARDS 3, 5, 6 & 10 AND SEKHUKHUNE DISTRICT MUNICIPALITY,
WARDS 1, 13, 20, 23, 24, 25, 26, 30 & 31**

VISUAL IMPACT ASSESSMENT

PREPARED FOR:



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EXECUTIVE SUMMARY

In 2011, Nsovo Environmental Consulting was appointed by Eskom Holdings SOC Limited, as the independent environmental consultant to undertake the Environmental Impact Assessment (EIA) for the proposed construction of a 131km, 275kV power line from the Merensky Substation, Steelpoort, to the Foskor Substation, South of Phalaborwa, Limpopo Province.

This Visual Impact Assessment (VIA) is a specialist study that forms part of the EIA and addresses the visual effects of the proposed line on the receiving environment.

Initially 4 alternative alignments were proposed for the construction of the line. After the Public Participation process another route was recommended, referred to as Route 5. Consequently, Route 5 was approved for the 275kV transmission line.

Eskom has subsequently identified the need to strengthen the network from a 275kV transmission line to a 400kV transmission line along the approved Route 5.

In November 2016 Outline Landscape Architects were requested to amend the Visual Impact Assessment where the Foskor-Merensky powerline would be changed from a 275kV to a 400kV transmission line.

The project components that may cause a potential landscape and/or visual impact are construction camps, access roads and the transmission lines. The transmission lines cause the greatest visual impact.

There will be a height difference in transmission towers, by proposing to change the transmission line from 275kV to 400kV. The average height of a 275kV tower is 28m and the average height of a 400kV tower is 40m.

A viewer sensitivity map was generated to compare the visual impact between the approved 275kV transmission line and the proposed 400kV transmission line and the increased impact is not much higher. If the mitigation measures are implemented the impact can be decreased.

The servitude required for a 275kV line was 47m, and the 400kV line will require a servitude of 55m and this will only have a minimal visual impact when the viewer is adjacent to the transmission line. However, if the mitigation measures, recommended in this report, are implemented the impact will only be temporary.

The study area consists of primarily vacant undeveloped land, as well as land used for cultivation, residential, subsistence farming and forestry. Mining is one of the key land uses and contributes significantly to the visual degradation of parts of the study area. Extensive game farming is located more to the northern and eastern areas. Human settlements are scattered throughout the study area and the landscape is degraded around these settlements.

The visual receptors included in this study are residents, tourists, motorists and game farm residents and visitors.

During the construction phase, unsightly views may be created by the presence of the construction camp and the lay-down yards. The duration of the potential visual impact will be temporary.

The entire study area is considered to have a moderate to high tourism potential. The temporary exposure to possible unsightly views of the construction camps and the associated activity will be minimal and localised.

Motorists' visual exposure to the impact during the construction phase and at completion will be brief and the severity of visual impact will be *low*.

Many game farms and protected areas are located within the study area. These are mostly located in the north-eastern parts and adjacent to the Kruger National Park.

The temporary duration of the construction phase is expected to cause localised and temporary visual impacts.

Route 5, the approved and preferred line, will have the least visual impact. From our investigations, the increase in tower height and width in servitude that will result from changing the transmission line to a 400kV line, will not have an increased visual impact.

The approved Route 5 follows partially along the existing route and partially along a portion of a main transportation route. Its great advantage lies in the fact that viewers are already exposed to a similar power line, so negative perception of a new power line following along an existing route has a less significant landscape and visual impact on tourists and residents as compared to the other alternatives. And the public association with transmission lines and major public roads is a common perception which makes the co-existence of these two features more acceptable.

If the mitigation measures are implemented and the recommendations are adhered to, this project can proceed.

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LIST OF ABBREVIATIONS

EIA	Environmental Impact Assessment.
FHWA	Federal Highway Administration of the United States Department of Transportation. The publishers of the guide “ <i>Visual Impact Assessment for High Projects</i> ” 1981.
LCA	Landscape Character Assessment.
LT	Landscape Type
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment.
ULI	Urban Land Institute
ZVI	Zone of Visual Influence.

1. INTRODUCTION

Nsovo Environmental Consulting was appointed by Eskom Holdings SOC Limited, as the independent environmental consultant to undertake the Environmental Impact Assessment (EIA) for the proposed construction of a 131km, 275kV power line from the Merensky Substation, Steelpoort, Mpumalanga, to the Foskor Substation, South of Phalaborwa, Limpopo Province.

Outline Landscape Architects was appointed by Nsovo Environmental Consulting as an independent sub-consultant to complete a Visual Impact Assessment. Neither the author, nor Outline Landscape Architects will benefit from the outcome of the project decision-making.

Kathrin Hammel, the principal Landscape Architect and Visual Specialist from Outline Landscape Architects undertook this Visual Impact Assessment. She is a registered Professional Landscape Architect at the South African Council of Landscape Architects, SACLAP no 20162. Kathrin has been involved as Visual Impact Specialist since 2009

This Visual Impact Assessment (VIA) is a specialist study that forms part of the EIA and addresses the visual effects of the proposed line on the receiving environment.

Initially 4 alternative alignments have been proposed for the construction of the line. After the Public Participation process another route was recommended, referred to as Route 5. This route has been approved for the 275kV transmission line.

Eskom proposed to amend the capacity of the approved corridor from 275kV to 400kv, subsequently in November 2016, Outline Landscape Architects were commissioned to reassess and amend the VIA report in line with the proposed amendment.

1.1. BACKGROUND AND BRIEF

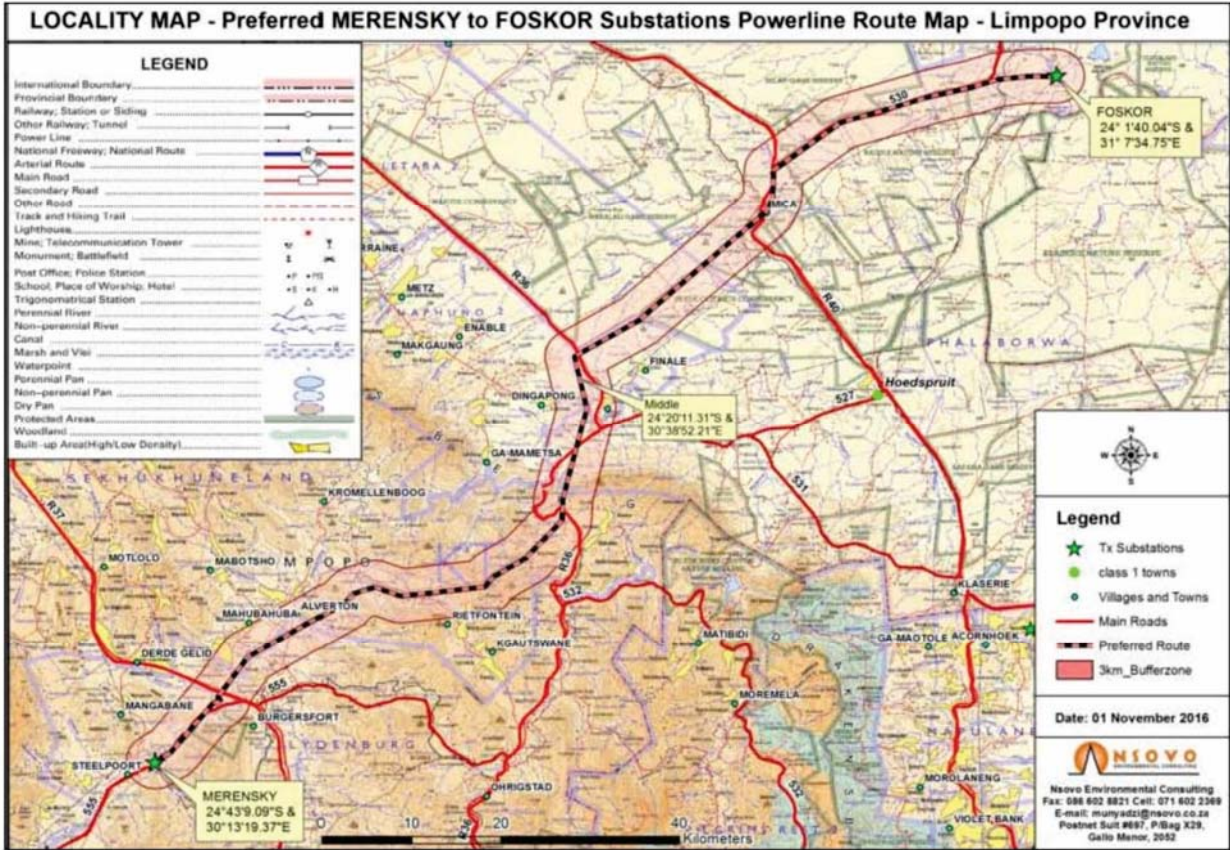
This VIA will conform to the requirements of a Level Three assessment which requires the realisation of the following objectives (Adapted from Oberholzer (2005)):

- Determination of the extent of the study area;
- Description of the proposed project and the receiving environment;
- Identification and description of the landscape character of the study area;
- Identification of the elements of particular visual value and -quality that could be affected by the proposed project;
- Identification of landscape- and visual receptors in the study area that will be affected by the proposed project and assess their sensitivity;
- Indication of potential landscape- and visual impacts;
- Assessment of the significance of the landscape- and visual impacts;
- Recommendations of mitigation measures to reduce and/or alleviate the potential adverse landscape- and visual impacts.

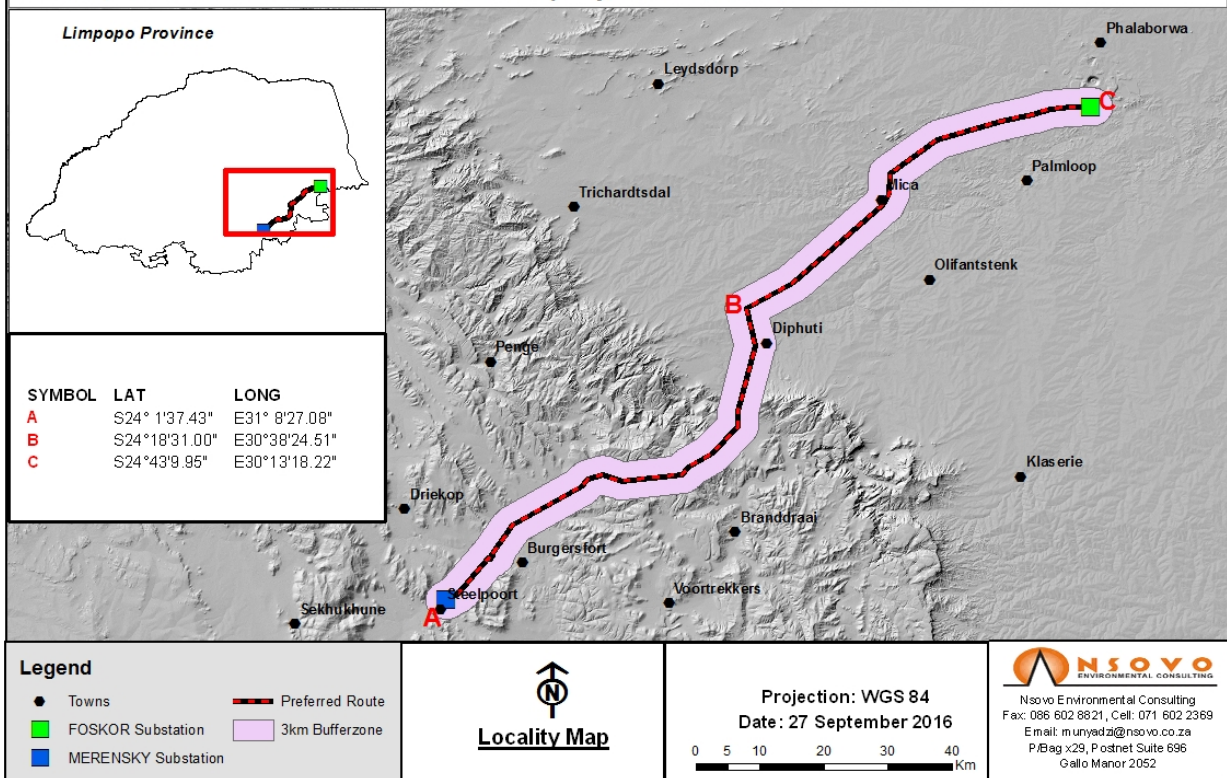
1.2. STUDY AREA

The study area runs in a north-eastern direction from the Merensky Substation to the Foskor Substation. The Merensky Substation is North of Steelpoort, Mpumalanga, on the R555, within the Greater Tubatse District Municipality. The Foskor Substation is South of Phalaborwa, within the Ba-Phalaborwa District Municipality, Limpopo province (Figure 1).

Figure 1: Locality Plan of Approved Route (referred to as Route 5)



The proposed amendment of Environmental Authorisation for approximately 130km Foskop – Merensky powerline from 275kV to 400kV and associated substation works within the jurisdiction of Mopani District Municipality, wards 3, 5, 6 & 10 and Sekhukhune District Municipality, wards 1, 13, 20, 23, 24, 25, 26,30 & 31.



2. STUDY APPROACH

2.1. INFORMATION BASE

This assessment was based on information from the following sources:

- Topographical maps and GIS generated data were sourced from the Surveyor General, and EcoGIS (2011 & 2016) respectively;
- Observations made and photographs taken during site visits;
- Professional judgement based on experience gained from similar projects; and
- Literature research on similar projects.

2.2. ASSUMPTIONS AND LIMITATIONS

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

- The exact alignment of the proposed line and position of the pylons are not yet determined and the alternatives only specify proposed corridors. The visibility results have been generated from the anticipated alignment and may deviate from the route for the final approved alignment. The differences are considered omissible;
- This level of assessment excludes surveys to establish viewer preference and thereby their sensitivity. Viewer sensitivity is determined by means of a commonly used rating system (Table 13).
- The site visit was conducted during December 2011 and the photographs used in this report illustrate the character of the landscape in the rainy season.

2.3. LEVEL OF CONFIDENCE

The level of confidence assigned to the findings of this assessment is based on:

- The level of information available and/or understanding of the study area (rated 2); and
- The information available and/or knowledge and experience of the project (rated 3).

This visual impact assessment is rated with a general confidence level of 6. This rating indicates that the author's general confidence in the accuracy of the findings is *high* (Table). Where the confidence level of specific findings is not regarded as high, it is noted in the last column of each impact assessment table.

2.4. METHOD

A broad overview of the approach and methodology used in this assessment is provided below:

- The extent of the study area is determined and indicated in Figure 1 indicating the preferred route;
- The site is visited to establish a photographic record of the site, views and areas of particular visual quality and or -value;
- The project components and activities are described and assessed as potential elements of visual and landscape impacts;
- The receiving environment is described in terms of its prevailing landscape- and visual character;

- Landscape- and visual receptors that may be affected by the proposed project are identified and described;
- Mitigation measures are proposed to reduce adverse impacts; and
- The findings of the study are documented in this Visual Impact Assessment.

3. PROJECT DESCRIPTION

3.1. OVERVIEW OF DEVELOPMENT

The approved and preferred route is Route 5, indicated in Figure 1.

This route follows along an existing transmission line from the Merensky Substation in a north-easterly direction, deviates west of Diphuti and then runs along the R526 until it joins up with the Foskop Substation, south of Phalaborwa.

3.2. PROJECT COMPONENTS AND ACTIVITIES

Each project component and activity will affect the receiving environment differently and is therefore discussed separately. The following project components will occur during the construction and operational phases of the project and are identified as elements that may cause a potential landscape and/or visual impact:

3.2.1. CONSTRUCTION CAMPS AND LAY-DOWN YARDS

Temporary construction camps will be present for the duration of the construction period. The appointed contractor will set up construction camp along the alignment where practical. The material lay-down yards are expected to be located adjacent to the construction camp and will serve as storage areas for the construction material and equipment (Figure 2). Typical construction equipment could include items as shown in Figure 3.

3.2.2. ACCESS ROADS

Where no access roads are available and vehicular access is required, roads will be constructed. Access may be by means of a two-track dirt road or a cleared corridor. It is expected that roads will be rehabilitated after the construction phase or maintained to facilitate access during periodic maintenance visits.

3.2.3. TRANSMISSION LINE

The completed transmission line will connect the Merensky and Foskop substations. The direct linear distance between the Merensky and Foskop substations is approximately 131 km (Figure 1).

A brief description of the expected tower characteristics is discussed in Table 1 and examples shown in Figure 4.

The initial study was based on a 275kV transmission line but has subsequently been amended to a 400kV line. The impact of the height difference of the towers that could have a visual impact has been taken into consideration in the report.

The servitude required for a 275kV line was 47m, and the 400kV line will require a servitude of 55m and this will only have a minimal visual impact when the viewer is adjacent to the transmission line. However, if the mitigation measures, recommended in this report, are implemented the impact will only be temporary.

A Viewer Sensitivity Map was generated for Route 5, included in the Appendix 1, Figure 11 and Figure 12. Initially a map was generated for a 275kV tower, which has been amended for a 400kV tower.

A comparison map (Figure 13) as generated over-laying the Viewer Sensitivity Map compiled for the 275kV line and for the 400kV and shows the effect in viewer sensitivity and the increased visibility that can be expected.

3.3. VISUAL CHARACTERISTICS OF PROJECT COMPONENTS

The transmission towers have an industrial character enforced by the double steel pole and the electrical cables between the towers. The entire transmission line will be perceived as a rhythmic arrangement of vertical towers forming a linear element through the landscape. The electrical cables emphasise the linear character of the transmission line but are easily absorbed in the background when viewed from distances greater than 1 km.

Table 1: Types and typical characteristics of proposed towers

Types and typical characteristics of proposed 400kV towers					
Type	Transposition Tower Self-supporting Suspension	Self-supporting strain tower	Cross-rope suspension tower	Guyed vee suspension tower	Angle strain tower
Maximum height	40m	35m	43m	40m	35m
Width at Top	17m	20m	35	23m	23m
Width at Bottom	9m	16m	27m	1m	18m

Figure 2: Example of construction camps



Typical example of site office



Typical example of bush clearing



Typical example of construction camp

EXAMPLE OF CONSTRUCTION CAMPS

PROPOSED MERENSKY - FOSKOR ESKOM TRANSMISSION POWERLINES
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Figure 3: Typical construction equipment



Typical example of helicopter



Typical example of crane



Typical example of tensioner station

EXAMPLE OF CONSTRUCTION EQUIPMENT

PROPOSED MERENSKY - FOSKOR ESKOM TRANSMISSION POWERLINES
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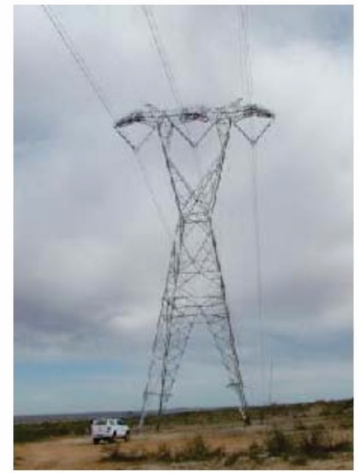


Figure 4: Typical 400kV Towers

400kV Transposition Tower
Self-Supporting Suspension
Max Height: 40m
Width Top: 17.2m
Width Bottom: 9m



400kV 529A Cross Rope
Suspension Tower
Max Height: 43m
Width Top: 35m
Width Bottom: 27m



400kV 517A Tower
Self-supporting Suspension
Max Height: 40m
Width Top: 22.4m
Width Bottom: 13m



400kV Guyed Vee Suspension Tower
Max Height: 40m
Width Top: 23.4m
Width Bottom: 1m



400kV 517F Tower Closing Span
Tower or Angle Strain Tower
Max Height: 35m
Width Top: 23.2m
Width Bottom: 18m



400kV 517E Self Supporting
Strain Tower
Max Height: 35m
Width Top: 22m
Width Bottom: 16m

EXAMPLES OF 400kV TOWER TYPES

PROPOSED MERENSKY - FOSKOR ESKOM TRANSMISSION POWERLINES

Compiled for: Nsovo Environmental Consulting



4. DESCRIPTION OF THE AFFECTED ENVIRONMENT

Landscape and visual impacts may result from changes to the landscape. A distinction should be made between impacts on the visual resource (landscape) and on the viewers. The former are impacts on the physical landscape that may result in changes to landscape character while the latter are impacts on the viewers themselves and the views they experience.

4.1. VISUAL RESOURCE

Visual resource is an encompassing term relating to the visible landscape and its recognisable elements, which through their co-existence; result in a particular landscape character.

4.1.1. LANDSCAPE CHARACTER

The study area consists of primarily vacant undeveloped land, as well as land used for cultivation, residential, subsistence farming and forestry. Mining is one of the key land uses and contributes significantly to the visual degradation of parts of the study area. Extensive game farming is located more to the northern and eastern areas. Human settlements are scattered throughout the study area and the landscape is degraded around these settlements.

The study area consists of large un-spoilt areas with some spectacular features such as the Echo Caves (approximately 68km from Steelpoort) and beautiful scenery along the Abel Erasmus Pass on the R532. Many elevated points allow for beautiful vistas into the valleys and across the surrounding landscape, which give a sense of remoteness. The un-spoilt, panoramic landscape is an amenity that greatly contributes to the pristine and remote character of the landscape.

The landscape character changes considerably through the study area. The study area is divided into distinct landscape types, which are areas within the study area that are relatively homogenous in character (Swanwick, 2002). Landscape types are distinguished by differences in topographical features, vegetation communities and patterns, land use and human settlement patterns.

Broad scale vegetation types have been identified in the study area and the preferred route (Figure 5) crosses through the following three dominant vegetation types:

- Granite Lowveld
- Phalaborwa-Timbavati Mopaneveld
- Lowveld Rugged Mopaneveld

4.1.2. VISUAL CHARACTER

Visual character is based on human perception and the observer's response to the relationships between and composition of the landscape, the land uses and identifiable elements in the landscape. The description of the visual character includes an assessment of the scenic attractiveness regarding those landscape attributes that have aesthetic value and contribute significantly to the visual quality of the views, vistas and/or viewpoints of the study area.

The overall landscape varies between pristine natural bushveld landscape, which is very mountainous, to degraded, polluted landscapes around villages and towns. Large mines are present which have a negative effect on the visual character of the landscape.

4.1.2.1 Visual Value

Visual value relates to those attributes of the landscape or elements in the landscape to which people attach values that, though not visually perceivable, still contribute to the value of the visual resource. These visual values are derived from ecological, historical, social and/or cultural importance and are described in terms of their uniqueness, scarcity, and naturalness and/or conservation status. The importance of visual value of a landscape or element in the landscape is measured against its value on an international, national and local level.

The region is known for the savanna-like landscape and unique fauna and flora. The ecological importance of the region is internationally recognised.

Great parts of the study area have undergone little or no change due to human intervention and can be generally described as an unspoilt, pristine landscape. These areas however remain under pressure and are vulnerable due to human settlement expansion and mining activities.

4.1.2.2 Visual Quality

Visual quality is a qualitative evaluation of the composition of landscape components and their excellence in scenic attractiveness. Many factors contribute to the visual quality of the landscape and are grouped under the following main categories (Table 2) that are internationally accepted indicators of visual quality (FHWA, 1981):

Table 2: Criteria of Visual Quality (FHWA, 1981)

INDICATOR	CRITERIA
Vividness	The memorability of the visual impression received from contrasting landscape elements as they combine to form a striking and distinctive visual pattern.
Intactness	The integrity of visual order in the natural and man-built landscape, and the extent to which the landscape is free from visual encroachment.
Unity	The degree to which the visual resources of the landscape join together to form a coherent, harmonious visual pattern. Unity refers to the compositional harmony of inter-compatibility between landscape elements.

The landscape is allocated a rating from an evaluation scale of 1 to 7 and divided by 3 to get an average. The evaluation scale is as follows: Very Low =1; Low =2; Moderately Low =3; Moderate =4; Moderately High =5; High =6; Very High =7;

The regional landscape is assessed against each indicator separately. All three indicators should be *high* to obtain a *high* visual quality. The evaluation is summarised in Table 3.

Table 3: Visual Quality of the regional landscape

VIVIDNESS	INTACTNESS	UNITY	VISUAL QUALITY
5	4	5	Moderately High

The moderately high visual quality can be attributed to the panoramic, natural landscape.

4.1.2.3 Visual absorption capacity

Visual Absorption Capacity (VAC) signifies the ability of the landscape to accept additional human intervention without serious loss of character and visual quality or value. VAC is founded on the characteristics of the physical environment such as:

- Degree of visual screening:
A degree of visual screening is provided by landforms, vegetation cover and/or structures such as buildings. For example, a high degree of visual screening is present in an area that is mountainous and is covered with a forest compared to an undulating and mundane landscape covered in grass;
- Terrain variability:
Terrain variability reflects the magnitude of topographic elevation and diversity in slope variation. A highly variable terrain will be recognised as one with great elevation differences and a diversity of slope variation creating talus slopes, cliffs and valleys. An undulating landscape with a monotonous and repetitive landform will be an example of a low terrain variability;
- Land cover:
Land cover refers to the perceivable surface of the landscape and the diversity of patterns, colours and textures that are presented by the particular land cover (i.e. urbanised, cultivated, forested, etc.);

A basic rating system is used to evaluate the three VAC parameters. The values are relative and relate to the type of project that is proposed and how it may be absorbed in the landscape (Table 4). A three value range is used; three (3) being the highest potential to absorb an element in the landscape and one (1) being the lowest potential. The values are counted together and categorised in a *high*, *medium* or *low* VAC rating.

Table 4: Regional Visual Absorption Capacity evaluation

VISUAL SCREENING	TERRAIN VARIABILITY	LAND COVER	VAC
3	3	3	high

The VAC of the study area is considered high and provides good overall screening capacity for this project. The high VAC relates to the mountainous topography and varied vegetation. The regular forms and associated vertical posture of the proposed power line are easily absorbed into the landscape and topography.

The less prominent project components such as access roads are expected to be visually absorbed to a large degree in the landscape.

Figure 5: Vegetation Map Route 5 (Preferred Route)

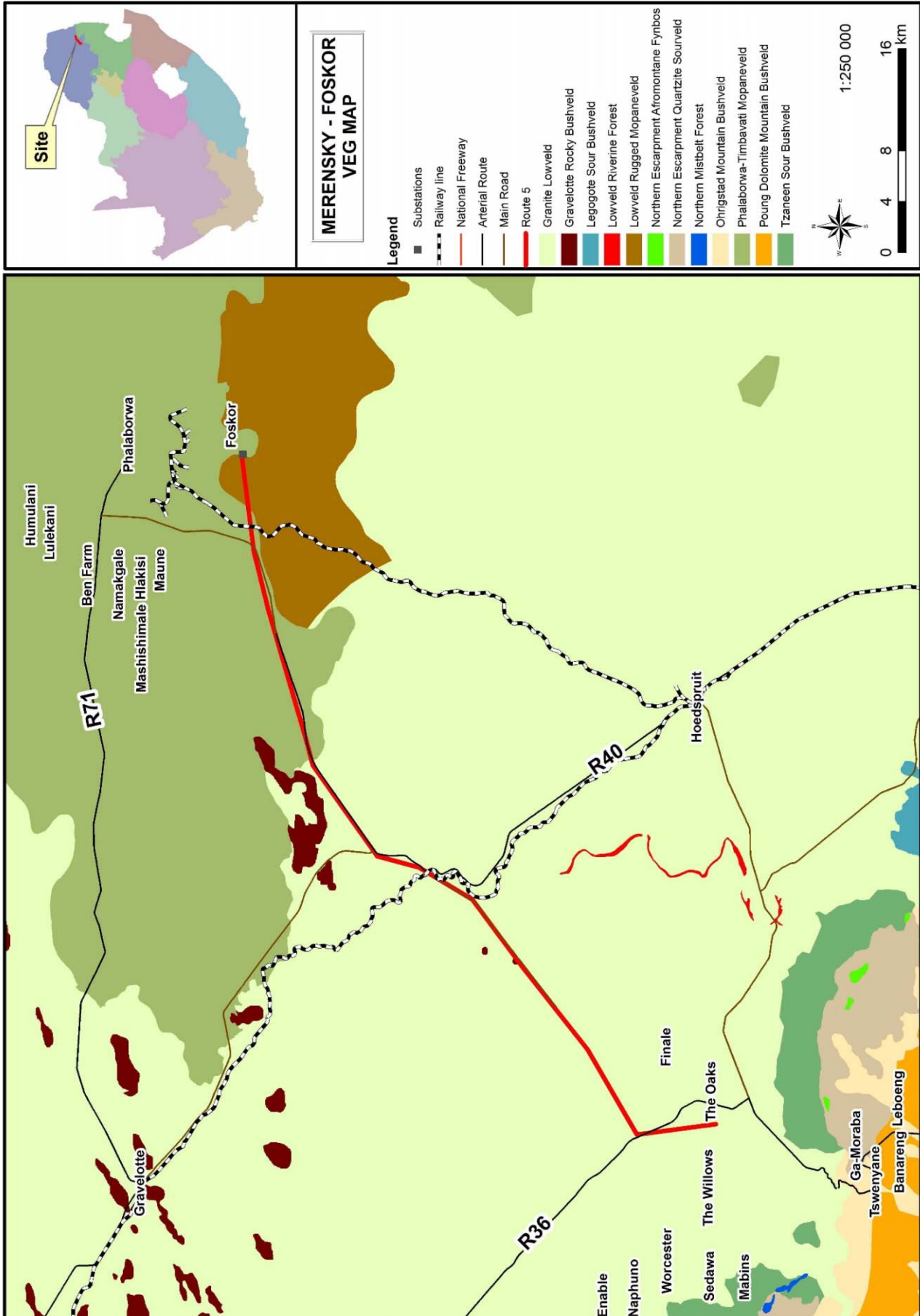


Figure 6: Land Cover Map of Route 5 (Preferred Route)

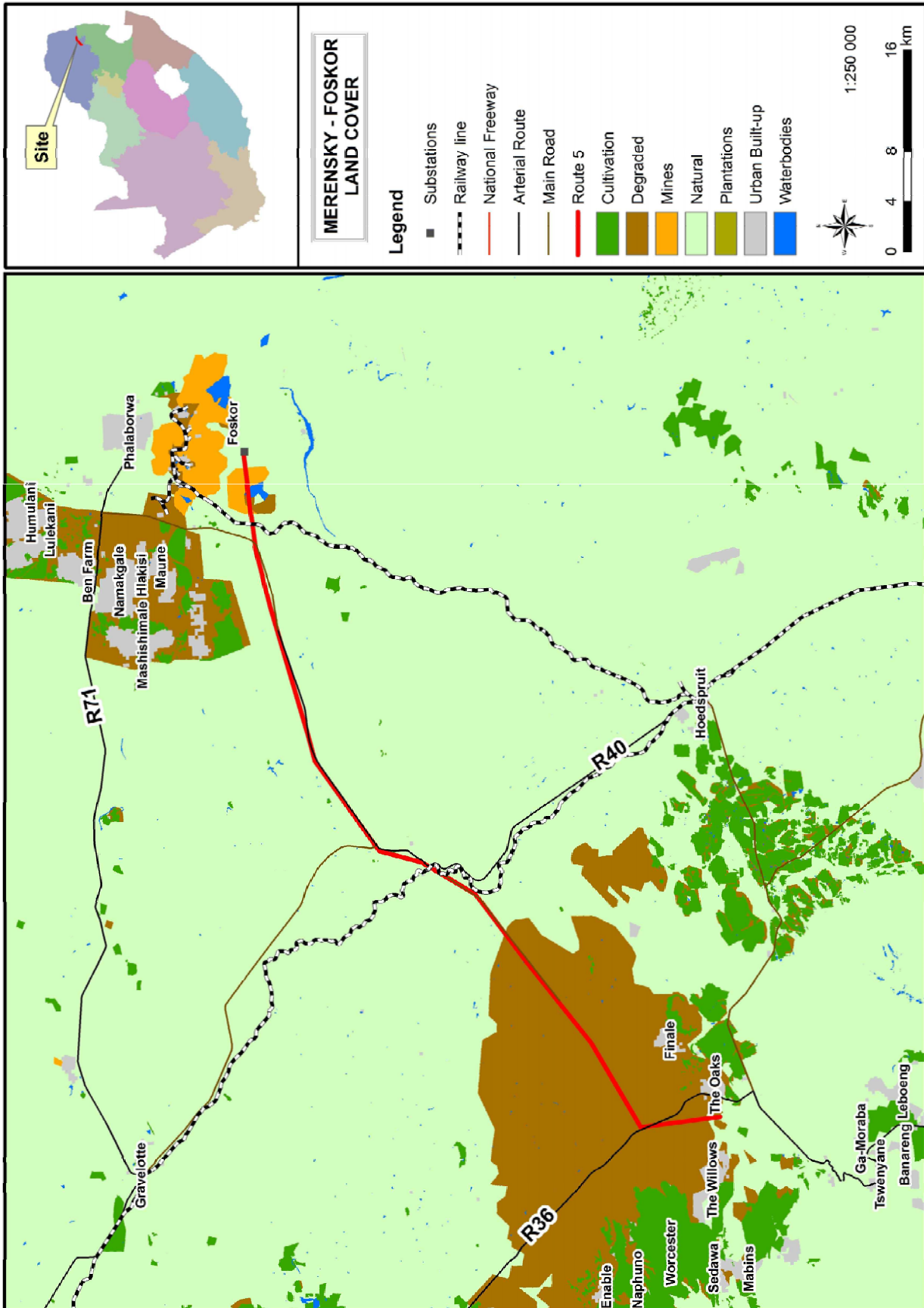


Figure 7: Landscape character of study area



Villages and Settlements



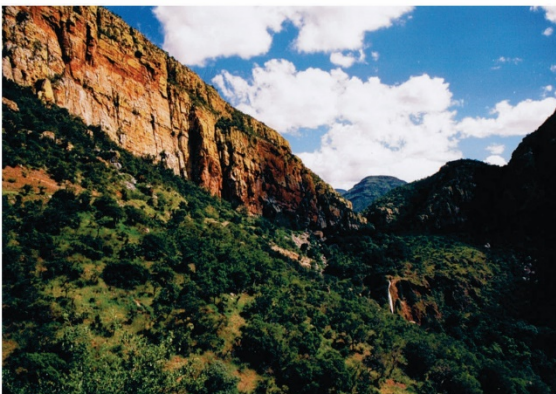
Agricultural activities



Villages and Settlements



Agricultural activities



Tourist attractions



Tourist attractions



Panoramic Views

Landscape Character

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Figure 8: Photo Reference Map (Along Preferred Route 5)

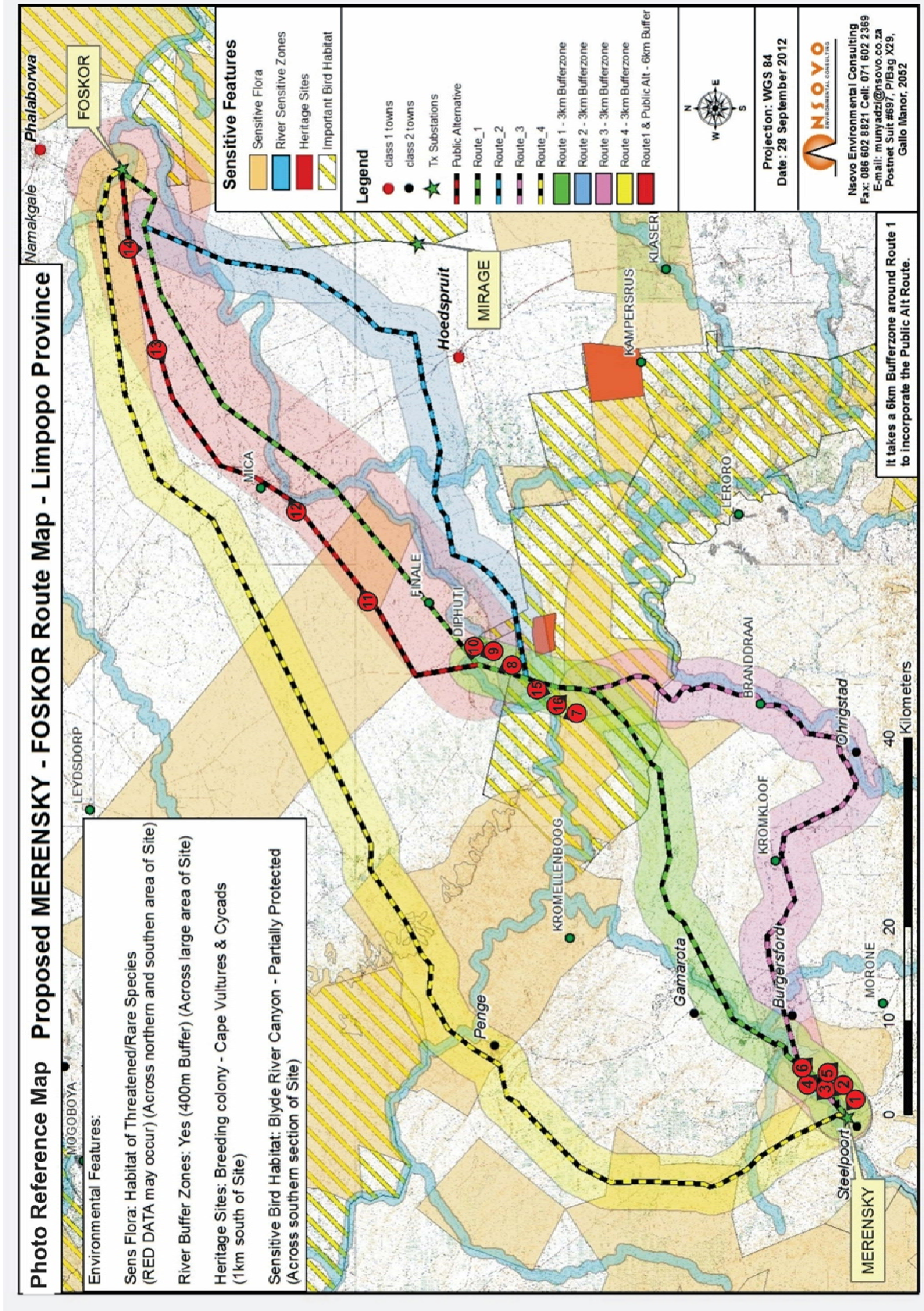


Figure 9: Photo plate 1



View 1



View 3



View 2



View 4



View 5



View 7



View 6



View 8

PHOTO PLATE 1

PROPOSED MERENSKY - FOSKOR ESKOM TRANSMISSION POWERLINES
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Figure 10: Photo plate 2



View 9



View 11



View 10



View 12



View 13



View 15



View 14



View 16

PHOTO PLATE 2

PROPOSED MERENSKY - FOSKOR ESKOM TRANSMISSION POWERLINES
Compiled for: Nsovo Environmental Consulting



5. IMPACT ASSESSMENT

The significance of impacts is a comparative function relating to the severity of the identified impacts on the respective receptors. The significance of an impact is considered *high* should a *highly* sensitive receptor be exposed to a *highly* severe impact (Table 5).

Table 5: Significance of impacts

RECEPTOR SENSITIVITY	IMPACT SEVERITY		
	LOW	MEDIUM	HIGH
LOW	No significance	Low	Low
MEDIUM	Low	Medium	Medium
HIGH	Low	Medium	High

5.1. SIGNIFICANCE OF LANDSCAPE IMPACT

5.1.1. LANDSCAPE CHARACTER SENSITIVITY

The sensitivity of the landscape character is an indication of "...the degree to which a particular landscape can accommodate change from a particular development, without detrimental effects on its character" (GLVIA, 2002). A landscape with a *high* sensitivity would be one that is greatly valued for its aesthetic attractiveness and/or have ecological, cultural or social importance through which it contributes to the inherent character of the visual resource.

The majority of the study area is considered to have medium landscape character sensitivity due to the relative undeveloped and pristine condition of the landscape, the generally high visual quality and associated tourism value. There is high terrain variability in the study area and thus a high VAC can be expected. Generally the vegetation cover is varied and of medium height trees and shrub and grassland, which will provide moderate to high visual screening for the proposed transmission line.

Previous human induced activities and interventions have impacted significantly on the original landscape character. In this case, mining and existing infrastructure, including power lines, roads, etc., can be classified as landscape disturbances and elements that cause a reduction in the condition of the affected landscape type and negatively affect the quality of the visual resource.

The assessment of the landscape is substantiated through professional judgement and informed reasoning which is based on the landscape character assessment in Section 4. A landscape sensitivity rating was adapted from GOSW (2006) (Table 6) and applied in the classification of the study area into different sensitivity zones.

Table 6: Landscape character sensitivity rating (Adapted from GOSW, 2006)

	DESCRIPTION
Low sensitivity	<p>These landscapes are likely to:</p> <ul style="list-style-type: none"> ◦ Have distinct and well-defined landforms; ◦ Have a strong sense of enclosure; ◦ Provide a high degree of screening; ◦ Have been affected by extensive development or man-made features; ◦ Have reduced tranquillity; ◦ Are likely to have little inter-visibility with adjacent landscapes; and ◦ Exhibit no or a low density of sensitive landscape features that bare visual value.
Moderate sensitivity	<p>These landscapes are likely to:</p> <ul style="list-style-type: none"> ◦ Have a moderately elevated topography with reasonably distinct landforms that provides some sense of enclosure; ◦ Have been affected by several man-made features; ◦ Have limited inter-visibility with adjacent landscapes; and ◦ Exhibit a moderate density of sensitive landscape features that bare visual value.
High sensitivity	<p>These landscapes are likely to:</p> <ul style="list-style-type: none"> ◦ Consist mainly of undulating plains and poorly defined landforms; ◦ Be open or exposed with a remote character and an absence of man-made features; ◦ Are often highly visible from adjacent landscapes; and ◦ Exhibit a high density of sensitive landscape features that bare visual value.

5.1.2. SEVERITY OF POTENTIAL LANDSCAPE IMPACTS

Landscape impacts are alterations to the fabric, character, visual quality and/or visual value which will either positively or negatively affect the landscape character. During the construction and operational phases, the project components are expected to impact on the landscape character of the landscape types it traverses. The magnitude/severity of this intrusion is measured against the scale of the project, the permanence of the intrusion and the loss in visual quality, -value and/or VAC.

Changing the transmission lines from 275kV to 400kV will not have a significant impact on the landscape, even though the height in transmission towers and servitude width increases. The below table indicates the significance of the impact on the landscape with and without mitigation.

Table 7: Landscape impact – Altering the landscape character

LANDSCAPE IMPACT								
Activity	Nature of Impact	Extent of Impact	Duration of Impact	Severity of Impact	Probability of Impact	Significance without Mitigation	Significance with Mitigation	Level of Confidence
Construction phase								
Route 5 (Approved Route)	Negative Impact on the visual quality of the landscape due to the presence of foreign elements and a loss of vegetation cover	Localised impacts over an extensive area	Permanent if not mitigated	Moderate	Definite	Moderate	Low	High
Operational phase								
Route 5 (Approved Route)	Negative Impact on the visual quality of the landscape due to the presence of a transmission line.	Regional	Permanent	Moderate	Definite	Moderate	Low	High

Construction phase

The activities that are expected to cause landscape impacts and that are associated with the construction phase, are the establishment of construction camps, construction of access roads and the clearance of the servitude. These activities will create surface disturbances which will result in the removal of vegetation and the exposure of the underlying soil.

The extent of the disturbances will generally affect a relatively small footprint area. Access roads to the towers are expected to be a two-track dirt road which will create minimum disturbance. During construction, the area around the individual towers will be disturbed. Vegetation will be trampled and may take years to recover.

The construction camps and lay-down yards are anticipated to disturb a much larger area. The size and location of the construction camps will play a major role in the severity of the landscape impact. Due to a lack of technical information, two options are considered namely; the location of construction camps in remote, virgin land, or in adjacent existing settlements. The initial presence of a construction camp in an undeveloped landscape will cause a temporary and localised alteration to the landscape character. A construction camp located in or adjacent to an existing town or settlement will be easily associated with the town and therefore the presence of the town, mitigates the impact. The mitigating result is most effective, the bigger the town or settlement is.

Servitude areas will increase if the transmission lines are changed from 275kV to 400kV from 47m to 55m. The visual impact will not be significant in our opinion. The complete removal of vegetation will result in disturbed areas of exposed soil and difference in texture for both scenarios.

The exposed soil and change in texture will contrast severely with the intact vegetation around the disturbance footprint and servitudes.

Considering the high VAC throughout most of the study area, the undeveloped condition of great parts of the landscape and the relatively high recovery rate of the endemic vegetation, the *severity of landscape impact* during the construction stage is expected to be *moderate to low* the approved route. The impact will extend over the entire length of the alignment and may vary in degrees of severity along the linear length as it transects landscape types of varying VAC. Surface disturbances are also minimised through, for example, utilising existing roads.

The *severity of the landscape impact* can however be mitigated to a low severity for the approved route. Sensitive placement of the construction camps, limited surface disturbance and prompt rehabilitation are prerequisite conditions if the severity of impact is to be reduced.

Operational phase

Surface disturbances created during construction may remain for an extended period during the operational phase. These are seen as residual affects carried forward from the construction phase and can be completely or substantially mitigated if treated appropriately during the construction phase.

An additional impact will be caused as a result of the presence of the completed transmission line, i.e. that of the evenly spaced towers. The industrial character and the near monumental vertical scale of the towers (approximately 40m for the proposed 400kV transmission lines) will be absorbed into the mountainous landscape character that prevails through most of the study area.

The mountainous character and relatively high vegetation allows for some absorption of the towers into the landscape. However the pristine character of part of the study area will need to be protected as it is vulnerable to human intervention. It is considered as a landscape amenity that provides the study area with a unique and valued sense of place. This quality of the landscape will be moderately affected with the presence of a transmission line of this scale and extent. The impact can however also be mitigated due to the 3km buffer zones around alignments, which allows for placement of the power lines in an area that will cause the least impact.

5.2. SIGNIFICANCE OF VISUAL IMPACTS

5.2.1. VIEWER SENSITIVITY

Within the receiving environment, specific viewers (visual receptors) experience different views of the visual resource and value it differently. They will be affected because of alterations to their views due to the proposed project. The visual receptors are grouped according to their similarities. The visual receptors included in this study are:

- Residents;
- Tourists; and
- Motorists
- Game farm residents and visitors.

To determine visual receptor sensitivity a commonly used rating system is utilised. This is a generic classification of visual receptors and enables the visual impact specialist to establish a logical and consistent visual receptor sensitivity rating for viewers who are involved in different activities without engaging in extensive public surveys.

5.2.1.1 Residents

Residents of the affected environment are classified as visual receptors of *high* sensitivity owing to their sustained visual exposure to the proposed development as well as their attentive interest towards their living environment.

5.2.1.2 Tourists

Tourists are regarded as visual receptors of exceptional *high* sensitivity. Their attention is focused towards the landscape which they essentially utilise for enjoyment purposes and appreciation of the quality of the landscape.

5.2.1.3 Motorists

Motorists are generally classified as visual receptors of *low* sensitivity due to their momentary view and experience of the proposed development. As a motorist's speed increases, the sharpness of lateral vision declines and the motorist tends to focus on the line of travel (USDOT, 1981). This adds weight to the assumption that under normal conditions, motorists will show *low* levels of sensitivity as their attention is focused on the road and their exposure to roadside objects is brief.

Motorists on the scenic routes in the study area will present a higher sensitivity. Their reason for being in the landscape is similar to that of the tourists and they will therefore be categorised as part of the tourist viewer group.

5.2.1.4 Game farm residents and visitors

These users are similar to tourists and are regarded as visual receptors of *high* sensitivity. Their focus is on the unspoilt landscape and the fauna habitats.

5.2.2. SEVERITY OF POTENTIAL VISUAL IMPACTS

Severity of visual impact refers to the magnitude of change to specific visual receptor's views and/or experience of the landscape. Severity of visual impact is influenced by the following factors:

- The **viewer's exposure** to the project:
 - Distance of observers from the proposed project;
 - The visibility of the proposed project (ZVI);
 - Number of affected viewers; and
 - Duration of views to development experienced by affected viewers.
- Degree of **visual intrusion** created by the project.

Empirical research indicates that the visibility of a transmission tower and hence the severity of visual impact, decreases as the distance between the observer and the tower increases. The landscape type, through which the distribution line crosses, can mitigate the severity of visual impact through topographical or vegetative screening. Bishop *et al* (1988) noted that in some cases the tower may dominate the view for example, silhouetted against the skyline, or in some cases be absorbed in the landscape. A complex landscape setting with a diverse land cover and topographical variation has the ability to decrease the severity of visual impact more than a mundane landscape (Bishop *et al*, 1985).

The Zone of Visual Influence (ZVI) is determined through a Geographical Information System (GIS). The result reflects a shaded pattern which identifies the areas that are expected to experience views of the proposed alignments. The ZVI is limited to 10 km from the proposed alignments.

Visibility analysis and viewer sensitivity has been completed for the proposed alignments (APPENDIX 1). According to Bishop *et al* (1988), visual receptors within 1 km from the alignments are most likely to experience the highest degree of visual intrusion, hence contributing to the severity of the visual impact. This is considered as the zone of highest visibility after which the degree of visual intrusion decreases rapidly at distances further away.

In order to assess the extent and degree of visibility in the visual envelope, a Geographical Information System (GIS) was utilized. A visibility analysis was performed which provides the following information (Figure 11 and 12):

- The areas within the visual envelope that may experience views of the proposed project; and
- The degree of visibility in terms of the percentage of the proposed project that will be visible from a specific location.

The GIS performs an analysis for a series of elevated observer points which represents the height of the entire power line in a digital elevation model (DEM). This results in a visibility map with the degree of visibility illustrated by a colour.

The visibility analyses consider worst-case scenarios, using line-of-sight, based on topography alone. The screening capability of vegetation is not captured in the base model of the DEM and is therefore not considered in these results.

A viewer sensitivity map was generated for the approved route (referred to as Route 5) for the 275kV transmission line (Figure 11) and then a map was generated (Figure 12) for the 400kV transmission line. The two maps were overlaid to indicate the increased visual impact (Figure 13).

Table 8: Potential visual impacts on residents

VISUAL IMPACT ON RESIDENTS OF THE 400kV TRANSMISSION LINE ON PREFERRED ROUTE								
Activity	Nature of Impact	Extent of Impact	Duration of Impact	Severity of Impact	Probability of Impact	Significance without Mitigation	Significance with Mitigation	Level of Confidence
Construction phase								
Route 5	Negative – Construction camp and lay-down yard may cause unsightly views	Local	Temporary	Low	Probable	Low	Low	Low
Operational phase								
Route 5	Negative – The presence of a power line intrudes on existing views and spoils the open panoramic views of the landscape.	Regional	Permanent	Low	Definite	Low	Low	High

The study area is moderately populated, with lower population in the rural settlements and farming communities, to higher populations in the towns. The towns and surrounding areas are generally degraded and not very scenic. The rural settlements and farming communities are normally situated along main transportation routes, near agricultural areas or adjacent rivers or water resources. There will be a moderate number of affected viewers across the study areas.

Construction phase

During the construction phase, unsightly views may be created by the presence of the construction camp and the lay-down yards. The duration of the potential visual impact will be temporary which will result in an anticipated *low* significance of visual impact for all the alternatives. The visual exposure to the construction activity will be limited.

The uncertainty pertaining to the number, location and size of the construction camps, relates to a low level of confidence in the assessment of the visual impact. The cleared site, construction camp and material lay-down yards will appear unsightly and out of character. Large scale construction elements, such as cranes, will be highly visible and increase awareness of the construction activity over a considerable area. The visual intrusion caused during the construction stage will be moderate, but will be temporary in nature.

Operational phase

The residents of the informal settlements and farming communities along the existing servitudes and power lines may experience a low degree of visual intrusion.

The presence of a transmission line in the visual field of the residents in this part of the study area will not spoil the views they currently experience.

The impact of increasing the transmission line from 275kV to 400kV where towers increase from 28m to 40m will not have a significant effect. The Visual Absorption Capacity (VAC) of the landscape of the proposed transmission line has the ability to decrease the severity of visual impact (*Bishop et al, 1985*) by creating a backdrop. The steel frames of the towers (especially the cross-rope suspension type) presents a high degree of visual permeability, and hence a low degree of visual obstruction. This characteristic of the towers allows it to readily blend into the background colours and patterns of the landscape. This results in a reduced ZVI because the visibility of the individual towers is limited to a smaller distance.

The majority of the study area is diverse in topography as well as vegetation, most being Bushveld with medium to high trees. It is apparent from the existing power lines running parallel to the preferred Route 5 that one is visually exposed to the line in close proximity of the line but the impact is absorbed easily into the distance by the landscape. Therefore the significance of the impact can be regarded as moderately-low.

5.2.2.1 Potential visual impacts on tourists

Table 9: Potential visual impacts on tourists

VISUAL IMPACT ON TOURISTS OF THE 400kV TRANSMISSION LINE ON PREFERRED ROUTE								
Activity	Nature of Impact	Extent of Impact	Duration of Impact	Severity of Impact	Probability of Impact	Significance without Mitigation	Significance with Mitigation	Level of Confidence
Construction phase								
Route 5	Negative – Construction camp and lay-down yard may cause unsightly views.	At a number of point locations	Temporary	Moderate	Probable	Moderate	Low	High
Operational phase								
Route 5	Negative – The presence of a power line intrudes on existing views and spoils the open panoramic views of the landscape.	Local	Permanent	Moderate	Definite	Moderate	Low	High

The study area is renowned for its biodiversity and Bushveld landscapes. These characteristics provide the basis for the tourism industry which plays a major role in the economy of the Limpopo Province. The entire study area is considered to have a moderate to high tourism potential, mostly because it is popular for stopovers along main thoroughfare roads to major tourist destinations such as the Kruger National Park. Many renowned private game farms and lodges are also found within the study area.

Construction phase

The temporary duration of the construction phase is not expected to cause major visual impacts. The location, number and size of the construction camps and lay-down yards will be crucial in regulating the impact. Detail information is not available and it is anticipated that the visual impact will occur localised and that a small number of tourists will be adversely affected by these project components during construction.

Their exposure to possible unsightly views of the construction camps and the associated activity will however be minimal and localised.

The potential visual impact on tourists during the construction phase of the proposed project can be mitigated with relative ease. The greatest factor to consider is the location of the construction camp.

Operational phase

A great number of tourists might be affected during their visit to the study area. Although it is difficult to pinpoint particular locations in the study area that are of specific value, the areas next to the roads will be most important. The presence of a transmission line in the existing pristine landscape areas will spoil the picturesque views that are experienced over the valleys and plains, especially when in close proximity to the power lines.

The approved route partially runs along an existing transmission line along a main transportation route. The presence of the transmission line in the field of the tourists will only have a high significance on tourists in near proximity to the power line, which will be mainly along main transportation routes and at destinations such as lodges. The high VAC of the landscape allows the power lines, even if they are increased to 400kV, to be absorbed into the landscape.

The severity of the visual impact of the power lines on tourists will be moderate, causing a moderately significant visual impact.

5.2.2.2 Potential visual impacts on motorists

Table 10: Potential visual impacts on motorists

VISUAL IMPACT ON MOTORISTS OF THE 400kV TRANSMISSION LINE ON PREFERRED ROUTE								
Activity	Nature of Impact	Extent of Impact	Duration of Impact	Severity of Impact	Probability of Impact	Significance without Mitigation	Significance with Mitigation	Level of Confidence
Construction phase								
Route 5	Negative – Intruding on existing views of the landscape.	At a number of point locations	Short period	Low	Probable	Low	Low	Low
Operational phase								
Route 5	Negative – Intruding on existing views of the landscape.	Local	Short period	Low	Definite	Low	Low	High

The major routes in the study area are the R555, R531, R526 and the R40 connecting the towns, mines and farms. The secondary road network in the study area carries a much lower volume of motorists. Their duration of views will be temporary and it is expected that the visual intrusion that they will experience will be low.

Construction phase

The potential visual impact that may be experienced by motorists during the construction phase is considered to be minimal. Limited information is available and the number, location and size of the construction camps and lay-down yard are essential for accurately assessing the visual impact.

The presence of the construction camp and lay-down yard may create unsightly views. Motorists' visual exposure to the impact will be brief and the severity of visual impact will be *low*. The significance of potential visual impact is expected to be *low*.

Operational phase

Route 5 will be the most visible from the R526 and R531. The severity and significance of visual impact for the proposed alternatives on motorists will be low. The speed at which motorists travel also has a moderating effect on the severity of the visual impact and further reduces visual exposure.

5.2.2.3 Potential visual impacts on Game Farm residents and visitors

Table 11: Potential visual impacts on game farm residents and visitors

VISUAL IMPACT ON GAME FARM RESIDENTS AND VISITORS OF THE 400kV TRANSMISSION LINE ON PREFERRED ROUTE								
Activity	Nature of Impact	Extent of Impact	Duration of Impact	Severity of Impact	Probability of Impact	Significance without Mitigation	Significance with Mitigation	Level of Confidence
Construction phase								
Route 5	Negative – Construction camp and lay-down yard may cause unsightly views.	At a number of point locations	Temporary	Moderate	Probable	Moderate	Low	High
Operational phase								
Route 5	Negative – The presence of a power line intrudes on existing views and spoils the open panoramic views of the landscape.	Local	Permanent	Moderate	Definite	Moderate	Low	High

Many game farms and protected areas are located within the study area. These are mostly located in the north-eastern parts and adjacent to the Kruger National Park. Balule Nature Reserve and Olifants-West Nature Reserve are some of the major game reserves that are used for commercial purposes. Many smaller private game reserves are also found. These game farms have high populations of game and floral biodiversity that should be protected and visual beauty should be maintained.

Construction phase

The temporary duration of the construction phase is expected to cause localised and temporary visual impacts. The location, number and size of the construction camps and lay-down yards will be crucial in regulating the impact. Detail information is not available and it is anticipated that the visual impact will occur localised and that a small number of tourists will be adversely affected by these project components during construction.

Their exposure to possible unsightly views of the construction camps and the associated activity will however be minimal and localised.

The potential visual impact on residents and visitors during the construction phase of the proposed project can be mitigated with relative ease. The greatest factor to consider is the location of the construction camp.

Operational phase

The approved Route 5 will have the least visual impact as it has been proposed partially along the existing line and then along a transportation route, which allows the line to be placed on the boundaries of the game farms and not in areas that have great visual potential and significance within game farm territories.

The proposed increase of the transmission line from a 275kV line to a 400kV transmission line in the field of the residents and visitors to the game farms will only have a high significance in near proximity to the power line, which will be near lodges or residences and near or along game drive routes. The high VAC of the landscape allows the power lines to be absorbed into the landscape. Also the buffer zone of 3 kilometers around each route will allow for placing the transmission line where it will cause the least impact.

The severity of the visual impact of the power lines on game farm residents and visitors will be moderate, causing a moderately significant visual impact.

6. RECOMMENDED MITIGATION MEASURES

The aim of mitigation is to reduce or alleviate the intrusive contrast between the proposed project components and activities, and the receiving landscape to a point where it is acceptable to visual and landscape receptors.

6.1. GENERAL

- Where areas are going to be disturbed through the destruction of vegetation, for example the establishment of the construction camp, the vegetation occurring in the area to be disturbed must be salvaged and kept in a controlled environment such as a nursery, for future re-planting in the disturbed areas as a measure of rehabilitation;

6.2. TRANSMISSION TOWERS

- The preferred type of tower is the compact cross-roped suspension tower. This tower type is the most permeable and creates an extremely low degree of visual obstruction;
- Avoid changing the alignment's direction too often in order to minimise the use of the self-supporting strain tower. This tower type is the most visually intrusive as the steel lattice structure is more dense than the other two tower types, hence creating more visual obstruction; and

- Rehabilitate disturbed areas around pylons as soon as practically possible after construction. This should be done to restrict extended periods of exposed soil.

6.3. ACCESS ROUTES

- Make use of existing access roads where possible;
- Where new access roads are required, the disturbance area should be kept to a minimum. A two track dirt road will be the most preferred option;
- Locate access routes so as to limit modification to the topography and to avoid the removal of established vegetation;
- Avoid crossing over or through ridges, rivers, pans or any natural features that have visual value. This also includes centres of floral endemism and areas where vegetation is not resilient and takes extended periods to recover;
- Maintain no or minimum cleared road verges;
- Access routes should be located on the perimeter of disturbed areas such as cultivated/fallow lands as not to fragment intact vegetated areas; and
- If it is necessary to clear vegetation for a road, avoid doing so in a continuous straight line. Alternatively, curve the road in order to reduce the visible extent of the cleared corridor.

6.4. CLEARED SERVITUDES

- Locate the alignment and the associated cleared servitude so as to avoid the removal of established vegetation; and
- Avoid a continuous linear path of cleared vegetation that would strongly contrast with the surrounding landscape character. Feather the edges of the cleared corridor to avoid a clearly defined line through the landscape.

6.5. CONSTRUCTION CAMPS AND LAY DOWN YARDS

- If practically possible, locate construction camps in areas that are already disturbed or where it isn't necessary to remove established vegetation like for example naturally bare areas;
- Utilise existing screening features such as dense vegetation stands or topographical features to place the construction camps and lay-down yards out of the view of sensitivity visual receptors;
- Keep the construction sites and camps neat, clean and organised in order to portray a tidy appearance; and
- Screen the construction camp and lay-down yards by enclosing the entire area with a dark green or black shade cloth of no less than 2m height.
- Keep the construction camps away from existing residents and especially lodges and tourist venues.

7. CONCLUSION

Initially the alternative alignments were investigated and it was found that the approved Route 5 would have the least visual impact with regards to the landscape character and the identified viewers.

From our investigations, the increase in tower height and width in servitude that will result from changing the transmission line to a 400kV line, will not have an increased visual impact.

The approved Route 5 follows partially along the existing route and partially along a portion of a main transportation route. Its great advantage lies in the fact that viewers are already exposed to a similar power line, so negative perception of a new power line following along an existing route has a less significant landscape and visual impact on tourists and residents as compared to the other alternatives. And the public association with transmission lines and major public roads is a common perception which makes the co-existence of these two features more acceptable.

If the mitigation measures are implemented and the recommendations are adhered to, this project can proceed.

APPENDIX 1

Figure 11 (Route 5 for a 275kV power line) and Figure 12 (Route 5 for a 400kV power line) reflect the results of a viewer sensitivity visibility assessment, carried out using GIS software. The results provide a clear interpretation of the extent of the visual influence and also provide an indication of the land use that can be expected in the affected areas.

Figure 11: Route 5 (Approved Route Map for 275kV Transmission Line)

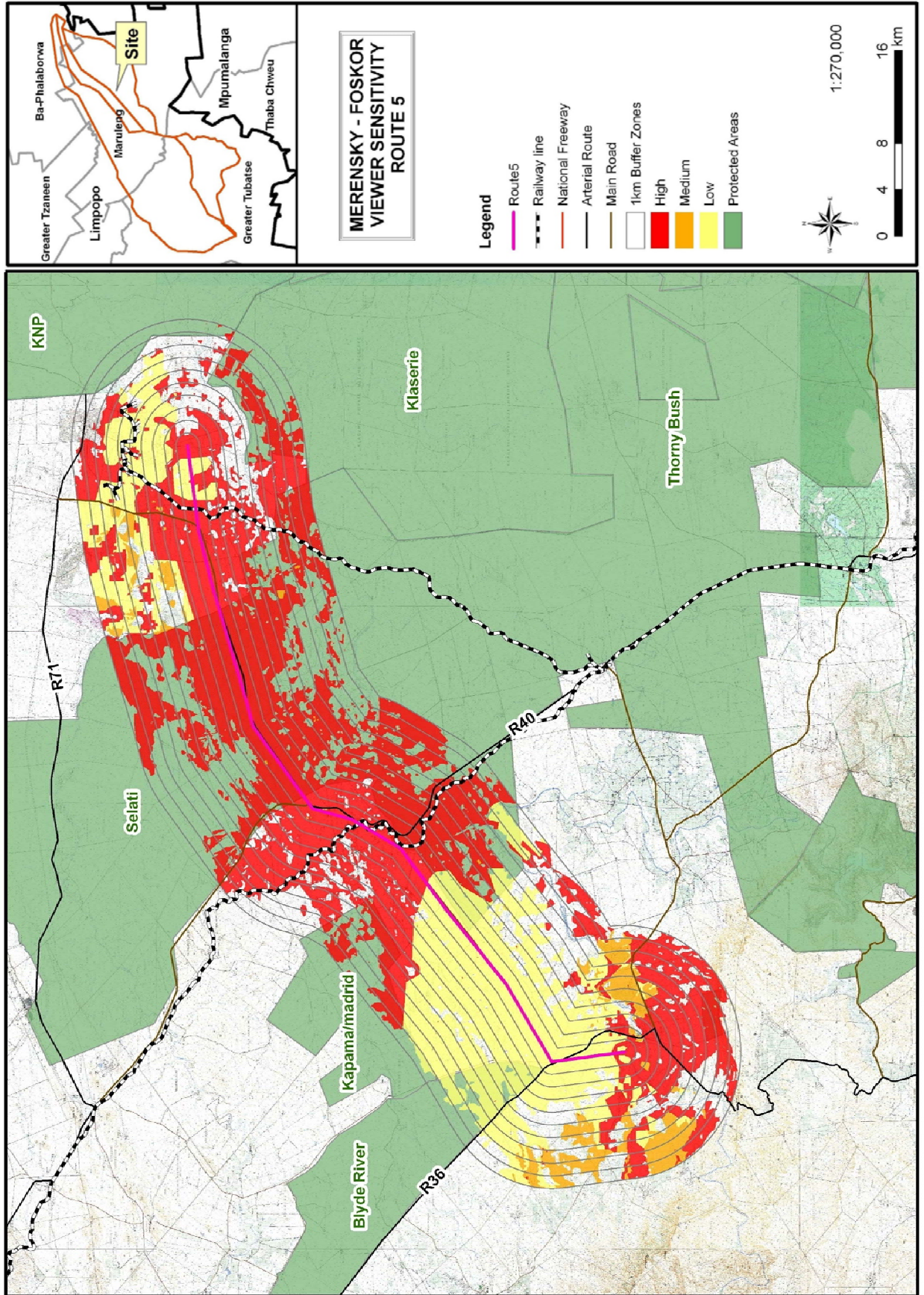


Figure 12: Route 5 (Approved Route Map for Proposed 400kV Transmission Line)

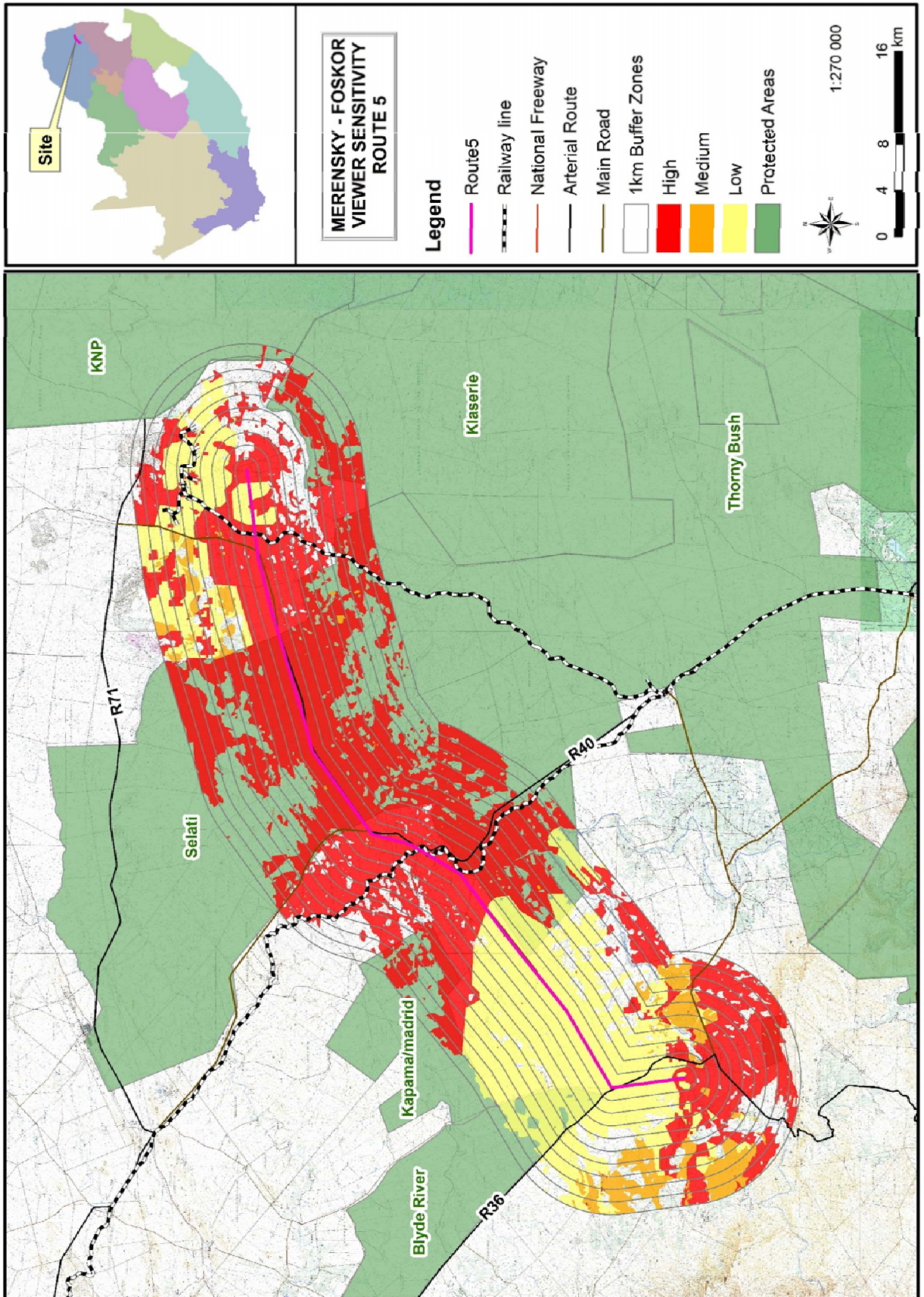
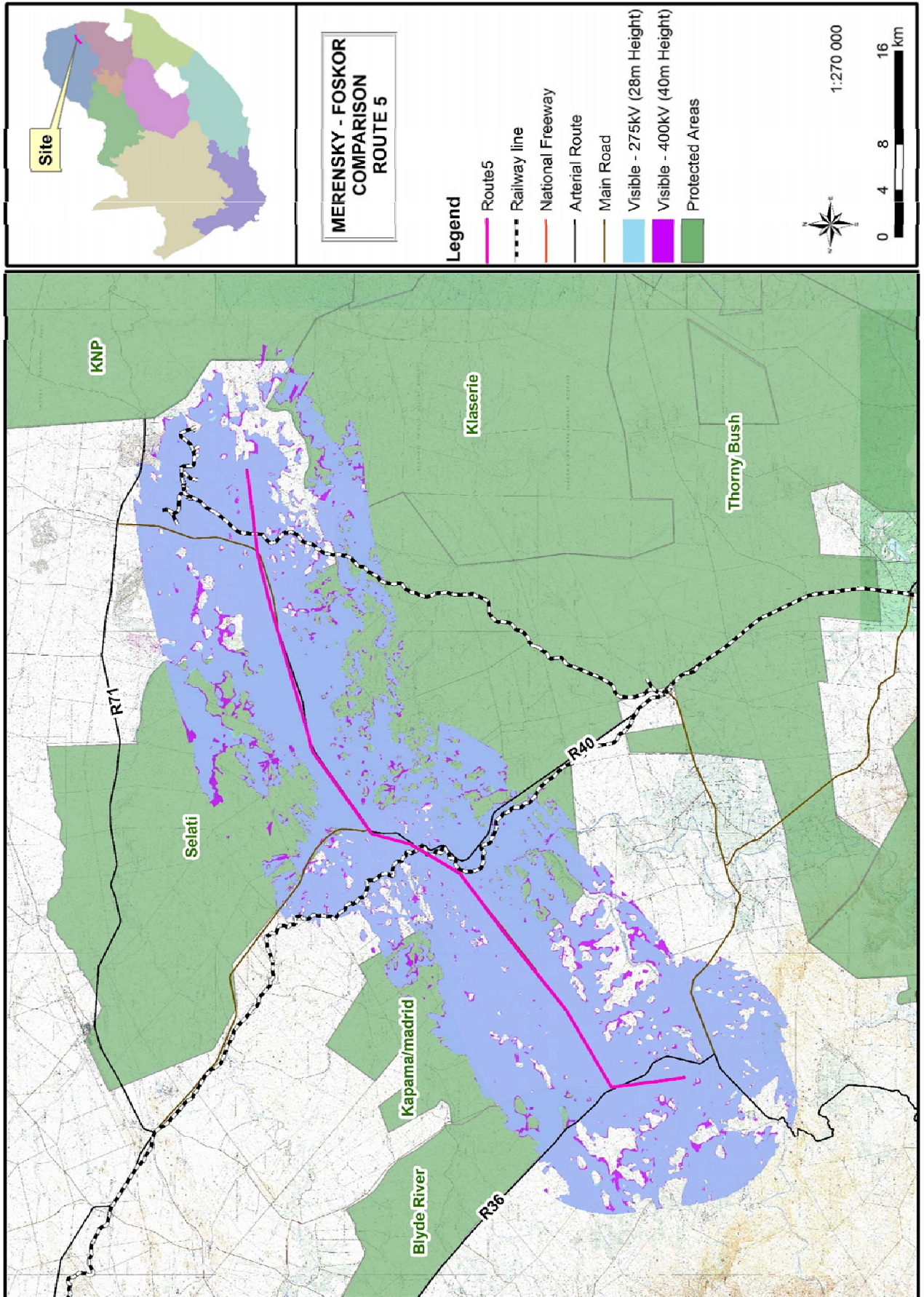


Figure 13: Route 5 (Comparison of Viewer Sensitivity between 275kV line and 400kV line)



GLOSSARY OF TERMS

Aesthetics	The science or philosophy concerned with the quality of sensory experience. (ULI, 1980)
Horizon contour	A line that encircles a development site and that follows ridgelines where the sky forms the backdrop and no landform is visible as a background. This is essentially the skyline that when followed through the full 360-degree arc as viewed from a representative point on the site defines the visual envelope of the development. This defines the boundary outside which the development would not be visible.
Landscape characterisation/ character	This covers the gathering of information during the desktop study and field survey work relating to the existing elements, features, and extent of the landscape (character). It includes the analysis and evaluation of the above and the supporting illustration and documentary evidence.
Landscape condition	Refers to the state of the landscape of the area making up the site and that of the study area in general. Factors affecting the condition of the landscape can include the level maintenance and management of individual landscape elements such as buildings, woodlands etc and the degree of disturbance of landscape elements by non-characteristics elements such as invasive tree species in grassland or car wrecks in a field.
Landscape impact	Changes to the physical landscape resulting from the development that include; the removal of existing landscape elements and features, the addition of new elements associated with the development and altering of existing landscape elements or features in such as way as to have a detrimental effect on the value of the landscape.
Landscape unit	A landscape unit can be interpreted as an “outdoor room” which are enclosed by clearly defined landforms or vegetation. Views within a landscape unit are contained and face inward.
Sense of place	That distinctive quality that makes a particular place memorable to the visitor, which can be interpreted in terms of the visual character of the landscape. A more emotive sense of place is that of local identity and attachment for a place “ <i>which begins as undifferentiated space [and] becomes place as we get to know it better and endow it with value</i> ” (Tuan 1977) ¹ .
Viewer exposure	The extent to which viewers are exposed to views of the landscape in which the proposed development will be located. Viewer exposure considers the visibility of the site, the viewing conditions, the viewing distance, the number of viewers affected the activity of the viewers (tourists or workers) and the duration of the views.
Viewer sensitivity	The assessment of the receptivity of viewer groups to the visible landscape elements and visual character and their perception of visual quality and value. The sensitivity of viewer groups depends on their activity and awareness within the affected landscape, their preferences, preconceptions and their opinions.
Visual absorption capacity (VAC)	The inherent ability of a landscape to accept change or modification to the landscape character and/or visual character without diminishment of the visual quality or value, or the loss of visual amenity. A high VAC rating implies a high ability to absorb visual impacts while a low VAC implies a low ability to absorb or conceal visual impacts.

¹ Cited in Climate Change and Our 'Sense of Place', <http://www.ucsusa.org/greatlakes/glimpactplace.html>

Visual amenity	The notable features such as hills or mountains or distinctive vegetation cover such as forests and fields of colour that can be identified in the landscape and described. Also included are recognised views and viewpoints, vistas, areas of scenic beauty and areas that are protected in part for their visual value.
Visual character	This addresses the viewer response to the landscape elements and the relationship between these elements that can be interpreted in terms of aesthetic characteristics such as pattern, scale, diversity, continuity and dominance.
Visual contour	The outer perimeter of the visual envelope determined from the site of the development. The two dimensional representation on plan of the horizon contour.
Visual contrast	The degree to which the physical characteristics of the proposed development differ from that of the landscape elements and the visual character. The characteristics affected typically include: <ul style="list-style-type: none"> • Volumetric aspects such as size, form, outline and perceived density; • Characteristics associated with balance and proportion such scale, diversity, dominance, continuity; • Surface characteristics such as colour, texture, reflectivity; and • Luminescence or lighting.
Visual envelope	The approximate extent within which the development can be seen. The extent is often limited to a distance from the development within which views of the development are expected to be of concern.
Visual impact	Changes to the visual character of available views resulting from the development that include: obstruction of existing views; removal of screening elements thereby exposing viewers to unsightly views; the introduction of new elements into the view shed experienced by visual receptors and intrusion of foreign elements into the view shed of landscape features thereby detracting from the visual amenity of the area.
Visual impact assessment	A specialist study to determine the visual effects of a proposed development on the surrounding environment. The primary goal of this specialist study is to identify potential risk sources resulting from the project that may impact on the visual environment of the study area, and to assess their significance. These impacts include landscape impacts and visual impacts.
Visual quality	An assessment of the aesthetic excellence of the visual resources of an area. This should not be confused with the value of these resources where an area of low visual quality may still be accorded a high value. Typical indicators used to assess visual quality are vividness, intactness and unity. For more descriptive assessments of visual quality attributes such as variety, coherence, uniqueness, harmony, and pattern can be referred to.
Visual receptors	Includes viewer groups such as the local community, residents, workers, the broader public and visitors to the area, as well as public or community areas from which the development is visible. The existing visual amenity enjoyed by the viewers can be considered a visual receptor such that changes to the visual amenity would affect the viewers.
Zone of visual influence	The extent of the area from which the most elevated structures of the proposed development could be seen and may be considered to be of interest (see visual envelope).

LEVEL OF CONFIDENCE

Table 12: Confidence level chart and description

CONFIDENCE LEVEL CHART				
		Information, knowledge and experience of the project		
		3b	2b	1b
Information, and knowledge of the study area	3a	9	6	3
	2a	6	4	2
	1a	3	2	1

3a – A *high* level of information is available of the **study area** in the form of recent aerial photographs, GIS data, documented background information and a thorough knowledge base could be established during site visits, surveys etc. The study area was readily accessible.

2a – A *moderate* level of information is available of the **study area** in the form of aerial photographs GIS data and documented background information 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.

1a – *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.

3b – A *high* level of information and knowledge is available of the **project** in the form of up-to-date and detailed engineering/architectural drawings, site layout plans etc. and the visual impact assessor is well experienced in this type of project and level of assessment.

2b – A *moderate* level of information and knowledge is available of the **project** in the form of conceptual engineering/architectural drawings, site layout plans etc. and/or the visual impact assessor is moderately experienced in this type of project and level of assessment.

1b – *Limited* information and knowledge is available of the **project** in the form of conceptual engineering/architectural drawings, site layout plans etc. and/or the visual impact assessor has a low experience level in this type of project and level of assessment. (Adapted from Oberholzer. B, 2005)

VISUAL RECEPTOR SENSITIVITY

Table 13: Visual receptor sensitivity

VISUAL RECEPTOR SENSITIVITY	DEFINITION (BASED ON THE GLVIA 2ND ED PP90-91)
Exceptional	Views from major tourist or recreational attractions or viewpoints promoted for or related to appreciation of the landscape, or from important landscape features.
High	Users of all outdoor recreational facilities including public and local roads or tourist routes whose attention or interest may be focussed on the landscape; Communities where the development results in changes in the landscape setting or valued views enjoyed by the community; Residents with views affected by the development.
Moderate	People engaged in outdoor sport or recreation (other than appreciation of the landscape);
Low	People at their place of work or focussed on other work or activity; Views from urbanised areas, commercial buildings or industrial zones; People travelling through or passing the affected landscape on transport routes.
Negligible (Uncommon)	Views from heavily industrialised or blighted areas

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