BASIC ASSESSMENT PROCESS FOR THE PROPOSED ESKOM KEKANA SUBSTATION AND LOOP IN & LOOP OUT POWERLINE SERVITUDE WITHIN THE JURISDICTION OF THE CITY OF TSHWANE, GAUTENG PROVINCE

VISUAL IMPACT ASSESSMENT

PREPARED FOR:

NSOVO ENVIRONMENTAL CONSULTING
CONTACT: MUNYADZIWA RIKHOTSO
TEL: 071 602 2369
WEB: WWW.NSOVO.CO.ZA
EMAIL: MUNYADZI@NSOVO.CO.ZA

ON BEHALF OF:

ESKOM HOLDINGS SOC LIMITED
PO BOX 1091
JOHANNESBURG
2157
TEL (011) 800-2465

PREPARED BY:

OUTLINE LANDSCAPE ARCHITECTS CC
815 GOVERNMENT AVENUE
EASTWOOD, PRETORIA
0083

MAY 2024

EXECUTIVE SUMMARY

Nsovo Environmental Consulting (Nsovo) has been appointed by Eskom Holdings SOC Limited, as the independent environmental consultant to undertake the Basic Assessment (BA) Process for the proposed Eskom Kekana Substation and Loop-in and Loop-out powerline servitude within the jurisdiction of the City of Tshwane, in the Gauteng Province.

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

The project components that may cause a potential landscape and/or visual impact are construction camps, access roads and the powerlines. The powerlines cause the greatest visual impact due to their height.

The sites are located in Hammanskraal West, where new residential development is expanding at a rapid rate onto previous agricultural land.

A viewer sensitivity map was generated for the visual impact of the proposed alternatives for the new substation and loop-in loop-out powerline servitude.

The visual receptors included in this study are residents, tourists, motorists.

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.

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*.

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

The extent of the visibility for the proposed project for all three alternatives is similar. The preferred alternative 1 will be routed closer to the high-density residential development, which may have a higher visual impact on residents.

There are existing powerlines near the preferred alternative route and already in the visual field of the visual receptors. The new line and substation should not have a very high negative visual impact and spoil the views they currently experience. The preferred substation alternative is proposed on degraded land. Overall visual value of the study area is low.

Alternative 2 and 3 have a higher impact to the south of the site where more natural landscape is found with some tourist activities, within private game reserves and recreational resorts. More natural landscape will have to be denuded and removed for the servitudes and the substations. Therefore Alternative 1 is the preferred option.

Existing powerlines within the area have a moderating effect on the severity of the visual impact and further reduces visual exposure.

If the mitigation measures are implemented and the recommendations are adhered to, this project can proceed with a very low visual impact.

Evaluation of proposed Eskom Kekana Substation and Loop-in & Loop-out Powerline Servitude

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
The visibility analyses consider worst-case scenarios, using line-of-sight, based on topography alone. The impacts for the construction phase are insignificant, while impacts for the operational phase are rated below.							
Visual Impact of proposed Activities							
Preferred Alternative 1 Kekana Substation and Powerline	No	Negative	2 (Local)	5 Permanent	4 Low	4 High	44 Medium
	Yes	Negative	2 (Local)	5 Permanent	4 Low	3 Medium	33 Medium
Alternative 2 Kekana Substation and Powerline	No	Negative	2 (Local)	5 Permanent	6 Moderate	4 High	52 Medium
	Yes	Negative	2 (Local)	5 Permanent	4 Low	3 Medium	33 Medium
Alternative 3 Kekana Substation and powerline	No	Negative	2 (Local)	5 Permanent	6 Moderate	4 High	52 Medium
	Yes	Negative	2 (Local)	5 Permanent	4 Low	3 Medium	33 Medium

The Visual Impact Assessment Criteria for all activities as indicated in the table applies and is rated as per below:

Status of Impact:
The visual impact is assessed as either having a:

- Negative effect (i.e. at a cost to the environment),
- Positive effect (i.e. a benefit to the environment), or
- Neutral effect on the environment.

Extent of the Impact:

(1) Site (site only),
(2) Local (site boundary and immediate surrounds),
(3) Regional,
(4) National, or
(5) International.

Duration of the Impact:
The length that the impact will last for is described as either:

(1) Immediate (<1 year)
(2) Short term (1-5 years),
(3) Medium term (5-15 years),
(4) Long term (ceases after the operational life span of the project),
(5) Permanent.

Magnitude of the Impact:
The intensity or severity of the impacts is indicated as either:

(0) none,
(2) Minor,
(4) Low,
(6) Moderate (environmental functions altered but continue),
(8) High (environmental functions temporarily cease), or
(10) Very high/unsure (environmental functions permanently cease).

Probability of Occurrence:

The likelihood of the impact actually occurring is indicated as either:

(0) None (the impact will not occur),
(1) Improbable (probability very low due to design or experience)
(2) Low probability (unlikely to occur),
(3) Medium probability (distinct probability that the impact will occur),
(4) High probability (most likely to occur), or
(5) Definite.

Significance of the Impact:

Based on the information contained in the points above, the potential impacts are assigned a significance rating (S). This rating is formulated by adding the sum of the numbers assigned to extent (E), duration (D) and magnitude (M) and multiplying this sum by the probability (P) of the impact.

S= (E+D+M) P

The significance ratings are given below:

- (<30) low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
- (30-60) medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- (>60) high (i.e. where the impact must have an influence on the decision process to develop in the area).

Specialist Sensitivity Form

LEGEND		**Definition**
Very High Sensitivity		The area is rated extremely sensitive to the negative impact of electricity grid infrastructure development. As a result, the area will either have very high conservation value, very high existing/ potential socio-economic value or hold legal protection status.
High Sensitivity		The area is rated highly sensitive to the negative impact of electricity grid infrastructure development. As a result, the area will either have high conservation value or existing/potential socio-economic value.
Medium Sensitivity		The area is rated as being of medium sensitivity to the negative impact of electricity grid infrastructure development. As a result, the area will either have medium levels of conservation value and/or medium levels of existing/potential socio-economic value.
Low Sensitivity		The area is considered to have low sensitivity levels in the context of electricity grid infrastructure.

General Description			
Visual Impact for the Eskom Kekana Substation and Loop-in Loop-out Powerline Servitude			
Sensitivity	Screening	Outcome	Medium
Corridor Assessment per Section			
Alternatives	**Kekana Substation and Loop In Loop Out Powerline Servitude**		

Constraints	1	Urban areas, most residents
	2	Bushveld and agricultural landscape
	3	Bushveld and agricultural landscape
Opportunities	1	Visually and environmentally degraded
	2	Visually more intact and natural vegetation to be retained as much as possible
	3	Visually more intact and natural vegetation to be retained as much as possible
Alternative Preference		1
Summary of preferred corridor and reasons		The preferred corridor is the Alternative 1. It is in a visually degraded area. There is an existing powerline and is close to transportation routes. This mitigates the visual impact as viewers are accustomed to power lines in their line of sight.

See Figures 12,13 and 14 in Visual Impact Assessment Report

Insert the Sensitivity Map above

Mitigation in Sensitive Areas

Very High High	Highly sensitive Areas	Retain natural vegetation as far as possible. Keep power line away from any tourism establishments. Keep power line away from residential developments as far as possible. Keep powerlines as close to transportation routes and existing powerlines as possible.
Medium	Medium Sensitive Area	Retain natural vegetation as far as possible. Screen the power line from tourists, motorists, and residents as much as possible.

Low	Low Sensitive Areas	Screen the power line from tourists, motorists, and residents as much as possible. Re-introduce vegetation to increase the visual value	
Permits Required			
Competent Authority	N/A	Applicable legislation	N/A
Type	N/A	Time frame	

TABLES OF CONTENTS

Page

EXECUTIVE SUMMARY i

TABLES OF CONTENTS iii

LIST OF FIGURES viii

LIST OF TABLES viii

LIST OF ABBREVIATIONS viii

1. INTRODUCTION 9

1.1. BACKGROUND AND BRIEF 9

1.2. STUDY AREA 9

2. STUDY APPROACH 10

2.1. INFORMATION BASE 10

2.2. ASSUMPTIONS AND LIMITATIONS 10

2.3. LEVEL OF CONFIDENCE 11

2.4. METHOD 11

3. PROJECT DESCRIPTION 11

3.1. OVERVIEW OF DEVELOPMENT 11

3.2. PROJECT COMPONENTS AND ACTIVITIES 12

3.2.1. CONSTRUCTION CAMPS AND LAY-DOWN YARDS 12

3.2.2. ACCESS ROADS 12

3.2.3. POWER LINE 12

3.4. VISUAL CHARACTERISTICS OF PROJECT COMPONENTS 12

4. DESCRIPTION OF THE AFFECTED ENVIRONMENT 15

4.1. VISUAL RESOURCE 15

4.1.1. LANDSCAPE CHARACTER 15

4.1.2. VISUAL CHARACTER 15

4.1.2.1 Visual Value 16

4.1.2.2 Visual Quality 16

4.1.2.3 Visual absorption capacity 16

5. IMPACT ASSESSMENT 21

5.1. SIGNIFICANCE OF LANDSCAPE IMPACT 21

5.1.1. LANDSCAPE CHARACTER SENSITIVITY 21

5.1.2. SEVERITY OF POTENTIAL LANDSCAPE IMPACTS 22

5.2. SIGNIFICANCE OF VISUAL IMPACTS 24

5.2.1. VIEWER SENSITIVITY 24

5.2.1.1 Residents 24

5.2.1.2 Tourists 24

5.2.1.3 Motorists 25

5.2.2. SEVERITY OF POTENTIAL VISUAL IMPACTS 25

5.2.2.1 Potential visual impacts on residents 26

5.2.2.2 Potential visual impacts on tourists 28

5.2.2.3 Potential visual impacts on motorists 29

6. RECOMMENDED MITIGATION MEASURES 30

6.1. GENERAL 30

6.2. TRANSMISSION TOWERS *30*
6.3. ACCESS ROUTES *30*
6.4. CLEARED SERVITUDES *31*
6.5. CONSTRUCTION CAMPS AND LAYDOWN YARDS *31*
7. CONCLUSION **31**
APPENDIX 1 ..... **33**
LEVEL OF CONFIDENCE **39**
VISUAL RECEPTOR SENSITIVITY **40**
REFERENCES **41**

LIST OF FIGURES

Figure 1: Locality Map 10
Figure 2: Example of construction camps 12
Figure 3: Typical construction equipment 14
Figure 4: Vegetation Map 17
Figure 5: Land Cover Map 18
Figure 6: Elevation Map 18
Figure 7: Landscape character of study area 19
Figure 8: Existing Powerlines in the study area 20
Figure 9: Alternative 1 20
Figure 10: Alternative 2 20
Figure 11: Alternative 3 21
Figure 11: Viewer Sensitivity for Alternative 1 34
Figure 11: Viewer Sensitivity for Alternative 2 35
Figure 14: Viewer Sensitivity for Alternative 3 36

LIST OF TABLES

Table 1: Criteria of Visual Quality (FHWA, 1981) 16
Table 2: Visual Quality of the regional landscape 16
Table 3: Regional Visual Absorption Capacity evaluation 17
Table 4: Significance of impacts 21
Table 5: Landscape character sensitivity rating (Adapted from GOSW, 2006) 22
Table 6: Landscape impact – Altering the landscape character 23
Table 7: Potential visual impacts on residents 26
Table 8: Potential visual impacts on tourists 28
Table 9: Potential visual impacts on motorists 29
Table 10: Evaluation of Proposed Alternatives for the Kekana Substation and Powerlines 32
Table 11: Confidence level chart and description 39
Table 12: Visual receptor sensitivity 40

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 (Nsovo) has been appointed by Eskom Holdings SOC Limited, as the independent environmental consultant to undertake the Basic Assessment (BA) Process for the proposed Eskom Kekana Substation and Loop-in and Loop-out powerline servitude within the jurisdiction of the City of Tshwane, in the Gauteng Province.

Outline Landscape Architects was appointed by Nsovo as an independent sub-consultant to complete the 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 Environmental Impact Assessment and addresses the visual effects of the proposed line and substation on the receiving environment.

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):

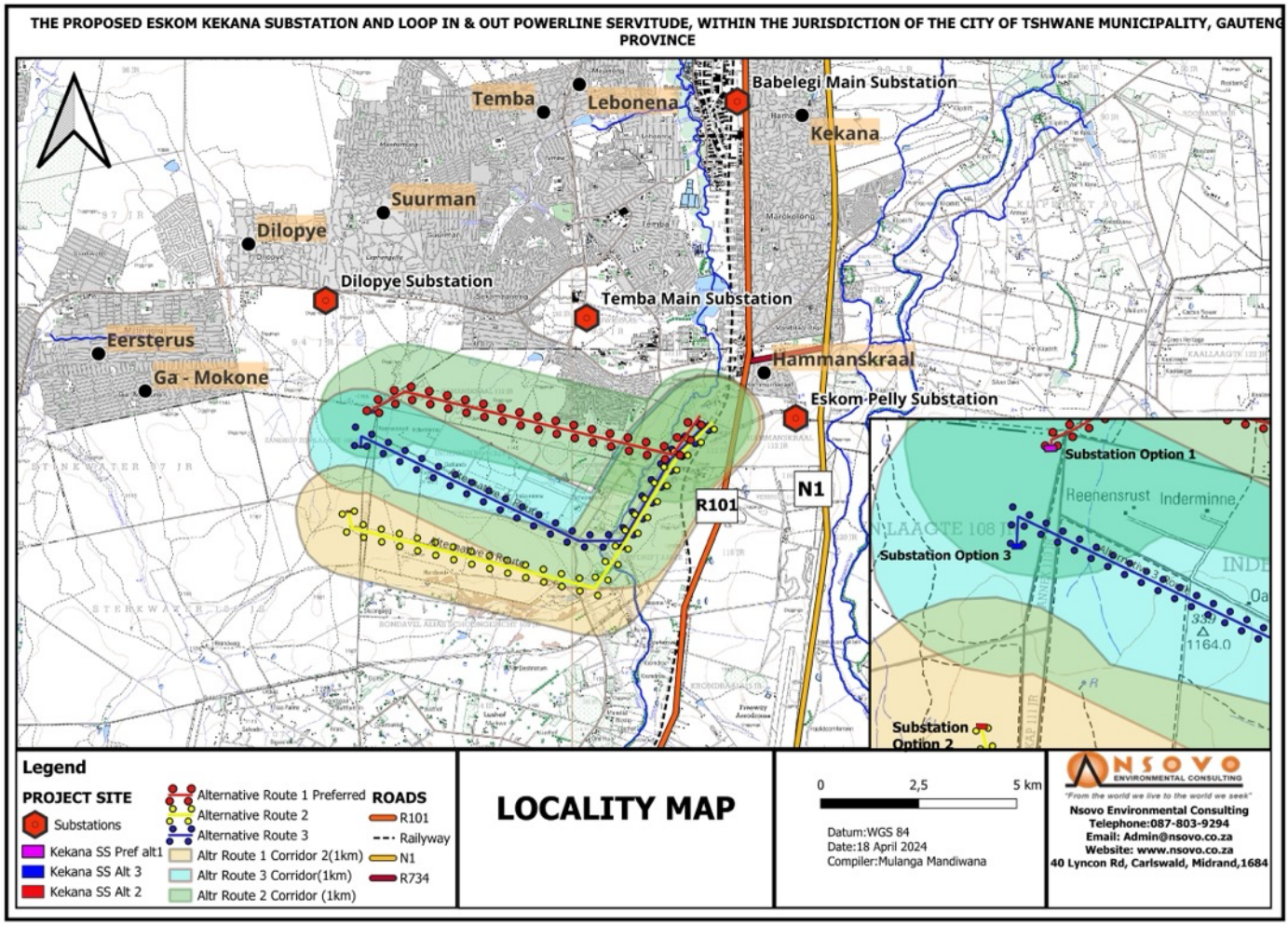
- Determination of the extent of the study area.
- Description of the proposed project and the receiving environment.
- Identification and description of the landscape character of the study area.
- Identification of the elements of particular visual value and -quality that could be affected by the proposed 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

There are three proposed site alternatives for the new Kekana substation and powerline, and they are located in Hammanskraal West.

Hammanskraal is located on the northern boundary of the Gauteng Province and is a trade-way hub linking the North West Province, Limpopo, Mpumalanga and Gauteng Province.

Figure 1: Locality Map



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 (2024) respectively.
- Observations made and photographs taken during site visits.
- Professional judgement based on experience gained from similar projects.
- 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 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 12).
- The site visit was conducted on the 14th of May 2024 and the photographs used in this report illustrate the character of the landscape in the autumn 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 11). 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 proposed route and the alternative 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.
- The findings of the study are documented in this Visual Impact Assessment.

3. PROJECT DESCRIPTION

3.1. OVERVIEW OF DEVELOPMENT

The Kekana substation project will entail:

Servitude Project

- Servitude acquisition for the proposed Kekana 132/22kV substation,100x150m Site.
- Acquire 31m wide servitude for the approximate 7km 132kV double circuit loop-in, loop out line from the existing Pelly-Temba Main 132kV line to Kekana substation.

New Substation and Loop in & Loop out lines

- Build a new 132/22kV 2 × 20MVA transformers Kekana substation.

- Install 4 × 22kV feeder bay.
- Loop in and out New Kekana substation with 2 × 7m 132kV TERN conductor on a double circuit structure from existing Pelly – Temba Main 132kV Bear conductor.

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. POWERLINE

The completed powerline will be 7km in length. If the mitigation measures recommended in this report, are implemented the impact can be managed.

A Viewer Sensitivity Map was generated for each alternative and is included in the Appendix 1, Figure 12, 13 and 14.

3.3. VISUAL CHARACTERISTICS OF PROJECT COMPONENTS

The powerline towers have an industrial character enforced by the double steel pole and the electrical cables between the towers. The entire powerline 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 powerline 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

Figure 3: Typical construction equipment

Typical example of helicopter

Typical example of crane

Typical example of tensioner station

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 varies between agriculture, game reserves, high-density residential and industrial. Hammanskraal is surrounded by an enormous agricultural environment. Agriculture is the base economic activity for the region. The area has a large concentration of grain and wheat farms and many farms producing animal feeds. Livestock and poultry farming is also very prevalent.

The Dinokeng Game Reserve, to the east of the region is a large and well maintained natural asset. This game reserve also contributes to the growth of the tourism sector in the area. Other game reserves include many smaller private natural resorts and recreation sites.

The remainder of the spatial composition of the region consists of a combination of rural and urban residential settlements in a decentralized model and an industrial development zone at Babelegi, to the north of the site, which is now partially functional and a cluster of retail offerings.

There are two main vegetation types in the study area, namely (Figure 4):

- Central Sandy Bushveld
- Springbokvlakte Thornveld

4.1.2. VISUAL CHARACTER

Visual character is based on human perception and the observer's response to the relationships between the landscape 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 is degraded, with little natural landscape intact, and new residential developments surrounding the site. This has 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 study area is developed around the site, with minimal pristine, natural landscape remaining. The pockets of natural landscape are under pressure and are vulnerable due to human settlement expansion and industrial developments.

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 1) that are internationally accepted indicators of visual quality (FHWA, 1981):

Table 1: 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 2.

Table 2: Visual Quality of the regional landscape

VIVIDNESS	INTACTNESS	UNITY	VISUAL QUALITY
2	2	2	Low

The low visual quality can be attributed to the degraded, residential, industrial and developed 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 3). 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 3: Regional Visual Absorption Capacity evaluation

VISUAL SCREENING	TERRAIN VARIABILITY	LAND COVER	VAC
1	1	1	low

The VAC of the study area is considered low and provides minimal overall screening capacity for this project. The low VAC relates to the slightly sloped topography and low-growing bushveld with some scattered higher trees. The regular forms and associated vertical posture of the proposed power line are not 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 4: Vegetation Map

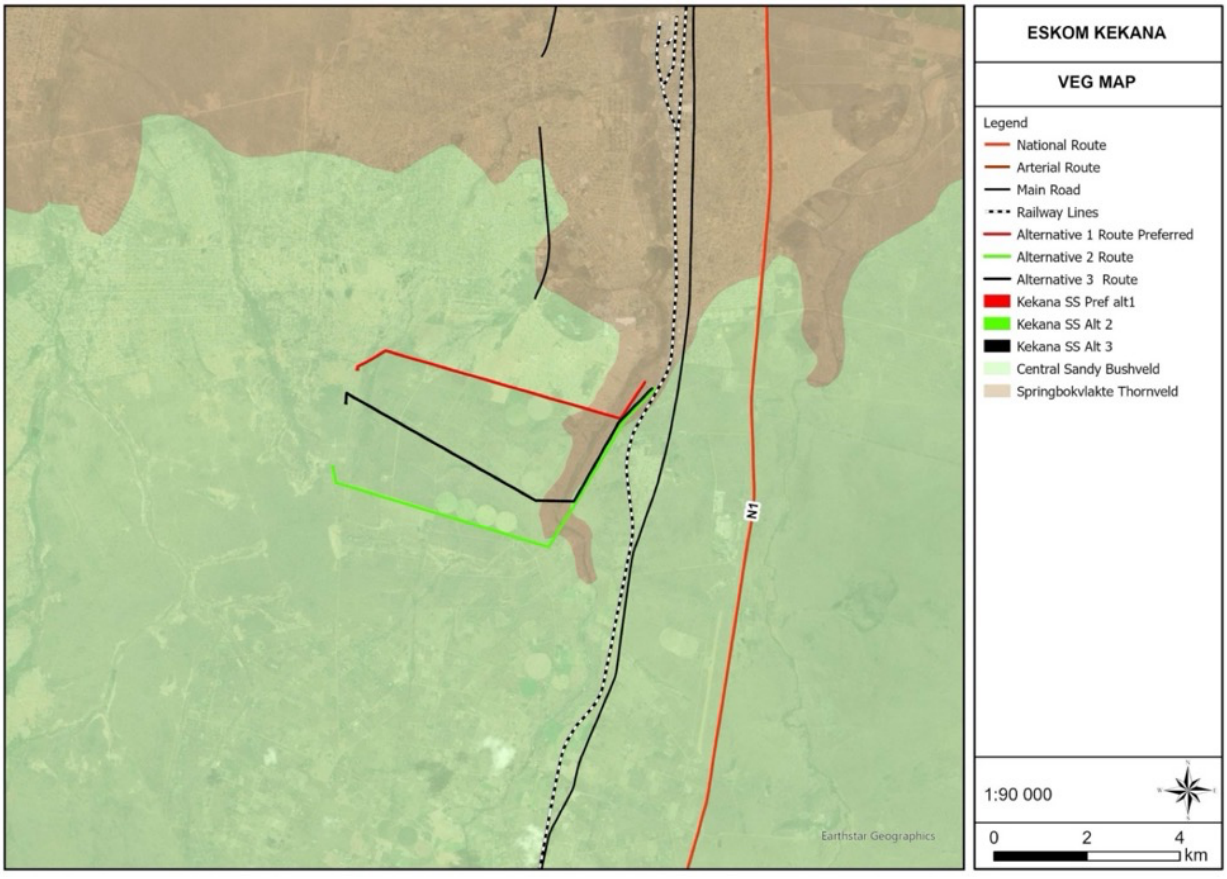


Figure 5: Land Cover Map

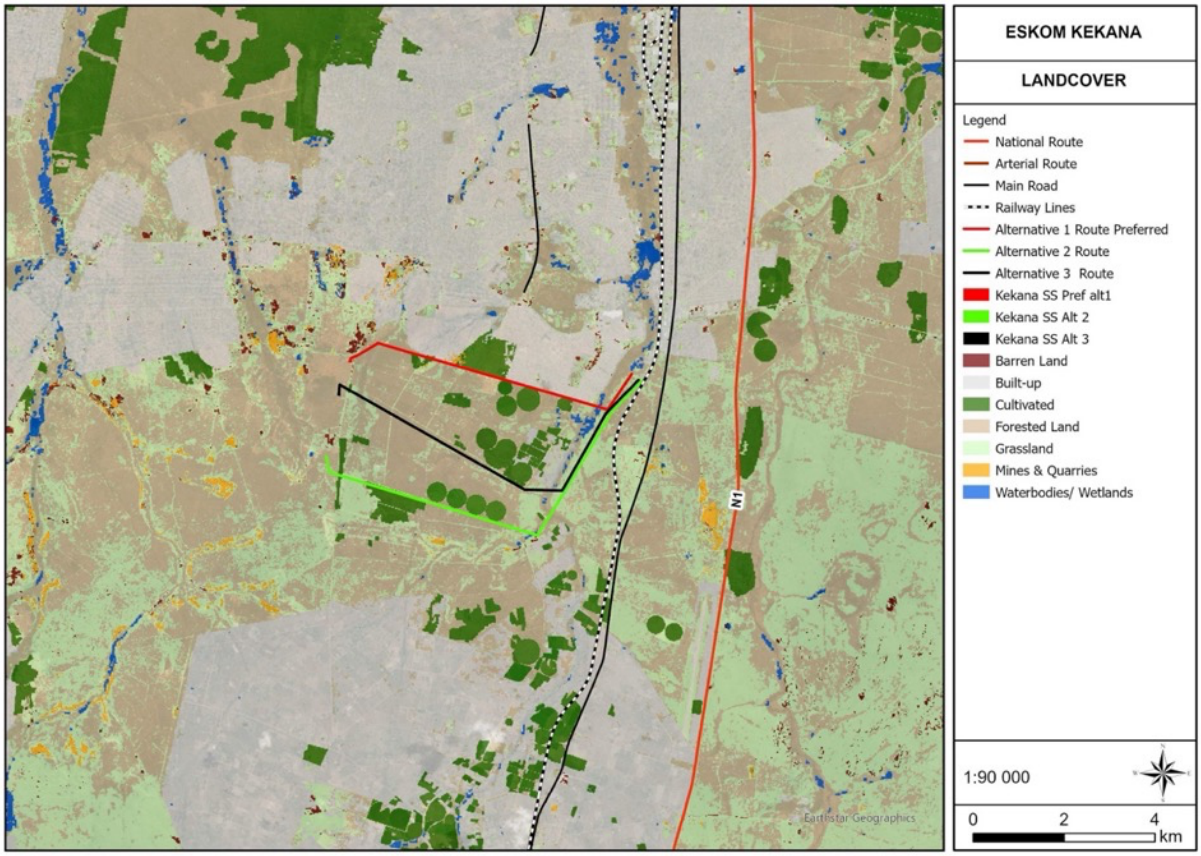


Figure 6: Elevation Map

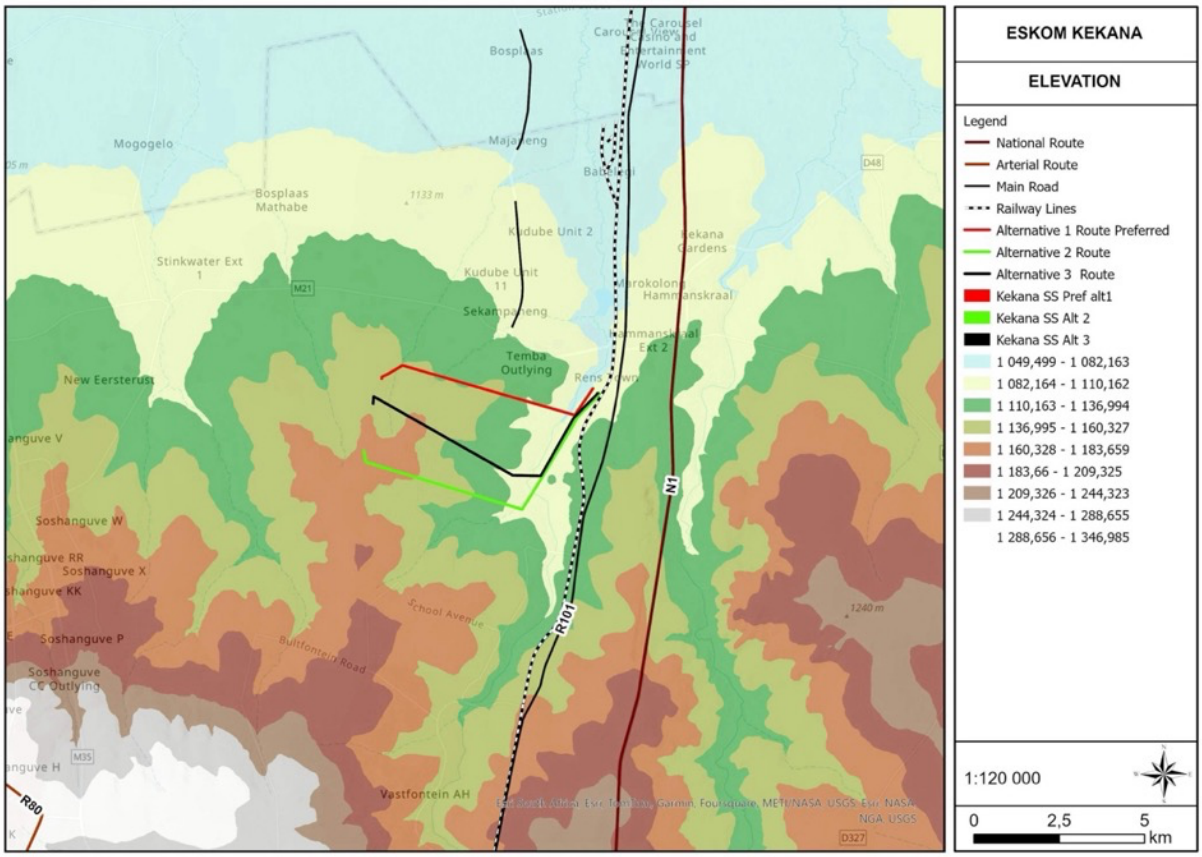


Figure 7: Landscape character of study area

Built-up residential to the north of site

Bushveld landscape to the south of site

Figure 8: Existing Powerlines in study area


Figure 9: Preferred Alternative 1


Figure 10: Alternative 2


Figure 11: Alternative 3

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 4).

Table 4: 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 low landscape character sensitivity due to the degraded condition of the landscape, the generally low visual quality. There is little tourism value in the direct study area. There is low terrain variability and thus a low VAC can be expected. The vegetation cover is low and consists of bushveld vegetation, much of it is degraded and denuded, which will provide low visual screening for the proposed project.

Previous human induced activities and interventions have impacted significantly on the original landscape character. In this case, large-scale residential, industrial and existing infrastructure, including power lines, roads, railways, 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 5) and applied in the classification of the study area into different sensitivity zones.

Table 5: 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.

The below table (Table 6) indicates the significance of the impact on the landscape with and without mitigation.

Table 6: 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								
Preferred Alternative 1 Kekana Substation and Powerline	Negative Impact on the visual quality of the landscape due to the presence of foreign elements and a loss of vegetation cover	Temporary	Permanent	Low	Definite	Low	Low	High
Alternative 2 Kekana Substation and powerline				Low	Definite	Low	Low	High
Alternative 3 Kekana Substation and Powerline				Low	Definite	Low	Low	High
Operational phase								
Preferred Alternative 1 Kekana Substation and Powerline	Negative Impact on the visual quality of the landscape due to the presence of a distribution line.	Regional	Permanent	Moderate	Definite	Moderate	Low	High
Alternative 2 Kekana Substation and Powerline				High	Definite	Moderate	Low	High
Alternative 3 Kekana Substation and Powerline				High	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.

Access roads 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.

Considering the low VAC throughout most of the study area, the degraded condition 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 the proposed route alternatives. Surface disturbances are also minimised through, for example, utilising existing roads.

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 powerline, i.e. that of the evenly spaced towers. The industrial character and the near monumental vertical scale of the towers will not be absorbed into the flat landscape character that prevails throughout the study area. The impact is mitigated by the presence of the existing powerlines, as viewers are accustomed by the powerlines.

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
- Motorists

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 on 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.

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
  - 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 distribution 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 and substations (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 for each alternative, which provides the following information (Figure 12, 13 and 14):

- 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.

Viewer sensitivity map was generated for the proposed Kekana substation and powerline alternatives (Figure 12,13 and 14).

5.2.2.1 Potential visual impacts on residents

Table 7: Potential visual impacts on residents

VISUAL IMPACT ON RESIDENTS – KEKANA SUBSTATION AND LOOP-IN LOOP-OUT POWERLINE								
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								
Preferred Alternative 1 Kekana Substation and Powerline	Negative – Construction camp and lay-down yard may cause unsightly views	Local	Temporary	Moderate	Probable	Moderate	Low	Low
Alternative 2 Kekana Substation and Powerline				Moderate	Probable	Moderate	Low	Low
Alternative 3 Kekana Substation and Powerline				Moderate	Probable	Moderate	Low	Low
Operational phase								
Preferred Alternative 1 Kekana Substation and Powerline	Negative – The presence of a power line intrudes on existing views and spoils the open panoramic views of the landscape.	Regional	Permanent	High	Definite	Moderate	High	High
Alternative 2 Kekana Substation and Powerline				High	Definite	Moderate	Low	High
Alternative 3 Kekana Substation and Powerline				High	Definite	Moderate	Low	High

The study area is highly populated, especially around the proposed Preferred Alternative 1. The living environment is very degraded and polluted. There will be a high 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 high degree of visual intrusion.

The Preferred Alternative 1 is proposed to run very close to the Hammanskraal West residential area. Alternative 2 and 3 are proposed further south and cross over less populated landscape with degraded bushland vegetation and land used for agriculture.

There are existing powerlines near the Preferred Alternative 1 line and already in the visual field of the residents. The new lines and substation should not have a very high negative visual impact and spoil the views they currently experience. The substation position for Alternative 1 is proposed on degraded land, with little visual value.

Alternative 2 and 3 will affect few residents on smallholdings that value open space and a sense of remoteness. More natural landscape will have to be denuded and removed for the servitudes and the substations. Therefore Alternative 1 is the preferred option.

The Visual Absorption Capacity (VAC) of the landscape of the proposed substation and powerlines for all alternatives does not decrease the severity of visual impact (*Bishop et al, 1985*) by creating a backdrop. The steel frames of the towers present 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.

It is apparent from the existing power lines in the study area that one is visually exposed to the line in close proximity of the line, but the impact is absorbed into the distance by the landscape, which allows the powerline and substation to be placed in the most favourable position causing the least amount of visual impact. Therefore, the significance of the impact can be regarded as moderately low.

5.2.2.2 Potential visual impacts on tourists

Table 8: Potential visual impacts on tourists

VISUAL IMPACT ON TOURISTS – KEKANA SUBSTATION AND LOOP-IN LOOP-OUT POWERLINE								
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								
Preferred Alternative 1 Kekana Substation and Powerline	Negative – Construction camp and lay-down yard may cause unsightly views.	Local	Temporary	Low	Improbable	Low	Low	High
Alternative 2 Kekana Substation and Powerline				Low	Improbable	Low	Low	High
Alternative 3 Kekana Substation and Powerline				Low	Improbable	Low	Low	High
Operational phase								
Preferred Alternative 1 Kekana Substation and Powerline	Negative – The presence of a power line intrudes on existing views and spoils the open panoramic views of the landscape.	Regional	Permanent	Low	Probable	Low	Low	High
Alternative 2 Kekana Substation and Powerline				Low	Probable	Low	Low	High
Alternative 3 Kekana Substation and Powerline				Low	Probable	Low	Low	High

The study area is located to the west of the Dinokeng Nature Reserve, which is a prominent tourist destination in the Gauteng Province. Smaller private game reserves including the Sterkwater Nature Reserve is found to the south-west of the site. The smaller game reserves have lower volumes of tourists.

Construction phase

The temporary duration of the construction phase is not expected to cause any visual impacts. The potential visual impact, if any, on tourists during the construction phase of the proposed project can be mitigated with relative ease.

Operational phase

Few tourists visit the direct study area and are not expected to be affected by the substation and powerline in the study area.

The severity of the visual impact of the power line on tourists will be low.

5.2.2.3 Potential visual impacts on motorists

Table 9: Potential visual impacts on motorists

VISUAL IMPACT ON MOTORISTS – KEKANA SUBSTATION AND LOOP-IN LOOP-OUT POWERLINE								
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								
Preferred Alternative 1 Kekana Substation and Powerline	Negative – Intruding on existing views of the landscape.	Local	Temporary	Low	Probable	Low	Low	Low
Alternative 2 Kekana Substation and Powerline				Low	Probable	Low	Low	Low
Alternative 3 Kekana Substation and Powerline				Low	Probable	Low	Low	Low
Operational phase								
Preferred Alternative 1 Kekana Substation and Powerline	Negative – Intruding on existing views of the landscape.	Regional	Permanent	Low	Definite	Low	Low	High
Alternative 2 Kekana Substation and Powerline				Low	Definite	Low	Low	High
Alternative 3 Kekana Substation and Powerline				Low	Definite	Low	Low	High

Hammanskraal is a trans-provincial region that functionally connects and spreads along 4 provinces. The N1 is the major transportation route to the east of the site. The secondary road is the R101 carrying less volumes of traffic and local motorists.

The duration of motorist's 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

The proposed Preferred Alternative 1 is close to high density residential areas expanding from Hammanskraal West. Existing powerlines are present, and motorists are used to the visual intrusion. Alternative 2 and 3 will be visible mostly to motorists using local dirt roads. These roads carry very low volumes of traffic as the roads are no thorough-fare roads.

All three alternatives are proposed to run along the R101 for a short distance. There are already existing powerlines also crossing the R101 connecting to the Eskom Pelly Substation.

The severity and significance of visual impact for the proposed alternatives on motorists will be low. Existing powerlines within the area and the speed at which motorists travel 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

- Endemic plants should be salvaged, if possible, where areas are going to be disturbed through the destruction of vegetation, for example, the establishment of the construction camp, 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. DISTRIBUTION TOWERS

- Avoid, as much as possible, 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 denser than the other two tower types, hence creating more visual obstruction.
- 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, as much as possible, 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.
- 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.
- Avoid, as much as possible, 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.
- Keep the construction camps away from existing residents and especially lodges and tourist venues.

7. CONCLUSION

The extent of the visibility for the proposed project for all three alternatives is similar. The proposed Preferred Alternative 1 will be routed closer to the high-density residential development, which may have a higher visual impact on residents.

There are existing powerlines near the Preferred Alternative 1 line and already in the visual field of the visual receptors. The new lines and substation should not have a very high negative visual impact and spoil the views they currently experience. The substation position for the Preferred Alternative 1 is proposed on degraded land. Overall visual value of the study area is low as the area is degraded and polluted.

Alternative 2 and 3 have a higher impact to the south of the site where more natural landscape is found with some tourist activities, within private game reserves and recreational resorts. More natural landscape will have to be denuded and removed for the servitudes and the substations. Therefore Alternative 1 is the preferred option.

Existing powerlines within the area have a moderating effect on the severity of the visual impact and further reduces visual exposure.

If the mitigation measures are implemented and the recommendations are adhered to, this project can proceed with a very low visual impact.

Table 10: Evaluation of proposed Eskom Kekana Substation and Loop In and Loop Out Powerline

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
The visibility analyses consider worst-case scenarios, using line-of-sight, based on topography alone. The impacts for the construction phase are insignificant, while impacts for the operational phase are rated below.							
Visual Impact of proposed Activities							
Preferred Alternative 1 Kekana Substation and Powerline	No	Negative	2 (Local)	5 Permanent	4 Low	4 High	44 Medium
	Yes	Negative	2 (Local)	5 Permanent	4 Low	3 Medium	33 Medium
Alternative 2 Kekana Substation and Powerline	No	Negative	2 (Local)	5 Permanent	6 Moderate	4 High	52 Medium
	Yes	Negative	2 (Local)	5 Permanent	4 Low	3 Medium	33 Medium
Alternative 3 Kekana Substation and powerline	No	Negative	2 (Local)	5 Permanent	6 Moderate	4 High	52 Medium
	Yes	Negative	2 (Local)	5 Permanent	4 Low	3 Medium	33 Medium

The Visual Impact Assessment Criteria for all activities as indicated in Table 10 applies and is rated as per below:

Status of Impact:
The visual impact is assessed as either having a:

- Negative effect (i.e. at a cost to the environment),
- Positive effect (i.e. a benefit to the environment), or
- Neutral effect on the environment.

Extent of the Impact:

(1) Site (site only),
(2) Local (site boundary and immediate surrounds),
(3) Regional,
(4) National, or
(5) International.

Duration of the Impact:
The length that the impact will last for is described as either:

(1) Immediate (<1 year)
(2) Short term (1-5 years),
(3) Medium term (5-15 years),
(4) Long term (ceases after the operational life span of the project),
(5) Permanent.

Magnitude of the Impact:
The intensity or severity of the impacts is indicated as either:

(0) none,
(2) Minor,

(4) Low,
(6) Moderate (environmental functions altered but continue),
(8) High (environmental functions temporarily cease), or
(10) Very high/unsure (environmental functions permanently cease).

Probability of Occurrence:
The likelihood of the impact actually occurring is indicated as either:
(0) None (the impact will not occur),
(1) Improbable (probability very low due to design or experience)
(2) Low probability (unlikely to occur),
(3) Medium probability (distinct probability that the impact will occur),
(4) High probability (most likely to occur), or
(5) Definite.

Significance of the Impact:
Based on the information contained in the points above, the potential impacts are assigned a significance rating (S). This rating is formulated by adding the sum of the numbers assigned to extent (E), duration (D) and magnitude (M) and multiplying this sum by the probability (P) of the impact.
S= (E+D+M) P

The significance ratings are given below:

- (<30) low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
- (30-60) medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- (>60) high (i.e. where the impact must have an influence on the decision process to develop in the area).

APPENDIX 1

Figures 12, 13 and 14 reflect the results of a viewer sensitivity visibility analysis for each alternative, carried out using GIS software. The results provide a clear interpretation of the extent of the visual influence that can be expected in areas.

Figure 12: Visibility Analysis Eskom Kekana Substation and Powerline Preferred Alternative 1

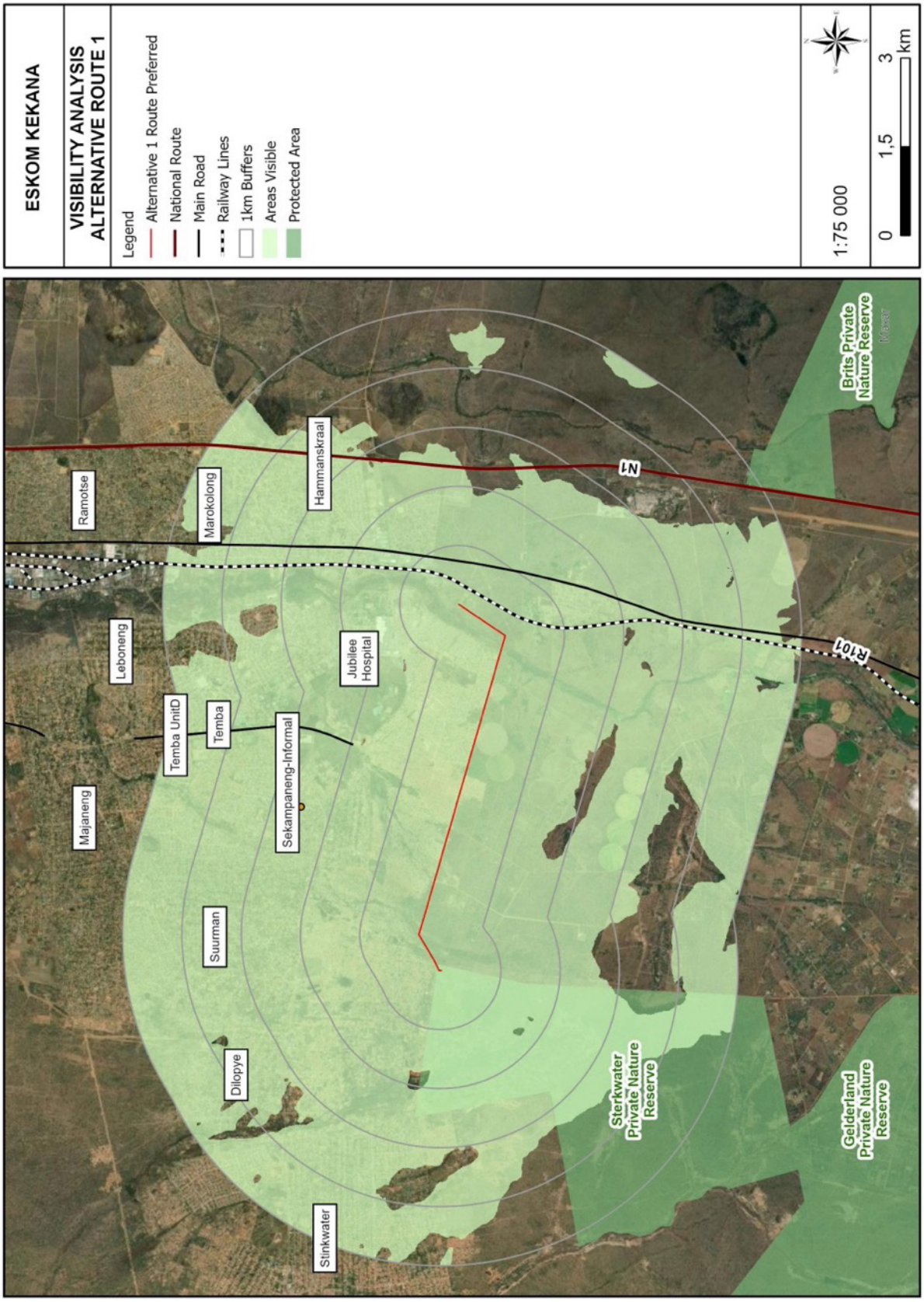


Figure 13: Visibility Analysis Eskom Kekana Substation and Powerline Alternative 2

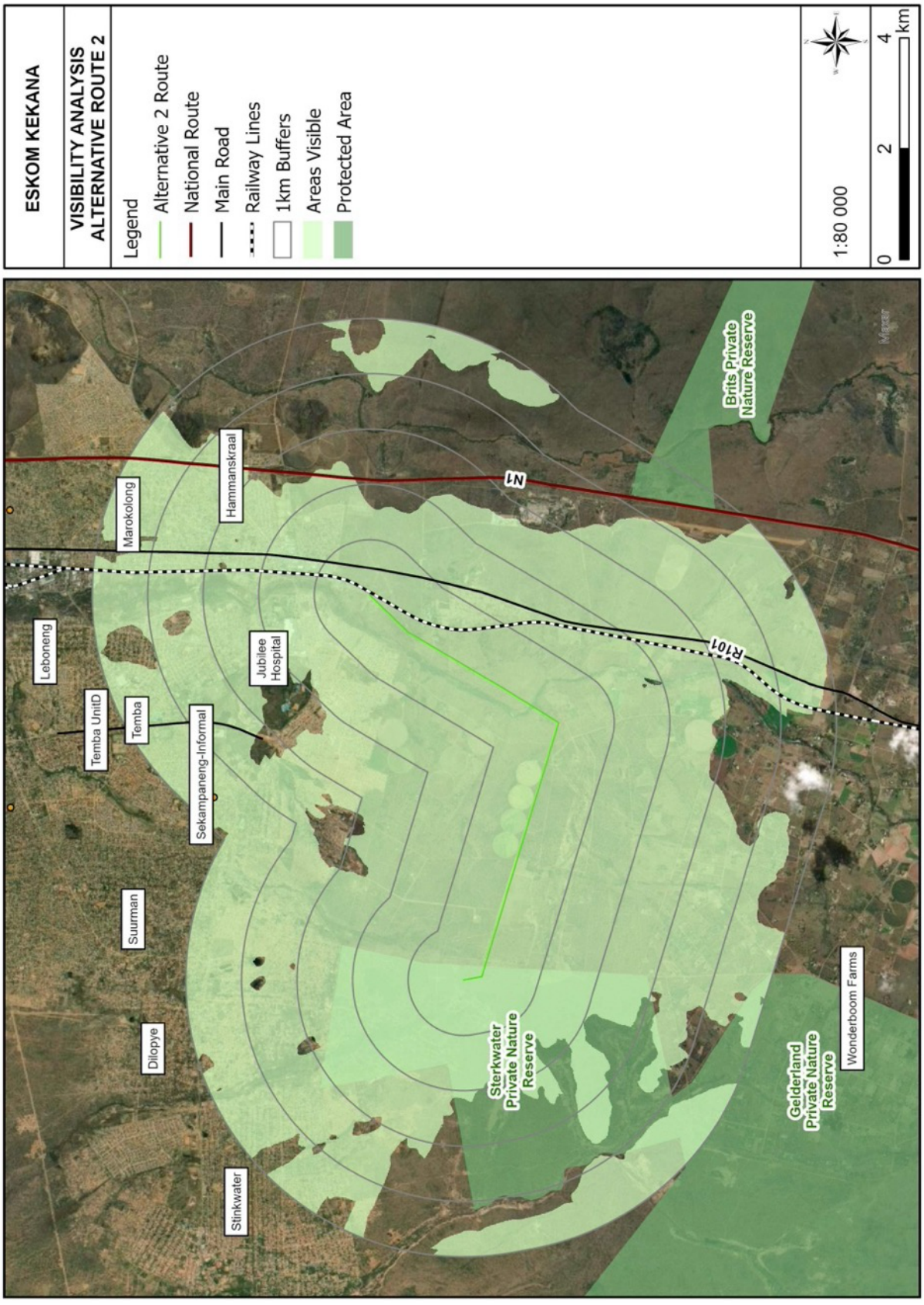
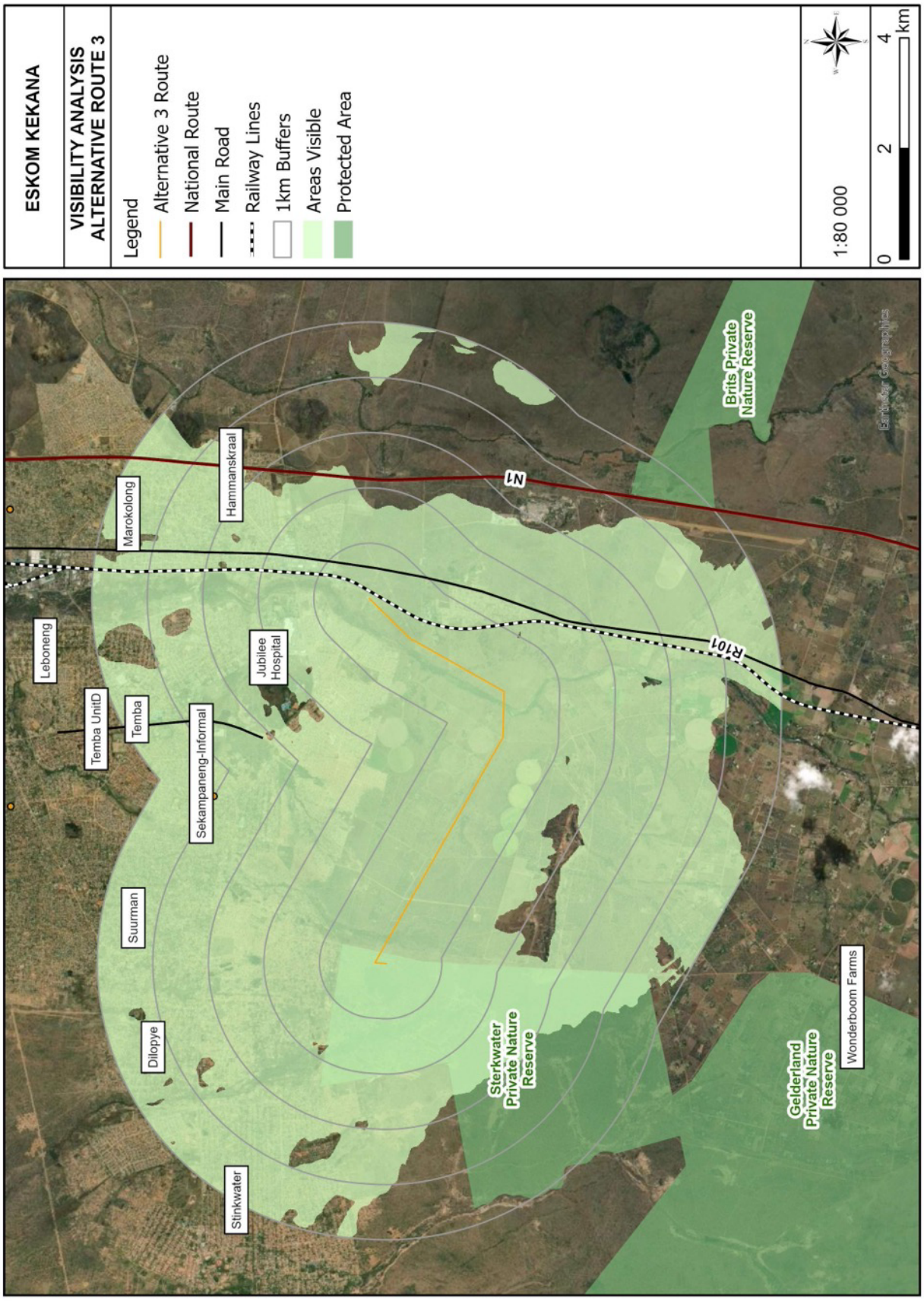


Figure 14: Visibility Analysis Eskom Kekana Substation and Powerline Alternative 3



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 a 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 11: 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 12: 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.