ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED 170KM 1X400KV MAPHUTHA-WITKOP POWERLINE, LIMPOPO PROVINCE

VISUAL IMPACT ASSESSMENT

PREPARED FOR:

NSOVO ENVIRONMENTAL CONSULTING
CONTACT: REJOICE APHANE
TEL: 011 041 3689
WEB: WWW.NSOVO.CO.ZA
EMAIL: REJOICE@NSOVO.CO.ZA

ON BEHALF OF:

Eskom Holdings SOC Limited
PO Box 1091
Johannesburg
2157
Tel (011) 800-2465
Fax (011) 800-3917

PREPARED BY:

OUTLINE LANDSCAPE ARCHITECTS cc
132 Meath Street
Kilberry, Pretoria
0083

AUGUST 2018
OUTLINE REF: VIA MW

EXECUTIVE SUMMARY

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 179km, 400kV power line from the Witkop Substation within the Capricorn District Municipality to the Maphutha Substation Sekhukhune District within the of the Limpopo Province.

Outline Landscape Architects were requested to compile a Visual Impact Assessment (VIA) for the project. This VIA is a specialist study that forms part of the EIA and addresses the visual effects of the proposed line on the receiving environment.

The study area contains the extent of two alternative corridors and includes an approximate 3 km buffer area around the alternatives.

ALTERNATIVES	DESCRIPTION
Alternative1	This Alternative follows along an existing transmission line that runs firstly in a south-easterly direction from the Witkop Substation, south of Polokwane Substation, through the Wolkberg corridor, and then veers in a south westerly direction until it meets up with the Maphutha Substation. The line transverses along a major road, the R37.
Alternveati 2	This Alternative runs in a south-easterly direction from the Witkop Substation passing along human settlements, through the Wolkberg corridor, to the Maphutha Substation, south-west of Steelpoort.

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.

DESCRIPTION OF THE AFFECTED ENVIRONMENT

The study area consists of primarily human settlements, mostly formal and the landscape is degraded around these settlements., There is also vacant undeveloped land, as well as land used for cultivation and subsistence farming. Mining is one of the key land uses and contributes significantly to the visual degradation of parts of the study area. Game farming is located more to the northern and eastern areas.

FINDINGS AND RECOMMENDATIONS

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 included in this study are:

- Residents;
- Tourists; and
- Motorists.

SIGNIFICANCE OF VISUAL IMPACTS

VISUAL IMPACT ON RESIDENTS

The study area is moderately populated, with lower population in the rural settlements and farming communities, to higher populations in the towns. The residents of the informal settlements and farming communities along the existing servitudes and power lines (Corridor Alternative 1) may experience a low degree of visual intrusion.

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 the proposed line.

VISUAL IMPACT ON TOURISTS

The study area has limited tourist activity with small pockets of high biodiversity and Bushveld landscapes. The entire study area is considered to have a moderate to low tourism potential, mostly because of the environmental degradation caused by the mining developments and many human settlements.

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

The preferred alternative follows along an existing power line.

The presence of the transmission line in the field of the tourists, in the study area, will only have a high significance on tourists in near proximity to the power line, which will be mainly along main transportation routes. The severity of the visual impact of the power lines on tourists will be low, causing a low visual impact.

VISUAL IMPACT ON MOTORISTS

The major routes in the study area are the R37, R555, R579 connecting the towns, mines and farms. The secondary road network in the study area carries a much lower volume of motorists. Many of the roads are gravel roads which are mostly utilised by the local residents.

Motorists' visual exposure to the impact during the construction phase will be brief and the severity of visual impact will be *low*. The significance of potential visual impact is expected to be *low*.

RECOMMENDED MITIGATION MEASURES

In most cases, the landscape and visual impacts occurring during the construction phase can be mitigated effectively. Rehabilitation of the disturbed areas may cause a reduction in the negative visual impact of the study area.

CONCLUSION

The two alternatives are rated according to preference by using a three-point rating system in the table below, one (1) being the most preferred. The preference rating is informed by the impact assessment discussions in Section 5 and the overall performance of each alternative with regards to the impact on the landscape character and the identified viewers.

Evaluation of alternative alignments

ALTERNATIVES	PREFERENCE RATING
Corridor Alternative 1	1
Corridor Alternative 2	2

The Corridor Alternative 1 line is regarded as the most preferred alternative. Its alignment follows along an existing line and servitude and along a main transportation route. It is considered to cause the least impact on the landscape character due to the reduced sensitivity of the landscape along the roads and servitudes. It is also concluded that the Visual Absorption Capacity of Alternative 1 is significantly higher that Alternative 2.

The impact of Alternative 1 on visual receptors varies between residents, tourists (mainly passing through) and motorists. Alternative 1 follows along an existing transmission line and along 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 alternative route. 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.

.

TABLES OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

EIA	Environmental Impact Assessment.
FHWA	Federal Highway Administration of the United States Department of Transportation. The publishers of the guide "*Visual Impact Assessment for High Projects*" 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 179km, 400kV power line from the Witkop Substation within the Capricorn District Municipality to the Maphutha Substation within the Sekhukhune District Municipality of the 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.

There are two Corridor Alternatives alignments that have been proposed for the construction of the line.

1.1. BACKGROUND AND BRIEF

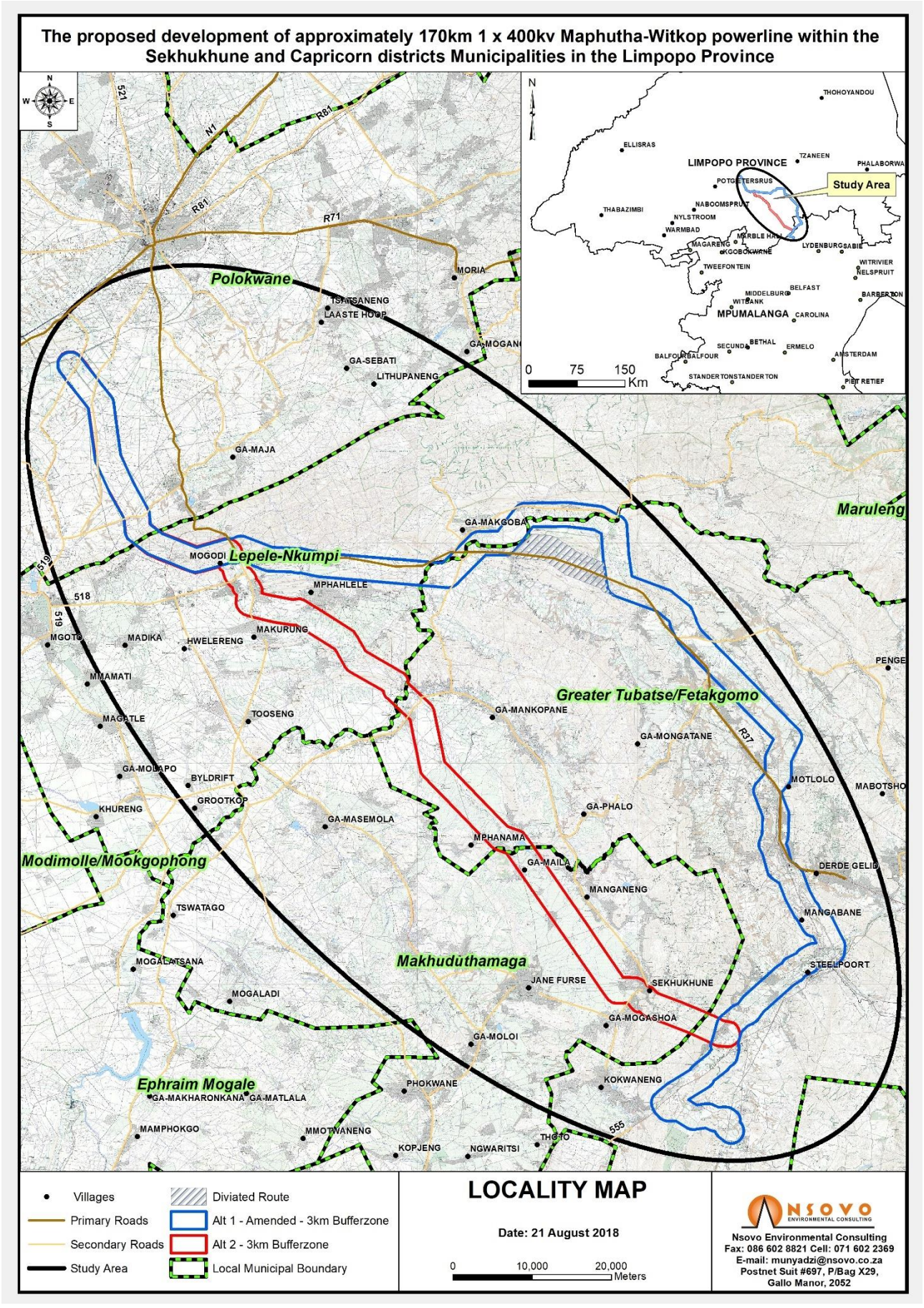
This VIA will conform to the requirements of a Level Three assessment which requires the realisation of the following objectives (Adapted from Oberholzer (2005)):

- 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 includes the entire area covered by the alternative alignments. It runs in a south eastern direction from the Witkop Substation to the Maphutha Substation. The Witkop Substation is, within the Capricorn District Municipality, Limpopo province. The Maphutha Substation is south-west of Steelpoort within the Sekhukhune District Municipality (Figure 1).

Figure 1: Locality Plan



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 (2018) 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 134).
- The site visit was conducted during July 2018 and the photographs used in this report illustrate the character of the landscape in the dry winter 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 12). 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;
- 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

In the table below is a description of the two suggested alternative alignments.

Table 1: Description of alternative alignments

ALTERNATIVES	DESCRIPTION (Refer to Figure 1)
Corridor 1	This Corridorfollows along an existing transmission line that runs firstly in a south-easterly direction from the Witkop Substation, south of Polokwane and the veers in a south westerly direction through the Wolkberg corridor until it meets up with the Maphutha Substation. The line transverses along a major road, the R37.
Corridor2	This Corridor runs in a south-easterly direction from the Witkop Substation, south of Polokwane, passing along human settlements, through the Wolkberg corridor,to the Maphutha Substation, south-west of Steelpoort.

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

The construction phase is expected to continue for 18 months from the commencement date. 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 3). Typical construction equipment could include items as shown in Figure 4.

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 proposed transmission line will connect the Maphutha and Witkop substations. The direct linear distance between the Maphutha and Witkop substations is approximately 179 km (Figure 1).

A brief description of the expected tower characteristics and the two alternatives are discussed in Table 2 and examples shown in Figure 4.

The study is based on the impact created by a 400kV transmission line. The impact of the maximum height of 40m of the towers that could have a visual impact has been taken into consideration in the report.

Table 2: 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

3.3. VISUAL CHARACTERISTICS OF PROJECT COMPONENTS

The 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.

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 MAPHUTHA - WITKOP ESKOM TRANSMISSION POWERLINES

Compiled for Nsovo Environmental Consulting

outline landscape architects | green consultants

Figure 3: Typical construction equipment

Typical example of helicopter

Typical example of crane

Typical example of tensioner station

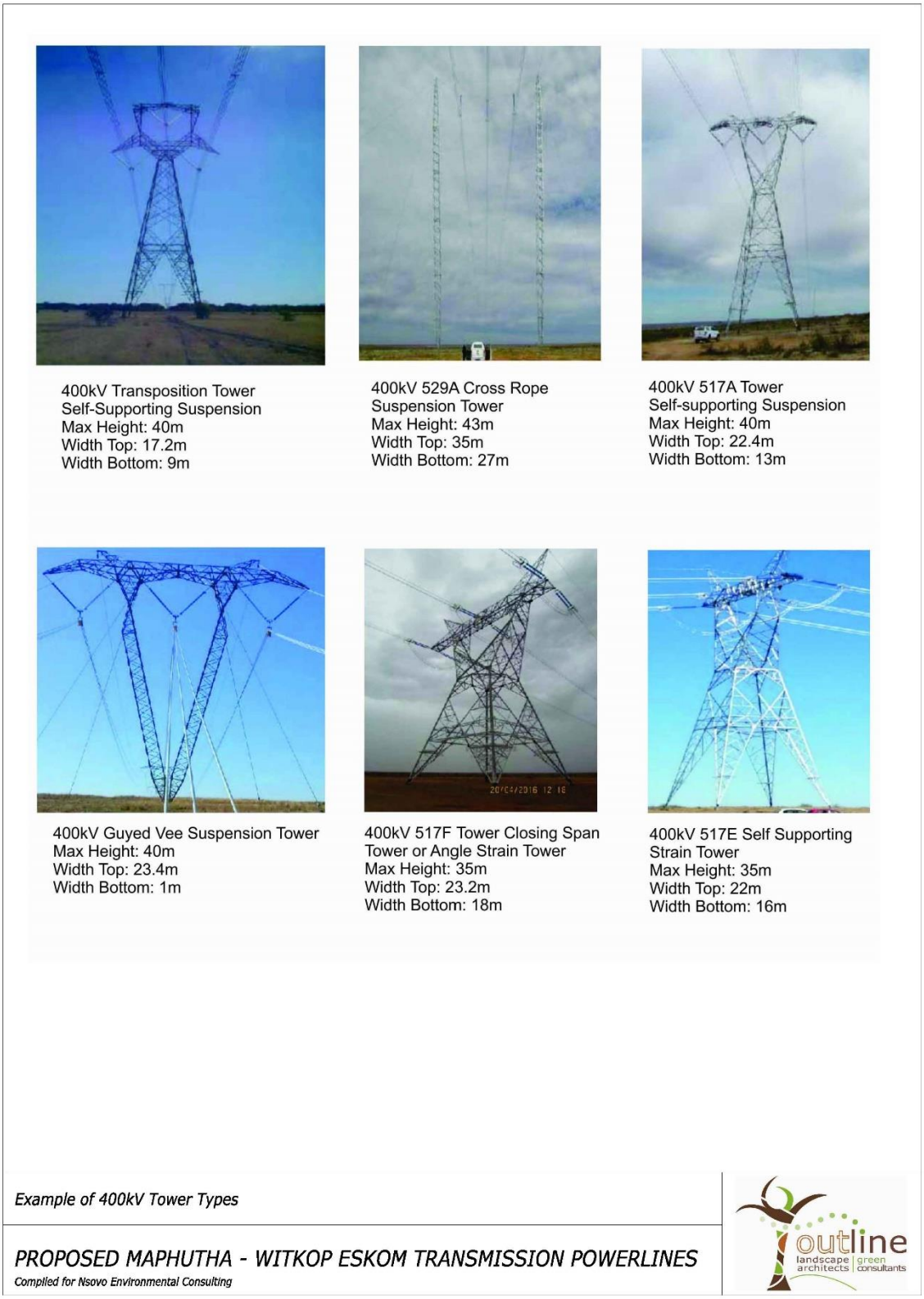
Example of Construction Equipment

PROPOSED MAPHUTHA - WITKOP ESKOM TRANSMISSION POWERLINES

Compiled for Nsovo Environmental Consulting

outline landscape architects | green consultants

Figure 4: Typical Towers



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 primarily of human settlements and the landscape is degraded around these settlements. There is also vacant undeveloped land, as well as land used for cultivation and subsistence farming. Mining, especially ferrochrome, is one of the key land uses and contributes significantly to the visual degradation of parts of the study area. Game farming is located more to the northern and eastern areas.

The study area consists of areas of un-spoilt landscape with some spectacular features and views such as the Wolkberg south of the Witkop Substation, Potlake Nature Reserve, along the proposed Corridor Alternative 1. Elevated points allow for beautiful vistas into the valleys and across the surrounding landscape, even though there is not a sense of remoteness, as human settlements or agricultural land is visible.

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.

The following broad scale vegetation types (Figure 5) have been identified in the study area:

- Sekhukhune Mountain Bushveld
- Sekhukhune Plains Bushveld
- Ohrigstad Mountain Bushveld
- Polokwane Plateau Bushveld
- Poung Dolomite Mountain Bushveld
- Mamabolo Mountain Bushveld

The majority of the natural landscape consists of the Sekhukhune Mountain Bushveld and the Sekhukhune Plains Bushveld.

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.

Very few parts of the study area have been left undisturbed and there are only pockets of unspoilt pristine landscape remaining. 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 3) that are internationally accepted indicators of visual quality (FHWA, 1981):

Table 3: 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 4.

Table 4: Visual Quality of the regional landscape

VIVIDNESS	INTACTNESS	UNITY	VISUAL QUALITY
4	3	4	Moderate

The visual quality of the landscape is moderate and can be attributed to the many built-up areas and mining developments.

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 5). 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 5: Regional Visual Absorption Capacity evaluation

ALTERNATIVE	VISUAL SCREENING	TERRAIN VARIABILITY	LAND COVER	VAC
Alternative 1	3	2	3	high
Alternative 2	2	2	2	moderate

The VAC of the study area is considered high, for Alternative 1 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.

Alternative 2 has a lower VAC due to the more monotonous landform.

Figure 5: Vegetation Map

Figure 6: Land Cover Map

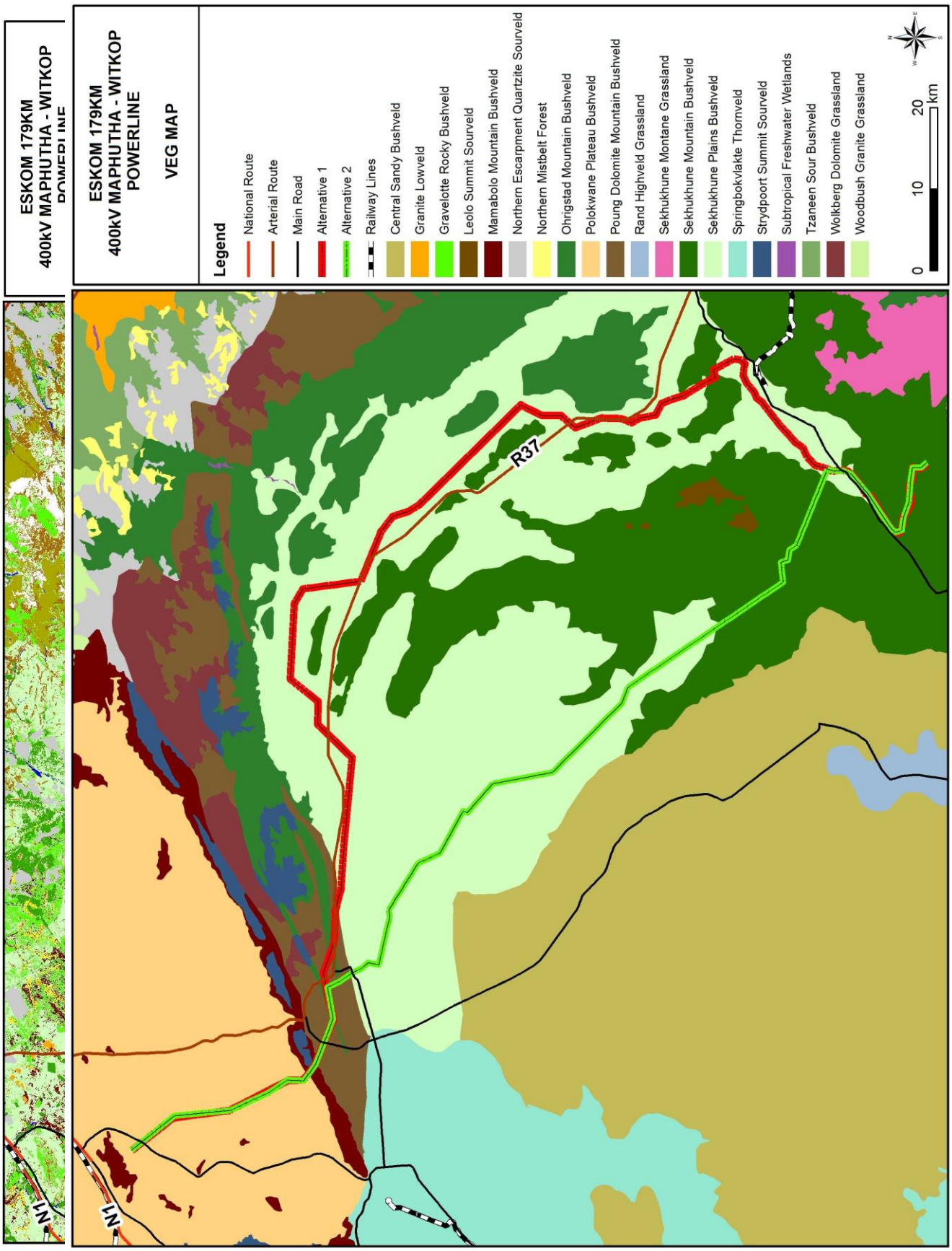


Figure 7: Landscape character of study area

Mountainous landscape in background and historical farmland

Mountainous landscape in background and historical farmland

Landscape Character

PROPOSED MAPHUTHA - WITKOP ESKOM TRANSMISSION POWERLINES

Compiled for Nsovo Environmental Consulting

outline landscape architects | green consultants

Figure 8: Landscape Character

Natural Bushveld Landscape through the Wolkberg

Human settlements and subsistence farming activities

Landscape Character

PROPOSED MAPHUTHA - WITKOP ESKOM TRANSMISSION POWERLINES

Compiled for Nsovo Environmental Consulting

Figure 9: Landscape Character

Villages and mountains in background

Mountainous landscape, high visual absorption capacity

Landscape Character

PROPOSED MAPHUTHA - WITKOP ESKOM TRANSMISSION POWERLINES

Compiled for Nsovo Environmental Consulting

outline landscape architects | green consultants

Figure 10: Landscape Character

Towns and in background chrome mining activity

Rocky outcrops interspersed between human settlements

Landscape Character

PROPOSED MAPHUTHA - WITKOP ESKOM TRANSMISSION POWERLINES

Compiled for Nsovo Environmental Consulting

outline landscape architects | green consultants

Figure 11: Photo Reference Map

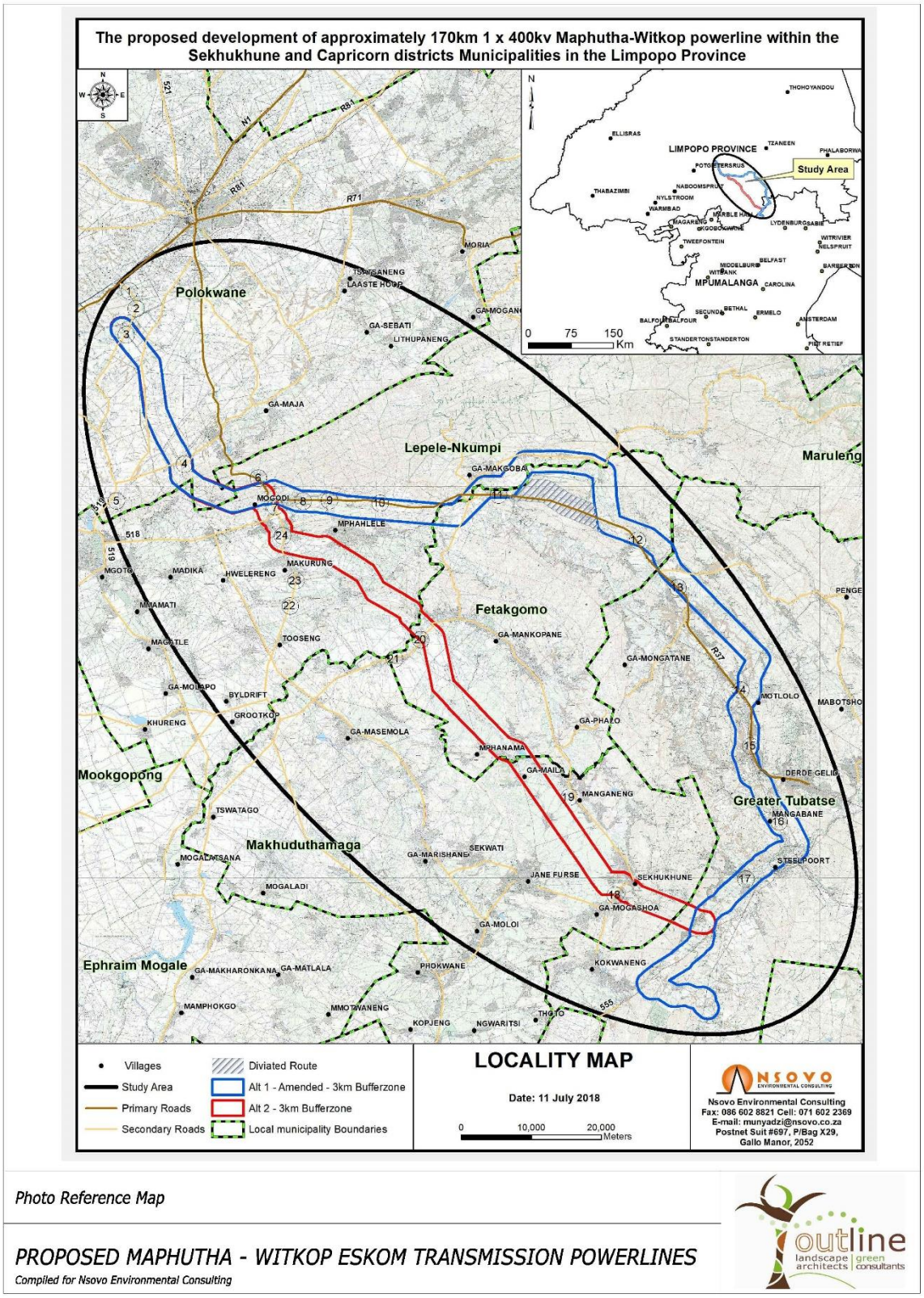


Figure 12: Photo Plate 1

View 1

View 2

View 3

View 4

View 5

View 6

Photo Plate 1

PROPOSED MAPHUTHA - WITKOP ESKOM TRANSMISSION POWERLINES

Compiled for Nsovo Environmental Consulting

outline landscape architects | green consultants

Figure 13: Photo plate 2

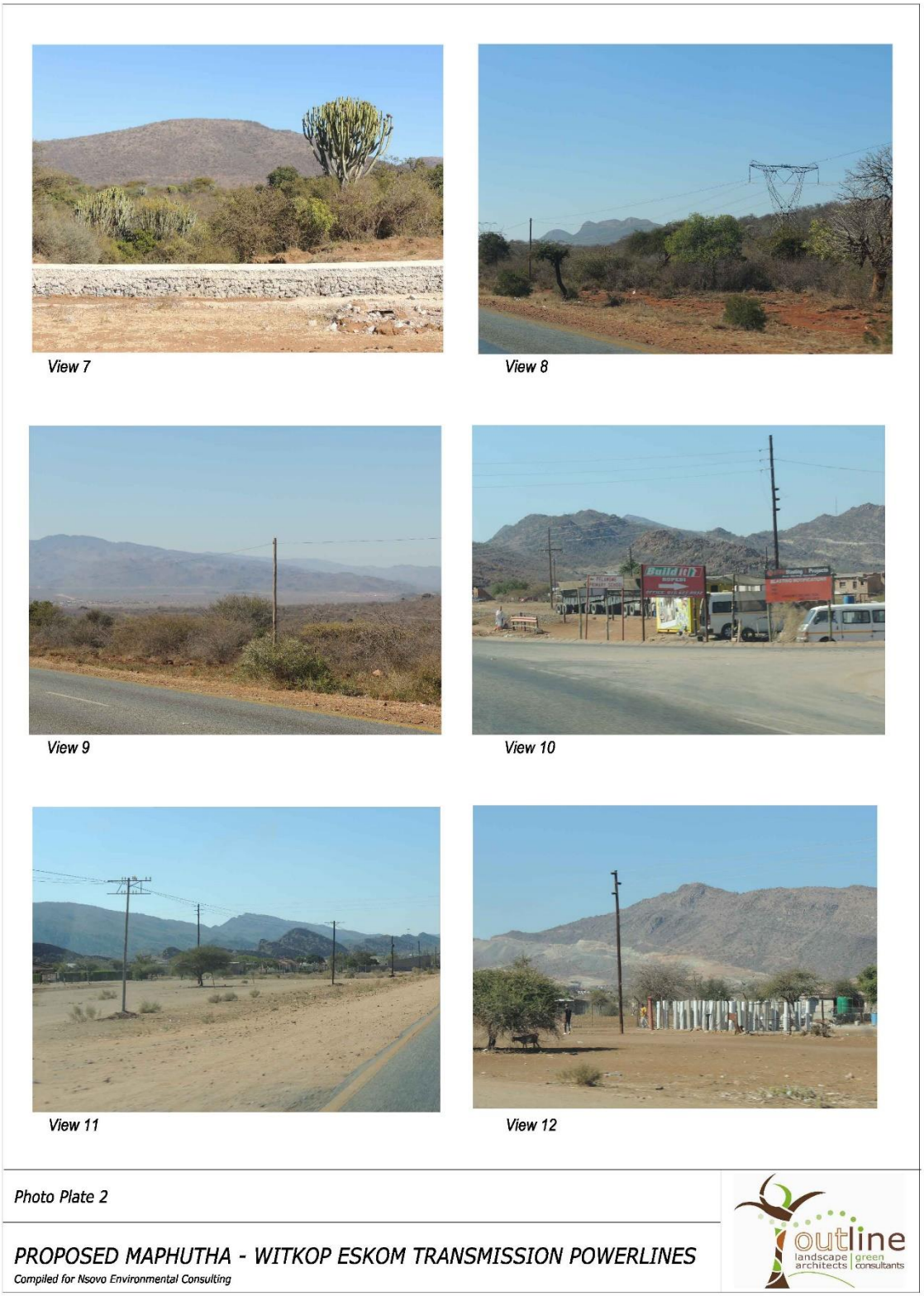


Figure 14: Photo plate 3

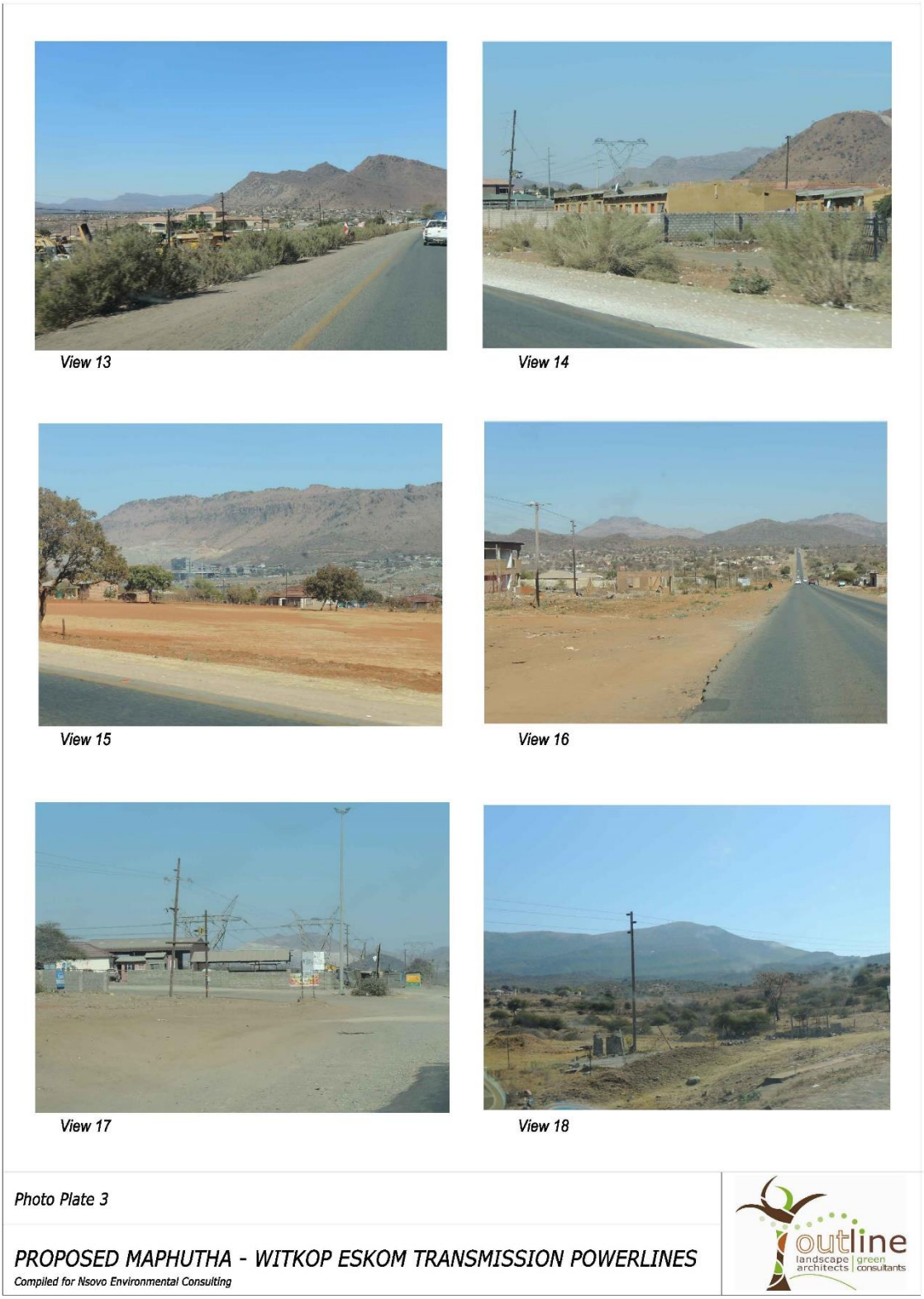


Figure 15: Photo plate 4

View 19

View 20

View 21

View 22

View 23

View 24

Photo Plate 4

PROPOSED MAPHUTHA - WITKOP ESKOM TRANSMISSION POWERLINES

Compiled for Nsovo Environmental Consulting

outline landscape architects | green consultants

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 6).

Table 6: 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 moderate to low landscape character sensitivity due to the mostly developed landscape, environmental degradation and the very minimal pristine condition of the landscape, the moderate visual quality and minimal tourism value. High terrain variability in the study area and thus a high VAC can be expected. In the areas of natural landscape, 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 7) and applied in the classification of the study area into different sensitivity zones.

Table 7: Landscape character sensitivity rating (Adapted from GOSW, 2006)

	DESCRIPTION
Low sensitivity	These landscapes are likely to: ° 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	These landscapes are likely to: ° 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	These landscapes are likely to: ° 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.

Table 8: 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								
Alternative 1	Negative Impacting 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	Low	Definite	Low	Low	High
Alternative2				Moderate	Definite	Moderate	Low	High
Operational phase								
Alternative 1	Negative Impact on the visual quality of the landscape due the presence of a transmission line.	Regional	Permanent	Moderate	Definite	Moderate	Low	High
Alternative 2				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.

Servitudes will generally be kept undisturbed. The complete removal of vegetation will result in disturbed areas of exposed soil and difference in texture.

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

Considering the moderate to high VAC throughout most of the study area, the developed 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 *low* for Alternative 1 and *moderate* for Alternative2. The impact will extend over the entire length of the different alignments 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 all the Alternatives. 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 effects 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 will be absorbed into the mountainous landscape character that prevails through some of the study area. The areas that are more monotonous and more undulating, and especially along the Alternative 1 alternative, are built up with human settlements, and similar powerline structures.

The mountainous character and relatively high vegetation of the northern portion of the proposed line 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;
- Motorists; and
- Tourists;

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

These 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.

5.2.2. 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.

A 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 16 - 19:

- 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.

5.2.2.1 Potential visual impacts on Residents

Table 8: Potential visual impacts on residents

VISUAL IMPACT ON RESIDENTS								
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								
Alternative1	Negative – Construction camp and lay-down yard may cause unsightly views	Local	Temporary	Moderate	Probable	Low	Low	High
Alternative 2				Moderate	Probable	Moderate	Low	High
Operational phase								
Alternative 1	Negative – The presence of a power line intrudes on existing views and spoils the open panoramic views of the landscape.	Regional	Permanent	Moderate	Definite	Low	Low	High
Alternative 2				Moderate	Definite	Moderate	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.

Numerous other farm residents will experience intrusion on their views due to the presence of the proposed transmission line. It is unpractical to discuss all, but they are recognised as the general population of the study area and are identified as affected visual receptors.

It can be concluded that the study area has a moderate density of residents that will be affected viewers.

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 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 formal and informal settlements and farming communities along the existing servitudes and power lines (Alternative 1) may experience a low degree of visual intrusion.

The current 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.

However, residents along Alternative 2 will experience a moderate to high intrusion of proposed new transmission lines, due to their proximity to the powerlines. These residents are within 5km and in some instances 1km from the proposed alignments. This is considered the zone of highest visibility and a degree of intrusion can be expected.

The Visual Absorption Capacity (VAC) of the different landscape plays a major role in the visibility of the proposed transmission line. A diverse land cover and topographically varied terrain does have 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 VAC to the north of the transmission lines, as it crosses through the Wolkberg is higher than the southern parts of both Alternatives. The southern parts, of Alternative 2 are more densely populated and the presence of a transmission line in the visual field of residents in this part may spoil their current views.

Table 10: Potential visual impacts on Tourism

VISUAL IMPACT ON TOURISTS								
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								
Alternative 1	Negative – Construction camp and lay-down yard may cause unsightly views.	At a number of point locations	Temporary	Moderate	Probable	Low	Low	High
Alternative 2				Moderate	Probable	Moderate	Low	High
Operational phase								
Alternative 1	Negative – The presence of a power line intrudes on existing views and spoils the open panoramic views of the landscape.	Local	Permanent	Low	Definite	Low	Low	High
Alternative 2				Moderate	Definite	Moderate	Low	High

It is apparent from the existing power lines running parallel to the proposed Alternative 1 that one is visually exposed to the existing line in close proximity but the impact is absorbed easily into the distance by the landscape. Therefore the significance of the impact can be regarded as moderately-low.

5.2.2.2 Potential visual impacts on tourists

Table 9: Potential visual impacts on tourists

The study area has limited tourist activity with only interspersed pockets with high 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 low tourism potential, mostly because of the many human settlements, mining developments and overall environmental degradation. It can however be used as a thoroughfare along main roads to major tourist destinations such as the Kuschke Nature Reserve, just north-west of Witkop Power Station, Potlake Nature Reserve and Kruger National Park to the east. There are some private game farms and lodges that are 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

Considering the relative short length of the proposed alternatives, a limited 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 few 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.

It can be concluded that Alternative2 will cause the greatest visual intrusion for tourists travelling through the study area because it proposes new power lines in the landscape where Alternative 1 already follows along an existing line.

The presence of the transmission line in the field of the tourists, in the study area, will only have a high significance on tourists in near proximity to the power line, which will be mainly along main transportation routes. The high VAC of the landscape allows the power lines to be absorbed into the landscape.

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

5.2.2.3 Potential visual impacts on motorists

Table 10: Potential visual impacts on motorists

VISUAL IMPACT ON MOTORISTS								
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								
Alternative 1	Negative – Intruding on existing views of the landscape.	At a number of point locations	Short period	Low	Probable	Low	Low	High
Alternative 2				Moderate	Probable	Low	Low	High
Operational phase								
Alternative 1	Negative – Intruding on existing views of the landscape.	Local	Short period	Low	Definite	Low	Low	High
Alternative 2			Intermittent	Moderate	Definite	Moderate	Low	High

The major routes in the study area are the R37, R555, and the R579 connecting the towns, mines and farms. The secondary road network in the study area carries a much lower volume of motorists. Many of the roads are gravel roads which are mostly utilised by the local residents. 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

Alternative 1 will be the most visible from the R37. Alternative 2 is only intermittently visible to motorists when the proposed power lines cross the roads. 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.

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-rope suspension tower. This tower type is the most permeable and creates a 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

The two Corridor Alternative have been evaluated against internationally accepted criteria to determine the impact they will have on the landscape character and the viewers that have been identified in the study area.

The alternatives are rated according to preference by using a three-point rating system in Table 11, one (1) being the most preferred. The preference rating is informed by the impact assessment discussions in Section 5 and the overall performance of each alternative with regards to the impact on the landscape character and the identified viewers.

Table 11: Evaluation of alternative alignments

ALTERNATIVES	PREFERENCE RATING
Alternative 1	1
Alternative 2	2

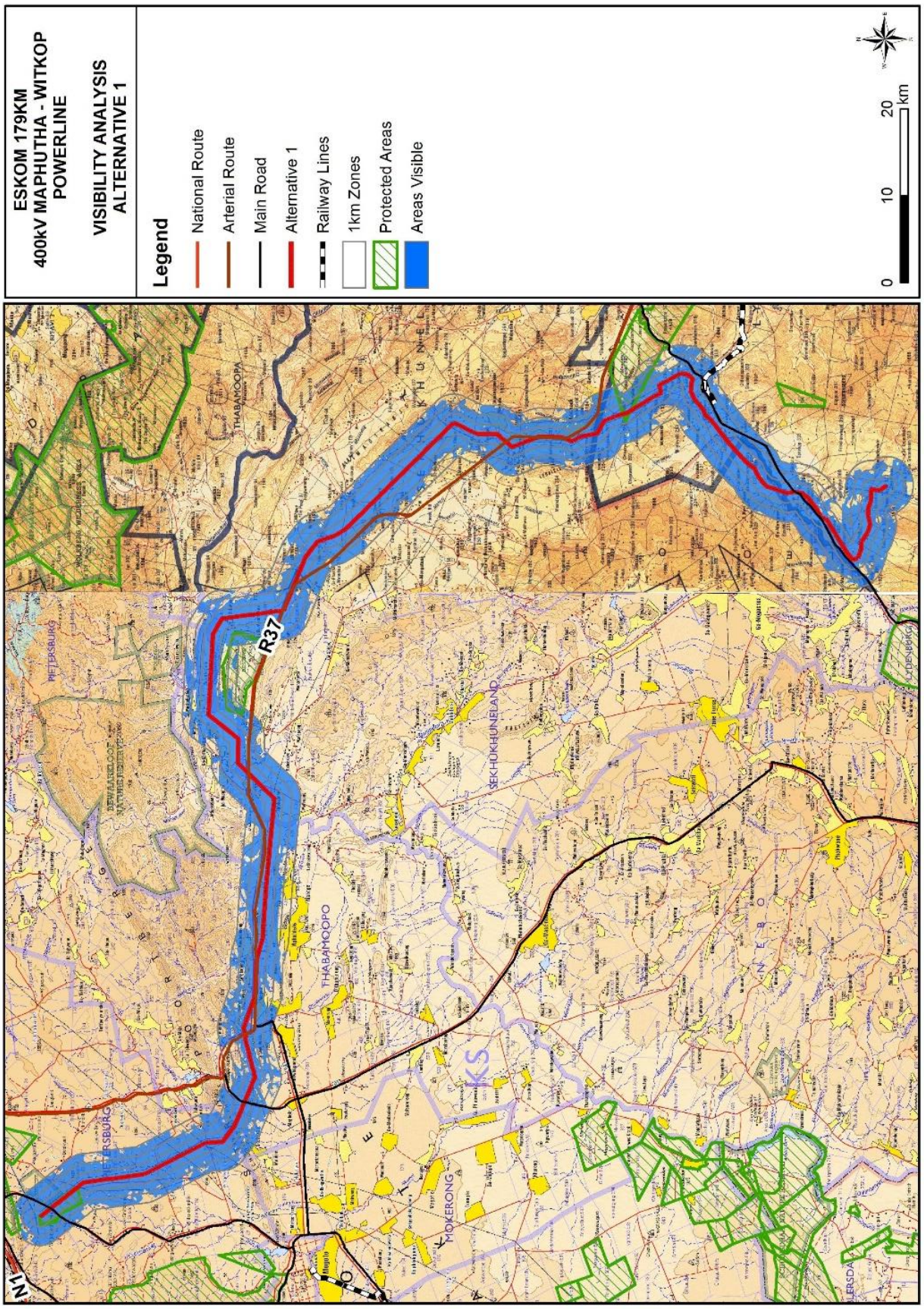
The **Alternative 1** is regarded as the most preferred alternative. Its alignment follows along an existing line and servitude and along a main transportation route. It is considered to cause the least impact on the landscape character due to the reduced sensitivity of the landscape along the roads and servitudes. The Visual Absorption Capacity of the Alternative 1 is significantly higher than Alternative 2.

The impact of Alternative 1 on visual receptors varies between residents, tourists (mainly passing through) and motorists. Alternative 1 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 alternative. 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.

APPENDIX 1

Figure 16 to Figure 19 reflects 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 16: Route 1



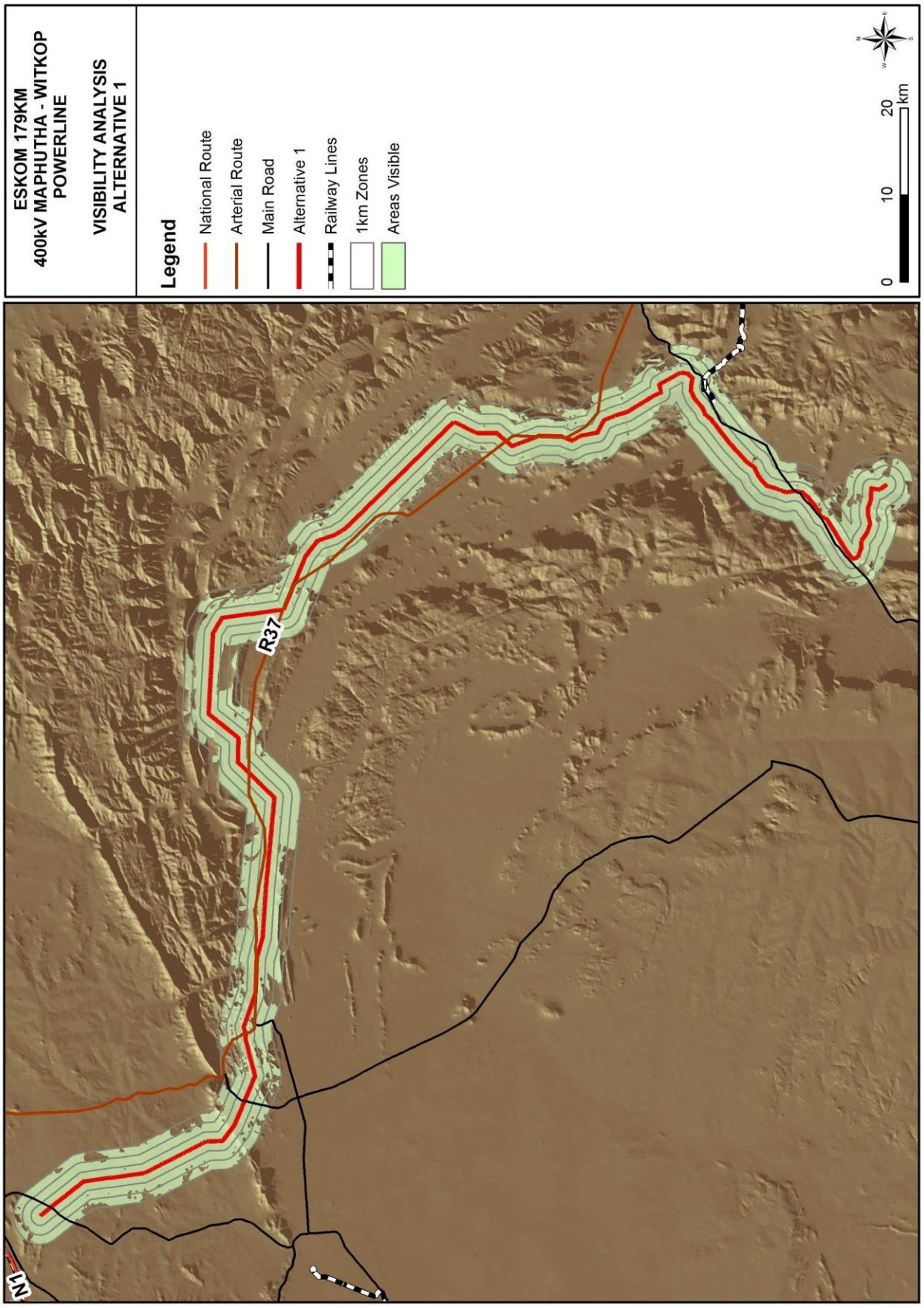
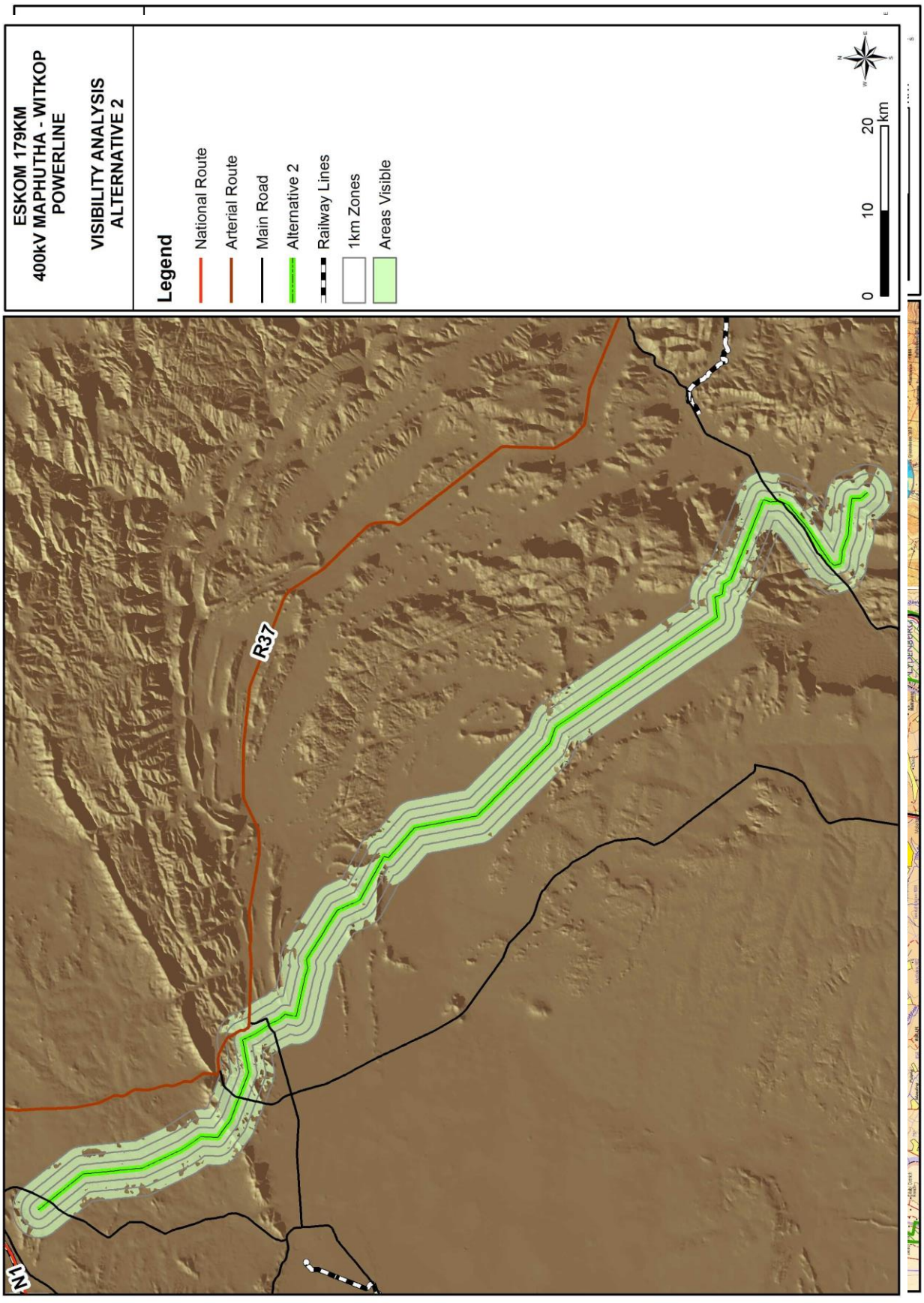


Figure 17: Route 1 (Terrain)

Figure 18: Route 2

Figure 19: Route 2 (Terrain)



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 "*which begins as undifferentiated space* [and] *becomes place as we get to know it better and endow it with value*" (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:

- 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**			
Information, and knowledge of the **study area**		3b	2b	1b
	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

REFERENCES

BLM (Bureau of Land Management). (1986). Handbook H-8431-1, Visual Resource Contrast Rating. U.S. Department of the Interior BLM. http://www.blm.gov/nstc/VRM/vrmsys.html

Government Office of the South West - England (2006). Using landscape sensitivity for renewable energy. REvision 2010 – Empowering the region [Online]. http://www.oursouthwest.com/revision2010/lca_methodology_windbiomass.doc [Accessed 8 November 2006]

Landscape Institute and the Institute of Environmental Assessment and Management. (2002). Guidelines for Landscape and Visual Impact Assessment (GLVIA). Second Edition, E & FN Spon Press.

M. Hill, J. Briggs, P. Minto, D. Bagnall, K. Foley, A.Williams. (March 2001). Guide to Best Practice in Seascape Assessment. Maritime (Ireland / Wales) INTERREG Programme- Building Bridges.

Oberholzer, B. (2005). Guideline for involving visual and aesthetic specialists in EIA processes: Edition 1. CSIR Report No ENV-S-C 2005 053 R. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning, Cape Town.

Swanwick, C. Department of Landscape, University of Sheffield and Land Use Consultants. (2002). Landscape Character Assessment:: Guidance for England and Scotland. The Countryside Agency / Scottish Natural Heritage.

Van Riet, W., Claassens, P., Van Rensburg, J., Van Viegen, T., Du Plessis, L. 1997. *Environmental Potential Atlas for South Africa.* The Department of Environmental Affairs and Tourism in conjunction with The Geographic Information Systems Laboratory CC and the University of Pretoria. J.L. van Schaik.

Van Rooyen, M.W. 2002. Management of the old field vegetation in the Namaqua National Park, South Africa: conflicting demands of conservation and tourism. Published paper from *The Geographical Journal*, Vol. 168, No.3, September 2002, pp. 211-223.

U.S.D.O.T., Federal Highway Administration, Office of Environmental Policy. (March 1981). Visual Impact Assessment for Highway Projects. U. S. Department of Transportation Washington D. C.

Urban Land Institute, 1980. Visual Resource Management 0510-1: Environmental Comment (May 1980). Washington D.C.