aurecon

BOSA Transmission Interconnection Project

27 November 2017

Revision: 2

Reference: 112581

Visual Impact Assessment – Impact assessment phase input

SAPP

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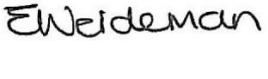
Author signature		Approver signature	
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List of acronyms

BOSA	Botswana South Africa
DEA & DP	Department of Environmental Affairs and Development Planning
EIA	Environmental Impact Assessment
EISA	Environmental Impact and Social Assessment
GIS	Geographic Information System
GPS	Geographical positioning System
MCDM	Multi Criteria Decision Making
NEMA	National Environmental Management Act
SAPP	South African Power Pool
VIA	Visual impact assessment
3D	Three-dimensional
Mamsl.	Meters above mean sea level

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Glossary

Alternatives	A possible course of action, in place of another, that would meet the same purpose and need defined by the development proposal. Alternatives considered in the ESIA process can include location and/or routing alternatives, layout alternatives, process and/or design alternatives, scheduling alternatives and input alternatives.
Environmental Impact Assessment	A public process that is used to identify, predict or cause the least damage to the environment at a cost acceptable to society, in the long term as well as in the short term.
Intensity	The magnitude of the impact on views, scenic or cultural resources.
Impact (Visual)	A description of the effect of an aspect of the development on a specified component of the visual, aesthetic or scenic environment within a defined time and space.
Issue (visual)	Issues are concerns related to the proposed development on a specified component of the visual, aesthetic or scenic environment within a defined time and space.
Level 4 assessment	Identification of issues raised during the scoping phase, site visit; description of the receiving environment and the proposed project; establishment of view catchment area, view corridors, viewpoints and receptors; indication of potential visual impacts using established criteria; description of alternatives, mitigation measures and monitoring programmes; 3D modeling and simulations, with and without mitigation.
Receptors	Individuals, groups or communities who are subject to the visual influence of a project.
Sense of place	The unique quality or character of a place, whether natural, rural or urban
Scoping	The process of determining the key issues, and the space and time boundaries to be addressed in an environmental assessment
Significance	The significance of impacts can be determined through a synthesis of the aspects produced in terms of their nature, duration, intensity, extent and probability.
Viewpoint	A selected point in the landscape from which views of a project or another feature can be obtained.
Viewshed	The outer boundary defining a view catchment area, usually along crests and ridgelines
Visibility	The geographic area from which the project will be visible.
Visual absorption capacity	The ability of an area to visually absorb development because of screening topography, vegetation or structures in the landscape.
Visual exposure	The relative visibility of a project or feature in the landscape. See also *zone of visual influence*.
Visual Impact Assessment	A Visual Impact Assessment simulates and predicts the significance and magnitude of the visual effects on the landscape.
Visual Intrusion	The level of compatibility or congruence of the project with the qualities of the area, or its sense of place. This is related to context and maintaining the integrity of the landscape or townscape.

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Executive Summary

Project description

Aurecon has been appointed to undertake an Environmental and Social Impact Assessment (ESIA) study to assess and address environmental and social impacts associated with Botswana-South Africa (BOSA) Transmission Interconnection Project. A visual assessment of the study area is required to inform the ESIA of the potential impacts posed by the construction and operational activities of the proposed project.

The Southern African Power Pool (SAPP) CC has initiated the BOSA Transmission Interconnection Project on behalf of Eskom of South Africa and Botswana Power Corporation of Botswana. The interconnector infrastructure components consist of a 400kV transmission line of approximately 210km, connecting the existing Isang 400kV substation in Botswana to the Watershed B area, close to Mafikeng in the North-West province of South Africa.

Terms of Reference

The scope of the study is to define the spatial context of influence of the proposed development/s in terms of the visibility of the overhead transmission lines, the substation and to identify potential sensitive receptor locations.

In terms of the *Guideline for Involving Visual and Aesthetic Specialist on EIA Processes* (Oberholzer, 2005), the depth and scope of a VIA should be based on a combination of the sensitivity of the existing environment and the nature of the development. The type of environment and type of development are both divided into five categories. The proposed development has been categorised as a Category 5 development (large scale infrastructure) and the environment has been categorised as “an area with medium scenic, cultural and historic significance”. The development can be expected to result in a development of moderate to high visual impact, which will require a Level 4 visual assessment.

Typically, a Level 4 visual assessment includes the following:

- Identification of issues raised in the scoping phase, and a site visit;
- Description of the receiving environment and the proposed project;
- Establishment of view catchment area, and receptors;
- Indication of potential visual impacts using established criteria;
- Inclusion of potential lighting impacts at night;
- Description of alternatives, mitigation measures and monitoring programmes; and
- Visual simulations with and without mitigation.

Approach

The VIA approach is based on Oberholzer (2005). The guideline draws on best practice in EIA and provides guidance applicable to visual specialist assessment. The study will be divided into a baseline phase and an assessment phase.

The baseline phase will describe the visual resource and the technical information associated with the proposed development. The description of the visual resource includes:

- The baseline conditions in terms of the **landscape character;**
- The **landscape quality** in terms of the visual absorption capacity and overall aesthetic appeal which included the existing land cover, intrinsic physical properties, landform, vegetation, water, colour, adjacent scenery, scarcity and cultural modifications;

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- The **visual receptors** and;
- The **sense of place**/*genius loci*

The technical information focuses on the main project components.

The assessment phase consists of the following tasks:

- Analysis of the proposed development in terms of the criteria such as **visual intrusion**, **visibility**, **visual exposure, visual absorption capacity** and **viewer sensitivity** to determine the **intensity** of the impact. A 3D GIS terrain model will be used to assess the visibility of the infrastructure or parts thereof, from significant viewpoints within the viewshed.
- Emphasis will be placed on potential visual receptors and critical views towards the proposed development. Photographs and a GPS will be used to record relevant geographical locations within the vicinity of the corridor. Unique viewpoints will be selected per land uses and different landscape characteristics.
- Determine the impact **significance** by synthesising the assessment criteria as described above.
- Recommend **mitigation measures** to reduce the potential negative impacts; and
- Photomontages will be used to compare the existing views with the probable effect of the proposed infrastructure.

Gaps and Limitations

The following limitations and assumptions are applicable to this report:

- Determining a visual resource in absolute terms is not achievable. It is a complex procedure since it is determined through a combination of quantitative (visibility) and qualitative (aesthetic value) criteria. Therefore, a VIA cannot be *entirely* objective in this sense. Individuals will evaluate a landscape differently, based on experience, culture and social background.
- Various factors can enhance or reduce the visual impact of the proposed project, for instance, vegetation near a receptor's view of the proposed project. Other factors include weather, climatic conditions and seasonal change. It is therefore difficult to determine the visual impact of the proposed project from the viewpoint of each individual receptor.
- The layouts and technical designs provided are conceptual. Therefore, the possibility of adaption exists. Should there be any significant changes in the designs of the proposed infrastructure, these changes may have to be re-assessed.
- The exact position for construction camps and laydown areas are not available at this stage therefore related detailed viewpoints towards the proposed impact cannot be determined.

Main characteristics of the study area

South Africa

The landscape character is defined by the vast, open flat terrain, the predominant agricultural and natural landscape features and overall rural feel. Dispersed rural settlement areas, formal towns and grasslands will likely have little screening value in terms of visual impact. The topography between the proposed Watershed B Area substation and the South Africa – Botswana border is predominantly uniform with the dominant topographical feature being flat plains. A series of consecutive ridges and isolated higher lying topographical areas are located north of the N4 and south of the South Africa - Botswana border. The lower lying areas between the consecutive ridges consists of drainage lines. Mean elevation ranges from 779 meters above mean sea level (mamsl) in the lowest point to 2328 mamsl at the highest point.

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The study area's land cover consists of:

Cultivated areas

Commercial farming – The study area consists of several game and cattle farms, for which the exact location and size is not available. Game farms provide for the management of large areas of natural rangeland with the commercial objective of producing livestock or game animals for hunting. Some other cultivated farming activities (croplands) are located north east of Mafikeng, lying west of the proposed alignment. Most of these farming activities are mostly concentrated close to larger towns.

Mining

Mining and its related activities (waste dumps, settling ponds) makes a significant contribution to the economy of the study area. Mines are concentrated around formalised towns or cities such as Ottoshoop (Chrome mining) and Nietverdiend (Fluorspar mining). This landscape type is not directly associated with the project as the closest mine is located 7km away from the proposed alignment and the impacts on this specific type of landscape will not be further assessed.

Rural and urban settlements

Larger formalised towns - these include Mafikeng, Ottoshoop, Zeerust and Nietverdiend. These towns consist of a combination of commercial, educational, institutional, business and residential land uses.

Rural settlements – Larger rural settlements are sparsely located north of the N4. Rural settlements include villages and gardens of traditional areas.

Natural landscape

Natural landscape – The largest part of the study area consists out of natural areas with wilderness characteristics. These types of landscapes have important well - being value contributing to the sense of place and aesthetic appeal. The type of natural landscapes includes wetlands, woodlands, indigenous forest and shrubland.

Protected areas

There are a few formalised protected areas, mostly categorised as nature reserves, which are an important green economy resource due to their wildlife and tourism potential. These areas are specifically set out for conservation purposes which includes a range of land use activities. These protected areas are mostly located along the South Africa - Botswana border, the largest one being the popular Madikwe Nature Reserve, located east of the preferred alignment.

The study area mostly falls within the Savanna biome (mosaic bushveld zone). Per Mucina and Rutherford this main biome type has an herbaceous layer usually dominated by grass species and a discontinuous, open tree layer. Tree canopies are often an irregular series of interlocking (often low) canopies with openings and sometimes little distinction between tall shrubs and small trees.

In lower lying areas, such as river gorges*, Acacia* and *Combretum* are the dominant tree species whereas higher lying areas are mostly covered by open, tall grasslands, often dotted with bushes and solitary Savanna trees. Extensive flat plains or areas of moderate undulating landscapes support various units ranging from sparsely scattered solitary trees and shrubs to a mosaic with typical savanna thornveld, bushveld and thicket patches.

The proposed overall study area has a rural feel with an even outstretched natural landscape, intercepted by dispersed rural settlements, homesteads and infrastructure associated with commercial agricultural activities.

The landscape is uncluttered, creating a homogenous visual quality with minimal vertical elements. Lower shrubland type vegetation with sparsely spaced trees and cultivated fields are predominantly spread over the study area. The visual absorption capacity (VAC) in terms of:

- Topography is moderate – low
- Pattern/Diversity is low
- Vegetation height is moderate - low

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The overall landscape quality is considered moderate - high because of the dominant horizontal scale of the study area, minimal man-made structures, little visual discontinuity and interruption of the natural environment.

Botswana

The Landscape character is defined by a smooth patchwork of smaller scale agricultural fields and an overall rural feel. The landscape offers little to no vertical definition in terms of manmade or natural features.

The uninterrupted flat terrain defines the dominant horizontal scale of the landscape north of the South Africa Botswana border towards Mochudi. The proposed corridor crosses two river valleys, north of Mochudi, offering some variation on the largely even topography.

Landscape types is measured by mapping land cover. Land cover describes the physical make up of an area based on interpretation of satellite imagery.

Most the study area's land cover consist of:

Cultivated areas

Subsistence farming – Small scale farming activities are located north of the border; it is expected that these are associated with small rural settlements.

Rural and urban settlements

Larger formalised towns - the only formalised town, lying west of the proposed alignment is Mochudi.

Rural settlements - Larger rural settlements are sparsely located north of the South Africa – Botswana border. Rural settlements include villages and gardens of traditional areas.

Natural landscape

The largest part of the study area, north of the South Africa Botswana border consists out of natural areas with wilderness characteristics. These types of landscapes have important well - being value contributing to the sense of place and aesthetic appeal. The type of natural landscapes includes riverine, wetlands grassland and shrubland.

Limited spatial information is available on the extent and types of vegetation found within the study area located within Botswana. Most the area is covered with the following Savanna/Woodland vegetation units:

Hardveld: Dominant species *Peltophorum africana* and *Acacia tortilis/ Terminalea sericea*

Transition Sandveld/Hardveld: Dominant species *Acacia tortilis/ Terminalea sericea* and *Ziziphus mucronata*

Sandveld: dominated by trees species *Vachellia erioloba*, *Terminalia sercicea and Lonchocarpus nelsii.*

The open and expansive semi-arid landscape is separated by patchworks of subsistence farming and is further defined by a flat to slightly undulating terrain.

The landscape is uncluttered, creating a homogenous landscape quality with minimal vertical elements. Lower shrubland type vegetation with sparsely spaced trees (becoming even more dispersed as one moves northwards) and cultivated fields are predominantly spread over the study area. The VAC in terms of:

- Topography is low
- Pattern/Diversity is low
- Vegetation height is moderate - low

Opportunities and constraints

Technical structures have not yet been chosen, therefore an informed decision cannot yet be made with regards to the visual impact of the power lines.

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The exact location of the transmission line within the corridor has not yet been fixed; where the proposed transmission line crosses a series of ridges, the line should be positioned in such a manner that it runs parallel with the lowest lying area, higher lying ridges on both sides will form a natural visual buffer.

Tourism livelihood are in some instances attached to large undeveloped tracts of land with high visual resource value. The proposed corridor borders the Madikwe, Duprenella and Olyvenbuilt Private Nature Reserves on its eastern boundary. The corridor could negatively influence sensitive views within the reserves, therefore a detailed map of the reserves must be obtained to confirm this and to determine if lodges, private houses, look out points, walking trails or views from bird hides are visually negatively affected.

Impact assessment

During the scoping phase a high-level impact assessment was undertaken. A list of impacts was identified but only the following impacts will be further assessed during the ESIA phase.

- The visual impact of construction camps and laydown areas in natural areas changing the:
  - Sense of place
  - Landscape quality
  - Landscape character

And altering the VAC in terms of:

  - Vegetation
  - Pattern/diversity

- The visual impact of transmission lines in natural areas changing the:
  - Sense of place
  - Landscape Quality
  - Landscape character

And altering the VAC in terms of:

  - Slope
  - Vegetation
  - Pattern/Diversity

- The visual impact of access roads in protected areas, changing the:
  - Sense of place
  - Landscape quality
  - Landscape character

And altering the VAC in terms of:

  - Vegetation
  - Pattern/Diversity

- The visual impact of cleared servitudes in natural areas, changing the:
  - Sense of place
  - Landscape quality

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- Landscape character

And altering the VAC in terms of:

- Vegetation
- Pattern/Diversity

Mitigation measures

The potential impacts related to the transmission line relate to its assumed maximum height of up to 30.75m and the metallic, industrial aesthetic that contrast with the typically flat and rural character of the study area. Mitigation strategies include:

- The management of the potential visual impacts associated with the transmission line should focus on careful alignment to avoid sensitive areas such as elevated ridges, koppies and pans that could be conserved as visual assets for tourist related activities. Where possible, a minimum buffer of five times the height of the pylons should be allowed between the alignment and any of the natural features;
- Advantage should be taken of existing vertical features such as rows of tall trees to serve as a backdrop or screen for the transmission line;
- The alignment of the transmission line should maintain as much distance as possible from large concentrations of potential viewers;
- The design of the pylon structure should attempt to reduce the bulk of the steel girders thereby presenting a lighter structure with lesser silhouette and;
- Where the route crosses over several ridges, running parallel to the proposed route, the alignment should be in the lower section so that the ridge lines form a visual screen from both sides.

The potential visual impacts associated with construction and maintenance of access roads are related to the need to clear vegetation and minor earthworks. The clearance of vegetation has the greatest potential to produce visual impacts. Clearing of vegetation especially in long straight lengths impacts on the sense of place, visual quality and landscape character.

Mitigation strategies include:

- Make use of existing access roads where feasible;
- Locate access roads so that it minimizes modification of the existing topography and the removal of large trees, roads should curve around natural features, mature trees and shrub thickets;
- New access roads should not extend in straight lines for distances of more than 50m;
- Match the alignment and construction method of new access roads to the topography and to the surrounding farm roads or tracks;
- Locate new access roads away from visual assets such as pans, ridges and koppies;
- New access roads must be at a minimum width requirement;
- Where access roads are constructed in agricultural areas, the shortest routes should be followed to the adjacent farm roads;
- Where the transmission line crosses a main road and views along the access roads extend for a significant length, the sightline should be reduced to a couple of meters by either curving the road or by aligning it alternatively on either side of the transmission line servitude;
- Access roads shall not cross over the crest of elevated landforms such as koppies and ridges, and;

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- Roads shall run parallel to and at a minimum distance of at least the height of the feature from the outline of the foot slopes.

The potential visual impacts associated with the initial clearing and on-going maintenance of servitudes are related to the need to clear vegetation over a certain height as they could pose a fire risk to the transmission line. The clearing of vegetation would most likely result in a loss of visual quality and reduced visual absorption capacity along the servitude.

- Avoid a linear path of cleared vegetation that would strongly contrast with the surrounding landscape character;
- Where the alignment should pass over dense stands of trees and shrubs or over areas of tall trees, either increase the height of the transmission line above the safe margin or reduce the extent of flammable material while allowing a natural transition of vegetation height and allowing tall trees to remain, and;
- The vegetation within the servitude should not be cut to an even height across the servitude instead the vegetation mass should rather be reduced by removing material from each of the vegetation layers, allowing for a diversity of height and plant material;

The potential visual impacts of construction camps and laydown areas relate to the possible clearing of vegetation and the foreign scale and aesthetics of the structures, security and stockpiled materials.

- Locate construction camps outside of visually sensitive areas and away from critical view sources such as main roads, existing urban and rural settlements and public gathering areas such as schools, sporting facilities, community halls etc.;
- Do not locate campsites in areas where it will be necessary to remove trees and shrubs or large areas of well-established vegetation;
- Limit the contrast between the vertical scale of the receiving environment and that of the camp infrastructure and material stockpiles;
- Where possible locate campsites in areas of low visual quality;
- Locate laydown areas and construction camps close to existing stands of exotic species which can serve as a screen or a backdrop to the camp;
- Where possible make use of sites which have been previously disturbed and that may not have been re vegetate and;
- Stockpiles must not be higher than 3m.

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Declaration of independence

I, Elmie Weideman declare that

I act as the independent specialist in this application

I will perform the work relating to the application in an objective manner, even if it results in views and findings that are not favourable to the applicant;

I declare that there are no circumstances that may comprise my objectivity in performing such work;

I have expertise in conducting the specialist report relevant to this application, including knowledge of the ACT, Regulations and any guidelines that have relevance to the proposed activity;

I will comply with the Act, Regulations and all other applicable legislation;

I have no, and will not engage in, conflicting interest in the undertaking of this activity;

I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing -any decision to be taken with respect to the application by the competent authority; and – the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority; all the particulars furnished by me in this form are true and correct; and

I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the specialist:

Name of company: Aurecon South Africa

Date: September 2017

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1 Introduction

1.1 Purpose of this report

The purpose of this report is to identify and assess the visual impacts associated with the 210km, 400Kv transmission line and the newly proposed Watershed B substation.

1.2 Contents this report

The study will be undertaken in compliance with Government Notice R982 of 2014. Accordingly, the report must contain the following:

- The specialist who prepared the report and the expertise to do so;
- Declaration that the specialist is independent;
- An indication of the scope of and the purpose for which the report was prepared;
- The date of the site investigation;
- Description of the adopted methodology;
- The specific identified sensitivity of the site related to the activity and its associated infrastructure;
- An identification of any areas to be avoided, including buffers (if applicable);
- A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers (if applicable);
- A description of the assumptions made;
- A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment;
- Recommendations in respect of any mitigation measures that should be considered (EIA phase);
- Any conditions for inclusion in the environmental authorisation (EIA phase);
- Any monitoring requirements for inclusion in the EMPr or environmental authorisation (EIA phase);
- A reasoned opinion as to whether the proposed activity or portions thereof should be authorised (EIA phase);
- A description of any consultation process that was undertaken during the course of preparing the specialist report (if applicable); and
- A summary and copies of any comments that were received during any consultation process (if applicable).

1.3 Visual assessment team

The VIA report was undertaken by Elmie Weideman and Johan Goosen (reviewer) of Aurecon. Both Mr Goosen and Mrs Weideman are qualified as Landscape Architects and registered with the South African Council for the Landscape Architectural Profession (SACLAP). All GIS mapping was compiled by Stephen Townshend of Aurecon.

Mr Goosen and Mrs Weideman have completed the following VIAs over the past five years:

- A 150-km power line for Eskom between Pietermaritzburg and Empangeni, Kwazulu Natal;
- An ash dam facility for Eskom at Kriel power station, Mpumalanga;

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- A wind farm for Just Energy near St. Helena Bay;
- A crude oil storage farm near Saldanha Bay;
- Upington Solar Farm, near Upington in the Northern Cape province;
- Various reservoirs located within the Olifants River catchment located in the Northern Province and Mpumalanga; and
- A photovoltaic facility close to Westonaria.

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2 Background

2.1 Project description

Aurecon has been appointed to undertake an Environmental and Social Impact Assessment (ESIA) study to assess and address environmental and social impacts associated with Botswana-South Africa (BOSA) Transmission Interconnection Project. A visual assessment of the study area is required to inform the ESIA of the potential impacts posed by the construction and operational activities of the proposed project.

SAPP CC has initiated the BOSA Transmission Interconnection Project on behalf of Eskom of South Africa and Botswana Power Corporation of Botswana. The interconnector infrastructure components consist of a 400kV transmission line of approximately 210km, connecting the existing Isang 400kV substation in Botswana to the Watershed B area, close to Mafikeng in the North-West Province of South Africa. Refer to Figure 1.

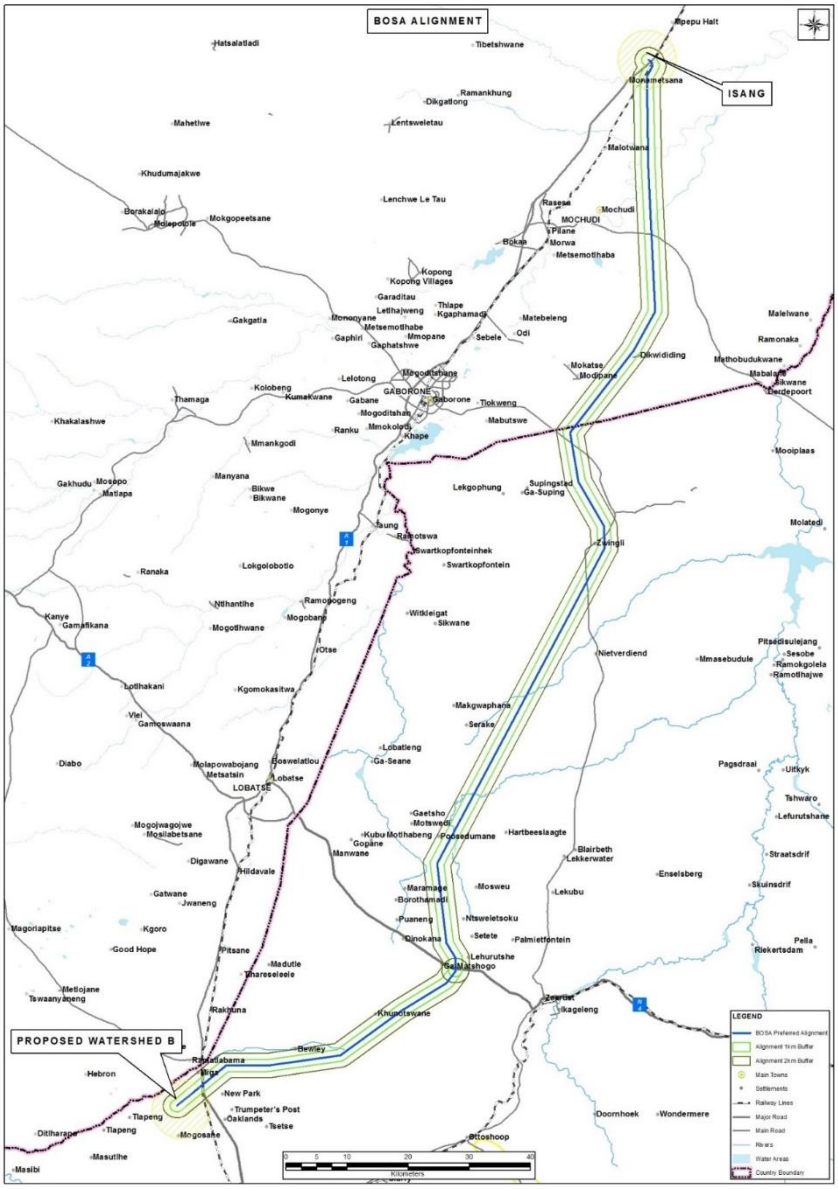

Figure 1: Locality map

2.2 Terms of Reference

The scope of the study is to define the spatial context of influence of the proposed development/s in terms of the visibility of the overhead transmission lines, the substation and to identify potential sensitive receptor locations.

In terms of the *Guideline for Involving Visual and Aesthetic Specialist on EIA Processes* (Oberholzer, 2005), the depth and scope of a VIA should be based on a combination of the sensitivity of the existing environment and the nature of the development. The type of environment and type of development are both divided into five categories, which are indicated in a matrix (Refer to Figure 2). The category of development is based on Figure 3, extracted from the same document.

The proposed development has been categorised as a Category 5 development (large scale infrastructure) according to Figure 3 and the environment has been categorised as "an area with medium scenic, cultural and historic significance" according to Figure 2. In terms of the matrix in Figure 2, the development can be expected to result in a development of moderate to high visual impact, which will require a Level 4 visual assessment (refer to Figure 4).

Typically, a Level 4 visual assessment includes the following:

- Identification of issues raised in the scoping phase, and a site visit;
- Description of the receiving environment and the proposed project;
- Establishment of view catchment area, and receptors;
- Indication of potential visual impacts using established criteria;
- Inclusion of potential lighting impacts at night;
- Description of alternatives, mitigation measures and monitoring programmes; and
- Visual simulations with and without mitigation.

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Table 1: Categorisation of issues to be addressed by the visual assessment

Type of environment	Type of development (see Box 3) Low to high intensity				
	Category 1 development	Category 2 development	Category 3 development	Category 4 development	Category 5 development
Protected/wild areas of international, national, or regional significance	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected	Very high visual impact expected
Areas or routes of high scenic, cultural, historical significance	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected
Areas or routes of medium scenic, cultural or historical significance	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected	High visual impact expected
Areas or routes of low scenic, cultural, historical significance / disturbed	Little or no visual impact expected. Possible benefits	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected
Disturbed or degraded sites / run-down urban areas / wasteland	Little or no visual impact expected. Possible benefits	Little or no visual impact expected. Possible benefits	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected

Figure 2: Categorisation of issues to be addressed by the visual assessment

Box 3: Key to Categories of Development

Category 1 development:
e.g. nature reserves, nature-related recreation, camping, picnicking, trails and minimal visitor facilities.

Category 2 development:
e.g. low-key recreation / resort / residential type development, small-scale agriculture / nurseries, narrow roads and small-scale infrastructure.

Category 3 development:
e.g. low density resort / residential type development, golf or polo estates, low to medium-scale infrastructure.

Category 4 development:
e.g. medium density residential development, sports facilities, small-scale commercial facilities / office parks, one-stop petrol stations, light industry, medium-scale infrastructure.

Category 5 development:
e.g. high density township / residential development, retail and office complexes, industrial facilities, refineries, treatment plants, power stations, wind energy farms, power lines, freeways, toll roads, large-scale infrastructure generally. Large-scale development of agricultural land and commercial tree plantations. Quarrying and mining activities with related processing plants.

Figure 3: Key categories of development

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Table 2: Categorisation of approaches used for visual assessment

Approach	Type of issue (see Box 4)				
	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected	Very high visual impact expected
Level of visual input recommended	**Level 1** visual input	**Level 2** visual input	**Level 3** visual assessment	**Level 4** visual assessment	

Figure 4: Categories of approaches

Box 4: Key to Categories of Issues

Very high visual impact expected:
Potentially significant effect on wilderness quality or scenic resources;
Fundamental change in the visual character of the area;
Establishes a major precedent for development in the area.

High visual impact expected:
Potential intrusion on protected landscapes or scenic resources;
Noticeable change in visual character of the area;
Establishes a new precedent for development in the area.

Moderate visual impact expected:
Potentially some affect on protected landscapes or scenic resources;
Some change in the visual character of the area;
Introduces new development or adds to existing development in the area.

Minimal visual impact expected:
Potentially low level of intrusion on landscapes or scenic resources;
Limited change in the visual character of the area;
Low-key development, similar in nature to existing development.

Little or no visual impact expected:
Potentially little influence on scenic resources or visual character of the area;
Generally compatible with existing development in the area;
Possible scope for enhancement of the area.

Figure 5: Key categories of issues

3 Methodology

The VIA approach is based on Oberholzer (2005). The guideline draws on best practice in EIA and provides guidance applicable to visual specialist assessment. The study will be divided into a baseline phase and an assessment phase. **Error! Reference source not found.** is a schematic illustration of the approach.

3.1 Baseline phase

The baseline phase will describe the visual resource and the technical information associated with the proposed development. The description of the visual resource includes:

- The baseline conditions in terms of the **landscape character;**
- The **landscape quality** in terms of the visual absorption capacity and overall aesthetic appeal which included the existing land cover, intrinsic physical properties, landform, vegetation, water, colour, adjacent scenery, scarcity and cultural modifications;
- The **visual receptors** and;
- The **sense of place**/*genius loci*

The technical information focuses on the main project components.

3.2 Assessment phase

The assessment phase consists of the following tasks:

- Analysis of the proposed development in terms of the criteria such as **visual intrusion**, **visibility**, **visual exposure, visual absorption capacity** and **viewer sensitivity** to determine the **intensity** of the impact. A 3D GIS terrain model will be used to assess the visibility of the infrastructure or parts thereof, from significant viewpoints within the viewshed.
- Emphasis will be placed on potential visual receptors and critical views towards the proposed development. Photographs and a GPS will be used to record relevant geographical locations within the vicinity of the corridor. Unique viewpoints will be selected per land uses and different landscape characteristics.
- Determine the impact **significance** by synthesising the assessment criteria as described above.
- Recommend **mitigation measures** to reduce the potential negative impacts; and
- Photomontages will be used to compare the existing views with the probable effect of the proposed infrastructure.

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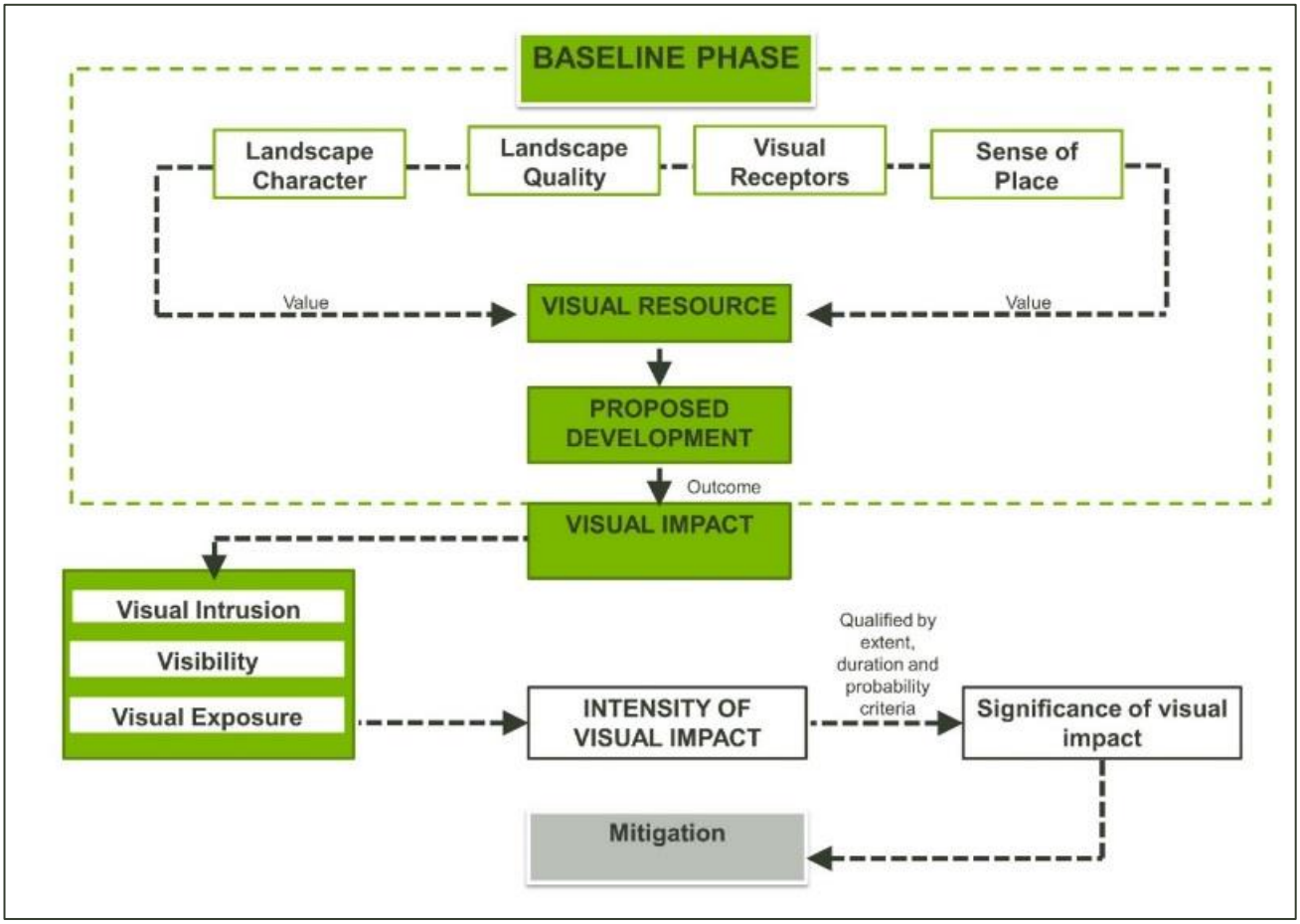

Figure 6: Visual impact methodology

3.3 Impact criteria and rating system

The following impact criteria and rating system was used (see

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Table 1):

- Duration - Duration refers to the length of time the impact will continue.
- Extent - Extent refers to the spatial scale of the impact.
- Intensity - Intensity refers to the degree which pre-development conditions are changed.
- Consequence - Consequence is determined by the combination of EXTENT, INTENSITY and DURATION. The sensitivity of the receiving environment and/or sensitive receptors is incorporated into the consideration of consequence.
- Probability - Probability refers to the likelihood of an impact occurring.
- Significance - To determine the significance of the impact, CONSEQUENCE and PROBABILITY are taken into account. The significance with and without mitigation will be determined.

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Table 1: Definition of impact criteria and rating system

Intensity		Duration	Extent	Consequence	Probability	Significance
Negative	Positive					
(-)4 – Very high degree of damage to natural or social systems or resources. These processes or resources may restore to their pre-project condition over very long periods of time (more than a typical human life time).	(+)4 – Great improvement to ecosystem or social processes and services or resources.	2 – Long term: The impact will continue for 6-15 years.	2 – Regional: The impact will affect the entire region	(-)8 Extremely detrimental	4 – Certain/ definite There are sound scientific reasons to expect that the impact will definitely occur.	(-) 4 Very high negative
(-)3 – High degree damage to natural or social system components, species or resources.	(+)3 – Intense positive benefits for natural or social systems or resources.	1 – Medium – term: The impact will continue for 2-5 years.	1 – Local: The impact will extend across the site and to nearby properties	(-)7 – (-)6 Highly detrimental	3 – Very likely It is most likely that the impact will occur.	(-) 3 High negative
(-)2 – Moderate damage to natural or social system components, species or resources.	(+)2 – Average, on-going positive benefits for natural or social systems or resources.	0 – Short - term	0 -Site specific	(-)5 – (-)4 Moderately detrimental	2 - Fairly likely This impact has occurred numerous times here or elsewhere in a similar environment and with a similar type of development and could very conceivably occur.	(-) 2 Moderate negative
(-)1 – Minor damage to natural or social system components, species or resources. Likely to recover over time. Ecosystems and valuable social processes not affected.	(+)1 – Low positive impacts on natural or social systems or resources.			(-)3 – (-) 2 Slightly detrimental	1 – Unlikely This impact has not happened yet but could happen.	(-) 1 Low negative

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Intensity		Duration	Extent	Consequence	Probability	Significance
0 – Negligible damage to individual components of natural or social systems or resources, such that it is hardly noticeable.	0- Limited low-level benefits to natural or social systems or resources.			(-)1 – (+)1 Negligible	3 – Very unlikely The impact is expected never to happen or has a very low chance of occurring.	0 – Very low
				(+)2 – (+)3 Slightly beneficial		(+)1 – Low positive
				(+)4 – (+)5 Moderately beneficial		(+)2 Moderate positive
				(+)6 – (+)7 Highly beneficial		(+) 3 High positive
				(+)8 Extremely beneficial		(+)4 High positive

3.4 Visual impact assessment resources

The software tools and techniques that were used during the VIA include the following:

- GIS applications using ArcView:
  - Data capturing and processing;
  - Digital terrain modelling;
  - Mapping;
- Site visit;
- Photographs; and
- Adobe Photoshop for photomontages.

3.5 Study Area

The overall study area for this VIA is based on the spatial extent of the infrastructure footprint and a buffer that includes potential indirect effects on the environment. For the purposes of the VIA, the boundary of the study area is set at 7km on both sides of the proposed alignment. The distance of 7km was selected based on human vision being restricted to this range. Structures further away than 7km are no longer clearly discernible or are most inconspicuous and therefore the visual impact beyond this range is considered negligible.

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4 Gaps and limitations

The following limitations and assumptions are applicable to this report:

- Determining a visual resource in absolute terms is not achievable. It is a complex procedure since it is determined through a combination of quantitative (visibility) and qualitative (aesthetic value) criteria. Therefore, a VIA cannot be *entirely* objective in this sense. Individuals will evaluate a landscape differently, based on experience, culture and social background.
- Various factors can enhance or reduce the visual impact of the proposed project, for instance, vegetation near a receptor's view of the proposed project. Other factors include weather, climatic conditions and seasonal change. It is therefore difficult to determine the visual impact of the proposed project from the viewpoint of each individual receptor.
- The layouts and technical designs provided are conceptual. Therefore, the possibility of adaption exists. Should there be any significant changes in the designs of the proposed infrastructure, these changes may have to be re-assessed.
- The exact position for construction camps and laydown areas are not available at this stage therefore related detailed viewpoints towards the proposed impact cannot be determined.
- Technical structures have not yet been chosen, therefore an informed decision cannot be made with regards to the visual impact of the power lines.
- The exact location of the transmission line within the corridor have not yet been fixed, where the proposed transmission line crosses a series of ridges, the line should be positioned in such a manner that it runs parallel with the lowest lying area therefore higher lying ridges on both sides will form a natural visual buffer.
- Tourism livelihood are in some instances attached to large undeveloped tracts of land with high visual resource value. The proposed corridor borders the Madikwe, Duprenella and Olyvenbuilt Private Nature Reserves on its eastern boundary, which could negatively influence sensitive views within the reserves and look out points, walking trails or views from bird hides could possibly be visually negatively affected.

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5 Legislative context

There are no specific legal requirements, nor is there any direct reference to the visual environment in the applicable environmental legislation. General legislation relating to the environment is contained in the following acts:

5.1 South Africa

- National Environmental Management Act, 1998 (NEMA) (Act No. 107. Of 1998)
- Environment Conservation Act, 1989 (Act No.73 of 1989)
- National Environmental Management Protected Areas Act, 2003 (NEM: PAA) (Act No. 57 of 2003)
- National Heritage Resources Act, 1999 (Act No.25 of 1999)
- Visual pollution is controlled, to a limited extent, by the Advertising on Roads and Ribbon Development Act, 1940 (Act No.21 of 1940), which deals mainly with signage on public roads.
- The Western Cape DEA&DP has produced a guideline (Oberholzer, 2005) for involving visual and aesthetic specialists in Environmental Impact Assessment (EIA) processes.

5.2 Botswana

- Environmental Assessment Act, No.10 of 2010
- Wildlife Conservation and National Parks Act
- National Monuments and Relics Act, 2001

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6 Description of Alternatives

Nineteen possible routes were identified from the proposed Watershed B substation in South Africa to the existing Isang substation in Botswana. These were screened based on technical, biophysical and social criteria, resulting in 5 viable alternatives. A Multicriteria Decision Model (MCDM) process which took place in May 2016, was used to determine the optimal corridor (considering technical, environmental, strategic and social criteria). The route was updated in early 2017, based on the change in location of the Watershed B substation, which followed the same process.

The visual analyses were based on the following criteria:

- Sensitivity of visual receptors (are they residing in the area or passing by)
- Visibility of the project
- Length of proposed line
- Large game reserves and areas of high tourism value

The preferred alternative is the shortest alternative with the lowest visual exposure. This alternative crosses the fewest number of settlements and towns. Even though it crosses the R49 various times, it is assumed that these receptors will be less sensitivity to an overhead electricity line compared to individuals residing in the area.

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7 Description of the affected environment

This section of the report analyses the existing landscape character, landscape quality and sense of place. This analysis assists the reader by describing the visual resource before the development. This is essential as the existing environment must be understood before assessing the impacts that will potentially change the existing environment.

The character and sensitivity of the visual environment within the study area varies at a local scale, depending on the presence of water bodies, ridges, agricultural use, roads, industrial infrastructure and urban and/or rural settlements. The preferred alternative alignment traverses various landscape types and therefore the sensitivity to visual impacts for each of the landscape types will differ.

7.1 Landscape character

Landscape character includes the natural and man-made attributes of the study area, including topography, land cover and vegetation. The overall landscape character is influenced negatively by incompatible activities, or positively by the presence of natural or man-made features that enrich the character, such as steep gradients, presence of rocky ridges, koppies, natural vegetation, pans and floodplains.

7.1.1 South Africa

The landscape character is defined by the vast, open flat terrain, the predominant agricultural and natural landscape features and overall rural feel. Dispersed rural settlement areas, formal towns and grasslands will likely have little screening value in terms of visual impact.

7.1.1.1 Topography

The topography between the Watershed B Area substation and the South Africa – Botswana border is predominantly uniform with the dominant topographical feature being flat plains. A series of consecutive ridges and isolated higher lying topographical areas are located north of the N4 and south of the South Africa - Botswana border. The lower lying areas between the consecutive ridges consists of drainage lines. Mean elevation ranges from 779 meters above mean sea level (mamsl) in the lowest point to 2328 mamsl at the highest point.

7.1.1.2 Landscape type

Landscape types is measured by mapping land cover. Land cover describes the physical make up of an area based on interpretation of satellite imagery.

The study area's land cover consists of:

Cultivated areas

Commercial farming – The study area consists of several game and cattle farms, for which the exact location and size is not available. Game farms provide for the management of large areas of natural rangeland with the commercial objective of producing livestock or game animals for hunting. Some other cultivated farming activities (croplands) are located north east of Mafikeng, lying west of the proposed alignment. Most of these farming activities are concentrated close to larger towns.

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Figure 7: Typical farming activities located close to Bewley

Mining

Mining and its related activities (waste dumps, settling ponds) conclude to a large part of the economy, mines are concentrated around formalised towns or cities such as Ottoshoop (Chrome mining) and Nietverdiend (Fluorspar mining). This landscape type is not directly associated with the project as the closest mine is located 7km away from the proposed alignment and the impacts on this specific type of landscape will not be further assessed.

Rural and urban settlements

Larger formalised towns - these include Mafikeng, Ottoshoop, Zeerust and Nietverdiend. These towns consist of a combination of commercial, educational, institutional, business and residential land uses.

Rural settlements – Larger rural settlements are sparsely located north of the N4. Rural settlements include villages and gardens of traditional areas.

Figure 8: Typical rural settlement with a formal concrete brick house and traditional garden area

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Natural landscape

Natural landscape –The largest part of the study area consists out of natural areas with wilderness characteristics. These types of landscapes have important well - being value contributing to the sense of place and aesthetic appeal. The type of natural landscapes includes wetlands, woodlands, indigenous forest and shrub land. These areas are mostly accessible by vast tracks of open dirt roads.

Figure 9: Typical natural landscape with vast tracks of open dirt roads

Protected areas

There are a few formalised protected areas (refer to **Error! Reference source not found.**), mostly categorised as nature reserves, which are an important green economy resource due to their wildlife and tourism potential. These areas are specifically set out for conservation purposes which includes a range of land use activities.

These protected areas are mostly located along the South Africa - Botswana border, the largest one being the popular Madikwe Nature Reserve, located east of the preferred alignment. A typical landscape scene will include short tufted grass with sparsely scattered small trees and shrubs, intercepted by bigger trees in isolated areas.

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Figure 10: Formally protected area with ridges in the background

Table 2: Nature Reserves bordering the proposed transmission line corridor

Name	Approximate extent (ha)	Ownership / management	NEMPAA Status
Druprenella Private Nature Reserve	3550	Individual landowners	Protected Area
J.H Klopper Private Nature Reserve	6390	Individual landowners	Protected Area
Olyvenbult Private Nature Reserve	3226	Individual landowners	Protected Area
Thys Snyman Nature Reserve	7680	Individual landowners	Protected Area
Koos Swart Private Nature Reserve	5409	Individual landowners	Protected Area
Drie Annies Private Nature Reserve	5749	Individual landowners	Protected Area
Nellie Private Nature Reserve	9090	Individual landowners	Protected Area
Tweekoppiesfontein Private Nature Reserve	13 117	Individual landowners	Protected Area
Weltevrede Nature Reserve	17 283	Individual landowners	Protected Area
Weldere Private Nature Reserve	11 002	Individual landowners	Protected Area
Madikwe Game Reserve	56823	NW Parks board	Protected Area

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There are other smaller privately owned game farms. Information with regards to size and ownership was not available at the time of writing this report.

7.1.1.3 Vegetation cover

The study area mostly falls within the Savanna biome (mosaic bushveld zone). Per Mucina and Rutherford this main biome type has an herbaceous layer usually dominated by grass species and a discontinuous, open tree layer. Tree canopies are often an irregular series of interlocking (often low) canopies with openings and sometimes little distinction between tall shrubs and small trees.

In lower lying areas, such as river gorges, *Acacia* and *Combretum* is the dominant tree species whereas higher lying areas are mostly covered by open, tall grasslands, often dotted with bushes and solitary Savanna trees. Extensive flat plains or areas of moderate undulating landscapes support various units ranging from sparsely scattered solitary trees and shrubs to a mosaic with typical savanna thornveld, bushveld and thicket patches. The site visit determined which areas within the study area, have significant tree cover.

Various vegetation types exist within the study area; they are mainly linked to topography.

- *Dwaalboom Thornveld* - Plains with layers of scattered, low to medium high, deciduous trees and shrubs with a continuous herbaceous layer dominated by grass species.
- *Madikwe Dolomite bushveld* - Gentle ridges and low hills located up to 100 - 150m above the surrounding plains. Tree and shrub layers often difficult to distinct, especially on steeper slopes. A continuous herbaceous layer are dominated by grasses.
- *Zeerust Thornveld* – Deciduous woodland, dominated by Acacia species, this vegetation type is associated with higher lying ridges north of Mafikeng.
- *Dwarsberg –Swartruggens Mountain Bushveld* – This vegetation type is associated with rocky low to medium high hills.
- *Mafikeng Bushveld* – This vegetation type is categorised by a well-developed grass layer; the dominant tree species is *Terminalia Sericea*.

7.1.2 Botswana

The Landscape character is defined by a smooth patchwork of smaller scale agricultural fields and an overall rural feel. The landscape offers little to no vertical definition in terms of manmade or natural features.

7.1.2.1 Topography

The uninterrupted flat terrain defines the dominant horizontal scale of the landscape north of the South Africa Botswana border towards Mochudi. The proposed corridor crosses two river valleys, north of Mochudi, offering some variation on the largely even topography.

7.1.2.2 Landscape type

Landscape types is measured by mapping land cover. Land cover describes the physical make up of an area based on interpretation of satellite imagery.

Most the study area's land cover consists of:

Cultivated areas

Subsistence farming – Small scale farming activities are located north of the border; it is expected that these are associated with small rural settlements.

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Figure 11: Typical farming activities north of the South Africa Botswana border

Rural and urban settlements

Larger formalised towns - the only formalised town, lying west of the proposed alignment is Mochudi.

Rural settlements - Larger rural settlements are sparsely located north of the South Africa – Botswana border. Rural settlements include villages and gardens of traditional areas.

Figure 12: Typical rural settlement with subsistence farming

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Figure 13: Larger formalised town

Natural landscape

The largest part of the study area, north of the South Africa Botswana border consists out of natural areas with wilderness characteristics. These types of landscapes have important well - being value contributing to the sense of place and aesthetic appeal. The type of natural landscapes includes riverine, wetlands grassland and shrubland.

Figure 14: Natural area

7.1.2.3 Vegetation cover

Limited spatial information is available on the extent and types of vegetation found within the study area located within Botswana. Most the area is covered with the following Savanna/Woodland vegetation units:

Hardveld: Dominant species *Peltophorum africana* and *Acacia tortilis/ Terminalea sericea*

Transition Sandveld/Hardveld: Dominant species *Acacia tortilis/ Terminalea sericea* and *Ziziphus mucronata*

Sandveld: dominated by trees species *Vachellia erioloba*, *Terminalia sercicea and Lonchocarpus nelsii.*

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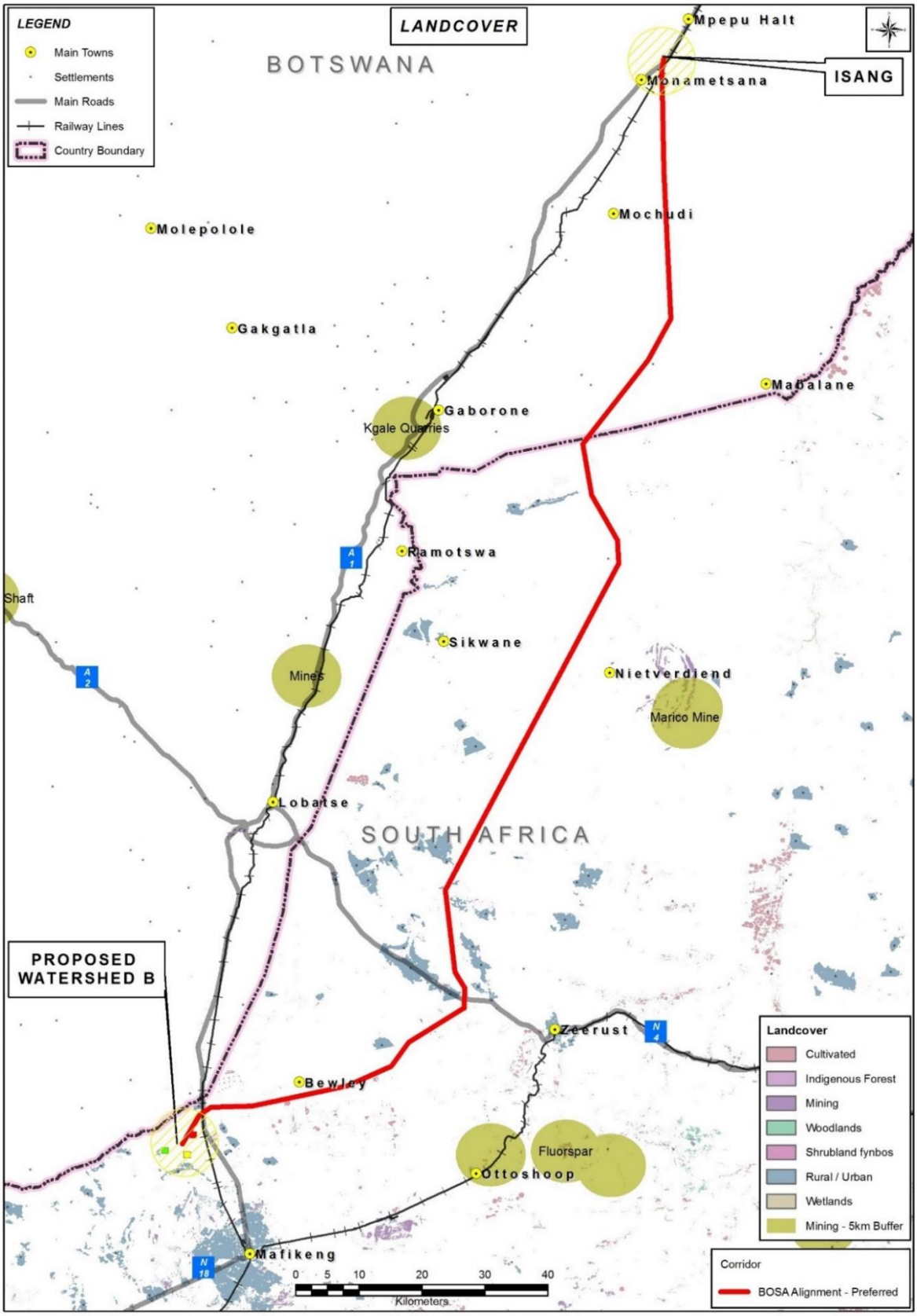

Figure 15: Landcover

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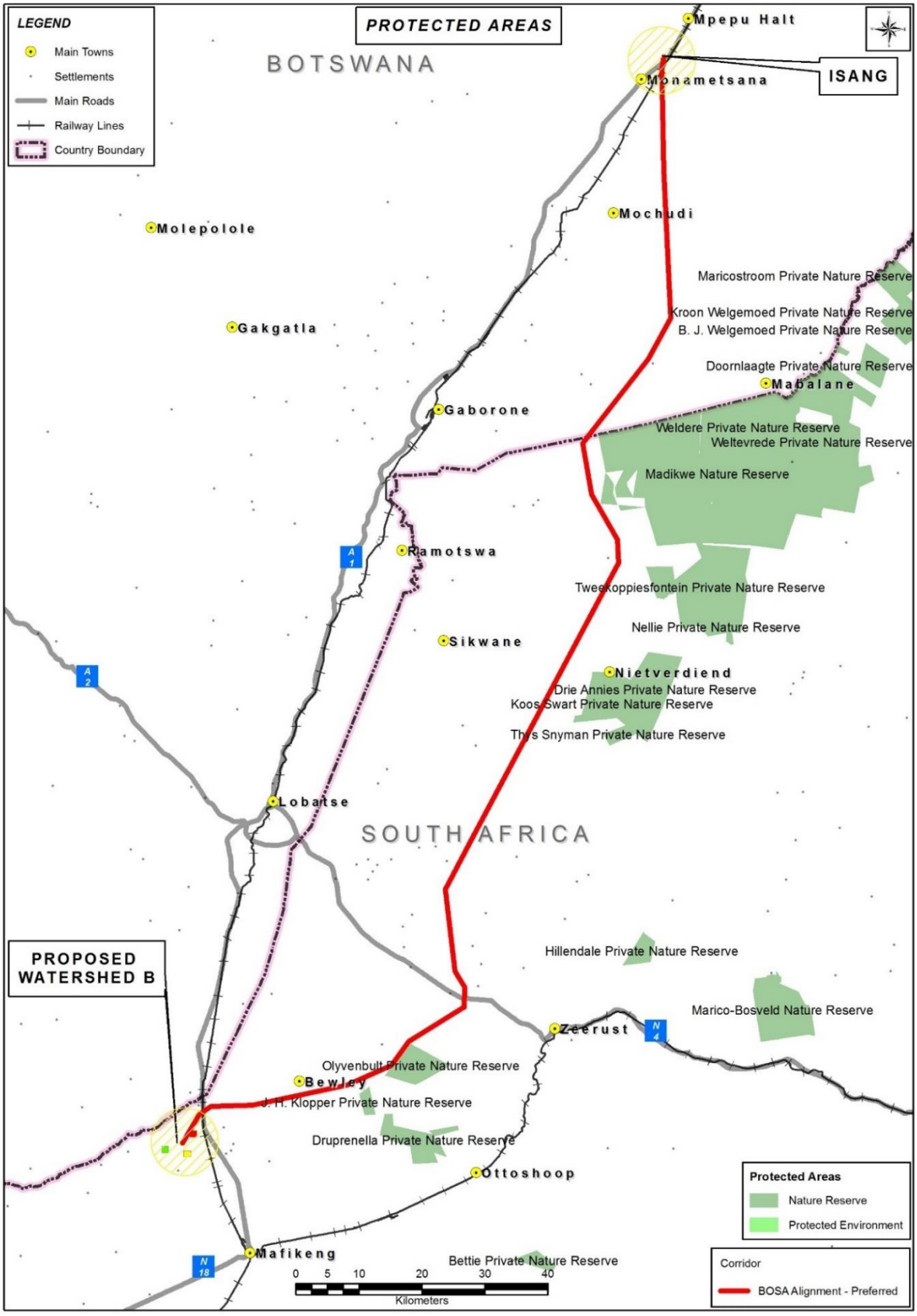

Figure 16: Protected areas

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7.2 Sense of Place

The sense of place in the study area derives from the combination of all landscape types and their impact on the senses and is influenced negatively or positively by natural or man-made features or activities that interrupt the vast open space. Sense of place is informed by the aspects of scale, texture, landform, enclosure and land use.

7.2.1 South Africa

The proposed overall study area has a rural feel with an even outstretched natural landscape, intercepted by dispersed rural settlements, homesteads and infrastructure associated with commercial agricultural activities.

7.2.2 Botswana

The open and expansive semi-arid landscape is separated by patchworks of subsistence farming and is further defined by a flat to slightly undulating terrain. Vast tracks of open dirt roads connect various smaller settlements and towns.

7.3 Landscape Quality

Landscape quality is based on human perceptions and expectations in the context of the existing environment. The landscape quality is based on a combination of the landscape's intrinsic physical properties, consisting out of the landform, vegetation, water, colour, adjacent scenery, scarcity, cultural or man-made modifications and the visual absorption capacity (VAC).

Landscape quality increases with the presence of water, topographic ruggedness and where diverse patterns of vegetation occur. Areas that contain more natural features or harmonious man-made compositions will have a more favourable landscape quality than areas with non-harmonious human activity. Landscape quality is rated from high – low as indicated in Table 3 .

Table 3: Landscape quality rating

Landscape quality rating	Criteria	Rating
High	Unmodified landscape: The landscape is almost free from human encroachment, Visual integrity occurs and where human intervention is visible, no visual discontinuity occurs and visual order is harmoniously maintained. Strongly defined landforms are noted, including mountains and large bodies of water. Distinct visual patterns are formed through patterns, colours and textures	3
Moderate	Moderately transformed/disturbed landscape: There is average visual integrity between the natural and manmade landscape. Some visual encroachment is visible which lacks visual order. There is some disruption of the natural and man-made patterns. Moderately distinctive landscape patterns are visible, including rolling hills and smaller water bodies.	2

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Low	Extensively transformed human intervention: There is low or no visual integrity between the natural and man – made natural features. The visual integrity of the landscape is disrupted and visual order is entirely lost. Little visual patterns are formed and vegetation patterns, colours and textures are not noticeable.	1

Landscape qualities were assigned to the landscape types as discussed under 7.1.1.2 .

Table 4: Landscape quality (site specific)

High	Moderate	Low
The ridge line running in an east west direction close to the South Africa – Botswana border. All formal protected areas	Farmsteads, agricultural activities, rural settlements, grazing fields. All natural vegetated areas which are not formally protected	Towns and Mines (including mining infrastructure)

7.4 Visual Absorption Capacity

VAC is an indication of the ability of the landscape to visually conceal the development. Areas with high VAC can accommodate and absorb physical changes in the landscape without transforming its visual character and quality. The factors that contribute to the VAC factor includes slope, vegetation height and visual pattern.

VAC in terms of topography, can be expressed as follows:

- High VAC – Slope >7%
- Moderate VAC – Slope between 3 -7%
- Low – 0 -3%

VAC in terms of visual pattern/diversity can be expressed as follows:

- High VAC – A diverse visual pattern, such as build up areas and industrialized/mining zones, where tall structures provide a high degree of screening.
- Moderate VAC – A moderate diverse visual pattern, such as rural and medium to low density urban and rural areas
- Low – A uniform visual pattern, such as naturally landscaped areas with no man-made structures

VAC in terms of vegetation height

- High VAC – Vegetation height more than 5m
- Moderate VAC – Vegetation height between 1-5m
- Low – Vegetation height <1m

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Table 5: Visual Absorption Capacity Rating

Visual Absorption Capacity rating	Rating
High	1
Moderate	2
Low	3

7.4.1.1 South Africa

The landscape is uncluttered, creating a homogenous visual quality with minimal vertical elements. Lower shrubland type vegetation with sparsely spaced trees and cultivated fields are predominantly spread over the study area. The VAC in terms of:

- Topography is: moderate – low
- Pattern/Diversity is: low
- Vegetation height is: moderate - low

The overall landscape quality is considered **moderate - high** because of the dominant horizontal scale of the study area, minimal man-made structures, little visual discontinuity and interruption of the natural environment. The low growing vegetation and the predominant flat topography provides little potential to conceal infrastructure of this size, as a combined result of the topography, pattern/diversity and vegetation the overall VAC is considered **low – moderate.**

7.4.1.2 Botswana

The landscape is uncluttered, creating a homogenous landscape quality with minimal vertical elements. Lower shrubland type vegetation with sparsely spaced trees (becoming even more dispersed as one moves northwards) and cultivated fields are predominantly spread over the study area. The VAC in terms of:

- Topography is low
- Pattern/Diversity is low
- Vegetation height is moderate - low

The overall landscape quality is considered **moderate - high** because of the dominant horizontal scale of the study area, minimal man-made structures, little visual discontinuity and interruption of the natural environment. The low growing vegetation and the predominant flat topography provides little potential to conceal infrastructure of this size, as a combined result of the topography, pattern/diversity and vegetation the overall VAC is considered **low – moderate.**

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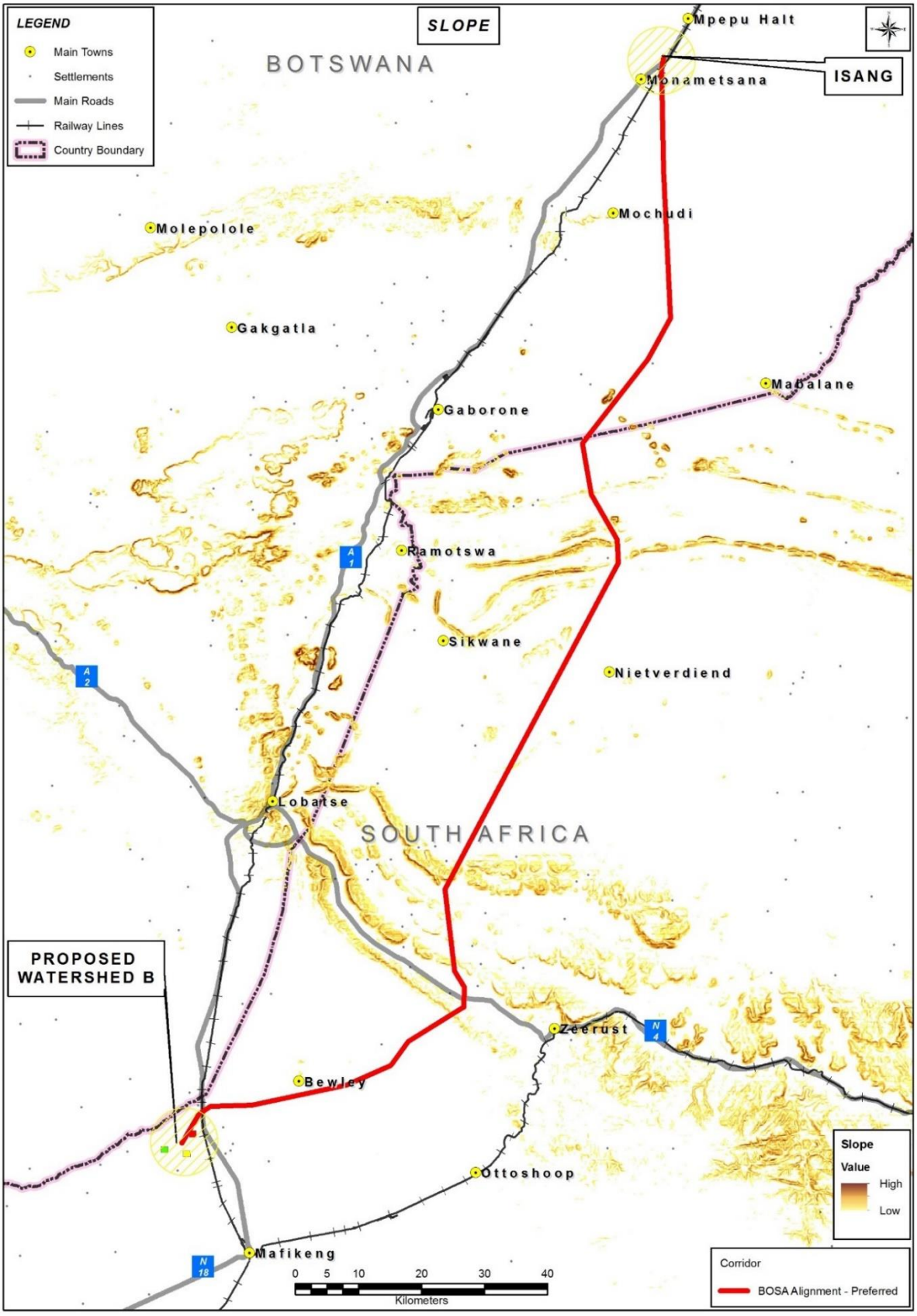

Figure 17: Topography

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7.5 Receptors

Receptors for visual impacts are potential viewers of the proposed development. Receptor sensitivity refers to the degree that a development affects people. Receptor sensitivity depends on the number of people viewing the project and their perceptions of the study area. Perception of an object is linked to the purpose for which a viewer is present in the study area (i.e. the reason for their visit). The sensitivity of an individual to the visual impact of a proposed development may, therefore, also vary over time as they experience different features and land uses in the area. Receptor sensitivity is also affected by how likely the receptors are to be affected. It is also dependent on their perception of the area and their ability to adapt to changes in their environment and can include how frequently they are exposed to the view.

A visual receptor's sensitivity is based upon the viewer's:

- Familiarity with the actual scene;
- Circumstances that brings them into contact with that view; and
- Nature of the view (full or glimpsed, near or distant).

Receptor sensitivity is expressed as follows:

- High sensitivity – e.g. views to and from nature reserves, coastal areas and scenic routes or trails;
- Moderate sensitivity – e.g. views to and from residential areas, agricultural areas, sporting / recreational areas or places of work; and
- Low sensitivity – e.g. views to and from industrial, mining or degraded areas.

The criteria used to define receptor sensitivity are summarised in Table 6

Table 6: Receptor sensitivity

Receptor sensitivity rating	Criteria	Weight
High	Towns and cities along major national roads with more than 1000 people	Factor 1.2
Moderate	Settlements along provincial roads with less than 1000 people	Factor 1.0
Low	Settlements, less than 100 people	Factor 0.8

The criteria used to define receptor perception are summarised in Table 7.

Table 7: Receptor perception rating

Receptor perception rating	Criteria
High	People attach a high value to aesthetics, such as in or around a game reserve, coastal areas, scenic routes or conservation areas, and the project is perceived to significantly impact on this value of the landscape

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Moderate	People attach a moderate value to aesthetics, such as neighbourhoods and smaller towns, where natural character is still plentiful and in close range of residency.
Low	People attach a low value to aesthetics, when compared to employment opportunities. Environment has already been transformed

7.5.1 South Africa

The selected viewpoints are based on viewing position and are used as a basis for determining potential visual impacts.

The viewpoints taken from site are as follows:

- Motorists traveling on the N18, viewing the newly proposed sub station
- Motorists traveling on the N4, viewing the proposed alignment in an east – west direction
- Permanent residence residing in Mantsie

The most sensitive receptors will be people permanently residing in the area (formal residential as well as informal settlements). These areas are associated with main towns as well as dispersed settlements mostly located north of the N4 and north of Mafikeng). Other sensitive receptors include the tourism industry and its related accommodation clientele from nearby game farms and formal conservation areas. These include tourists visiting nearby game lodges, such as The Bush House and Impodimo Lodge located within the greater Madikwe Nature Reserve. The overall receptor sensitivity is regarded moderate to high in isolated areas where the visual amenity plays a significant part in the tourism industry.

Figure 18: View towards proposed Watershed B substation

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Figure 19: South eastern view on the N4 - Lehurutshe gravel road

Figure 20: Eastern view from main road through Mantsie towards the proposed alignment

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7.5.2 Botswana

The viewpoints taken from site are as follows:

- Motorists traveling in an east – west direction on gravel roads north of the border, crossing the proposed alignment perpendicular.

The most sensitive receptors will be people permanently residing in the area (formal residential as well as informal settlements). These areas are associated with main towns as well as dispersed settlements mostly located east of Gaborone. Other sensitive receptors include people within vehicles traveling on the National Road A1. The overall receptor sensitivity for Botswana is moderate to low as from previous experience lower income residents may view transmission lines as a sign of progress.

Figure 21: Eastern view towards proposed alignment

7.6 Technical specifications

7.6.1 Project components

To identify the potential risk sources that may result in impacts on the visual environment, the proposed transmission line from Watershed B to Isang has been divided into project components. Project components which were identified are:

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7.6.1.1 Transmission power lines

The following proposed structure types, as shown below, are proposed to be used as the basis for the preliminary transmission line design:

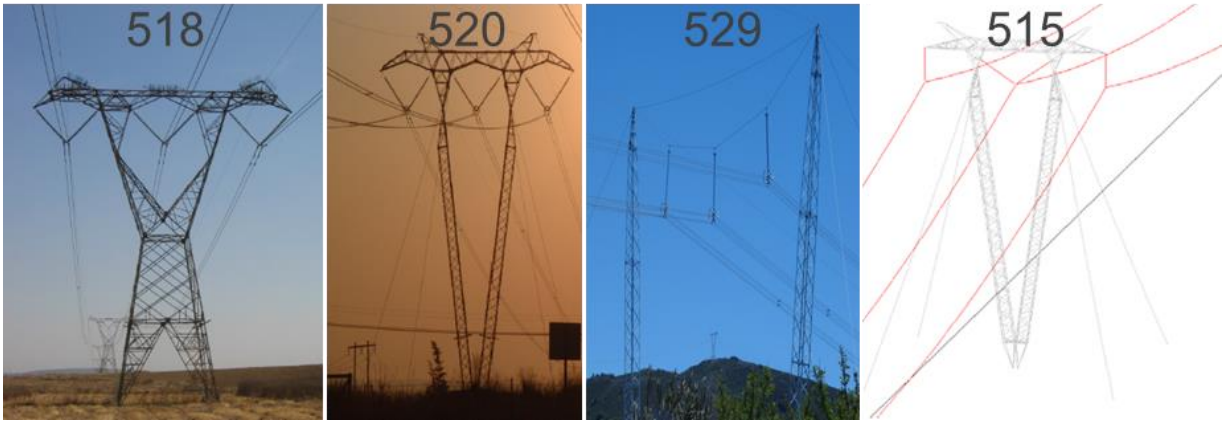

Figure 22: Proposed 400kV structures

Lattice suspension towers:

- 518H Lattice tower series,
- 518E Lattice tower if trans-positioning is required,
- 520B Guyed-V lattice towers, (Use where 529B is not suitable due to space restraints)
- 529A Cross-rope lattice tower, (Eskom preferred structure - use wherever possible)
- 515 Self-supporting and guyed-V lattice towers (BPC preferred structure).

Tower spacing and height

- Tower height will be between 21.75m – 30.75m
- Tower spacing will be between 250m- 500m

BPC has shown preference for the use of the Eskom 515 series structure for their portion of the line. Eskom has preference for the use of 529 series intermediate structures. Only if required, will an alternative option indicated above be utilised. Due to its broader footing, the 518-lattice tower will visually be more obtrusive.

7.6.1.2 Access Roads

Access roads will most likely be graded dirt roads and will only be required where there are no existing roads.

7.6.1.3 Cleared servitude

There will be clearing of vegetation beneath the proposed transmission line.

7.6.1.4 Construction camps and laydown areas

Construction camps also include the clearing of vegetation for material and equipment laydown areas

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8 Impact Assessment

The proposed development has been evaluated against the criteria of:

- Visibility;
- Visual intrusion; and
- Visual exposure

These criteria have been analysed in order to formulate the visual impact assessment criteria as illustrated in Figure 6.

8.1 Visibility

The visibility or viewshed (zone of theoretical visibility or ZTV) of the project is the area from which the project will be visible. The ZTV is theoretical as it assumes direct line of sight between any point within the viewshed and the object being viewed. However, the actual visibility will be smaller because of screening by trees, local variations in topography, buildings and other infrastructure.

A GIS has been used to generate the viewshed analyses for the proposed transmission line and related infrastructure. The system has three-dimensional topographical modelling capabilities, including a line of sight analysis. For this project, the viewshed analysis was generated by means of contours and using the conceptual design of the proposed transmission line. The visibility of a development and its influence on visual impact is rated using the criteria listed in Table 8 below:

Table 8: Visibility

Visibility (Based on the viewshed analysis)	Criteria	Rating
High	The development is visible from more than 50% of the zone of potential influence, views are unobstructed and the majority of viewers are affected.	3
Moderate	The development is visible from less than 50% of the zone of potential influence.	2
Low	The development is visible from less than 25% of the zone of potential influence.	1

The proposed transmission line's visibility is highest 2.5km east and west from the proposed alignment. Visibility is low in the valleys between the series of ridges and higher in Botswana as a result of the generally flat topography. Visibility is low at potential sensitive receptor locations such as Madikwe Nature Reserve. The overall visibility is rated as high as the development is visible from more than 50% of the zone of potential influence.

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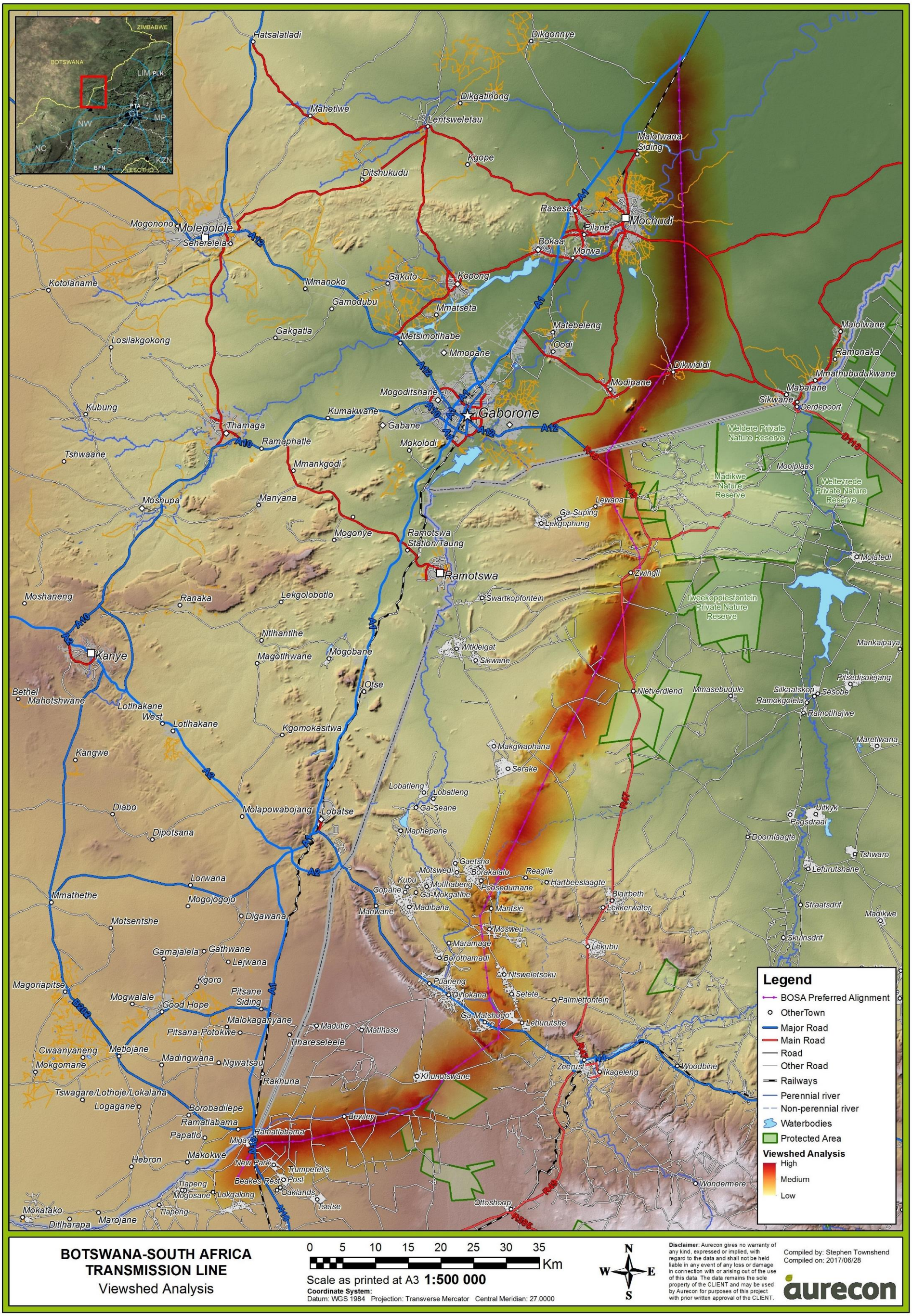

Figure 23: Viewshed analysis

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8.2 Visual intrusion

The degree of visual intrusion is related to the idea of context and maintaining the integrity of the landscape and essentially rates the degree of contrast between the appearance of the proposed development and the existing environment. The higher the landscape quality and the more consistent the visual context, the more likely the impact will be intrusive. Visual intrusion is rated as indicated in Table 9.

Table 9: Visual intrusion

Visual intrusion (How the project fits into the surrounding landscape)	**Criteria**	**Rating**
High	Results in a noticeable change or is discordant with the landscape	3
Moderate	Partially fits into the landscape, but clearly noticeable	2
Low	Minimal change or blends in well with the landscape	1
None	Negligible change to the landscape	0

There are no other transmission lines of this scale within the immediate context, telephone poles and smaller transmission lines are visible along main roads, such as the N4 and N18. The visual intrusion for the proposed infrastructure is regarded as high.

8.3 Visual exposure

According to Hull and Bishop (1998), The visual exposure of the proposed project is based on the distance from the proposed source of impact. The visibility of an object decreases exponentially over distance and accordingly visual impact will diminish as the viewer moves away from the object being viewed. The influence of distance is shown in Figure 24 and the criteria for visual exposure rating are explained in Table 10.

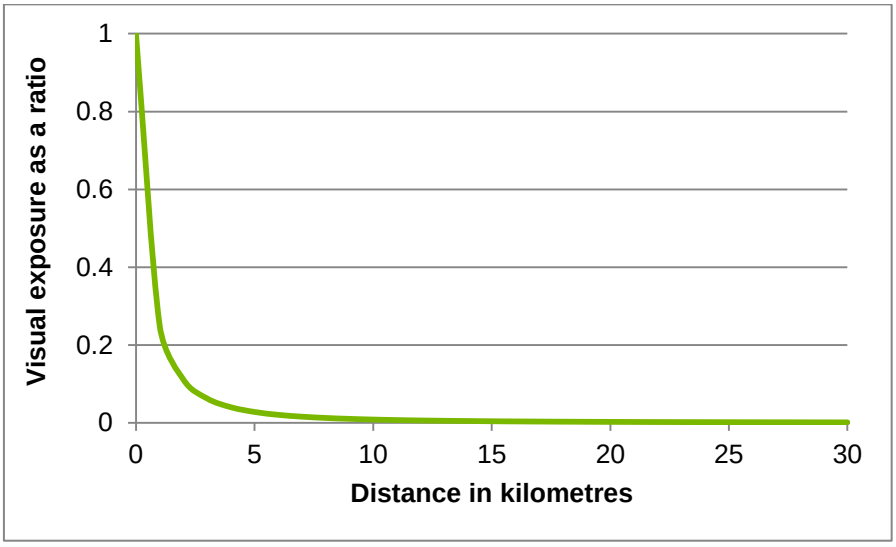

Figure 24: Visual exposure (after Bishop & Hull 1998)

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Table 10: Visual exposure rating

Visual exposure (How far is the activity from the viewers)	Criteria	Rating
High	0 -1 km (Dominant or clearly visible)	3
Moderate	1 – 3 km (Recognizable to the viewer)	2
Low	>3 km (Not particularly noticeable to the viewer)	1

The line crosses the N4 and R503 once and the R49 roads three times. The majority of viewers will experience the proposed transmission line more than 3km away and as a result will experience low visual exposure.

8.4 Visual impacts

A number of impacts were identified during the scoping phase, but only those with a significance rating of *moderate – negative* to *very high -negative* will be further assessed in detail, they are the following:

8.4.1 South Africa

- Visual impact of construction camps and laydown areas in natural areas;
- Visual impact of transmission lines in natural areas;
- Visual impact of transmission lines in protected areas;
- Visual impact of cleared servitudes in natural areas; and
- Visual impact of operational, safety and security lighting at night

8.4.2 Botswana

- Visual impact of construction camps and laydown areas in natural areas;
- Visual impact of transmission lines in natural areas and;
- Visual impact of cleared servitudes in natural areas;

8.5 Impact intensity

Intensity was determined by using a rating matrix of the landscape quality, visibility, visual intrusion, visual exposure and receptor sensitivity. Intensity is defined as the degree of change and is classified as very high, high, moderate, low or negligible, refer to Table 11.

Intensity of the potential visual impact of the project is calculated with the following formula:

Intensity = [Landscape Quality x (Visibility + Visual Intrusion + Visual Exposure + Visual absorption capacity)] x Viewer sensitivity. From the above formula, the maximum intensity score is 43.2.

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The possible range of intensity scores is categorised as in the first column. For the purpose of significance assessment and to be in line with the impact criteria and rating scale, the various categories are re–scored as indicated in the table below.

Table 11: Impact intensity rating

Intensity score	Re-scored to be in line with the impact criteria and rating scale
>37	(-)4
27 - 34	(-)3
18 - 26	(-)2
11 - 17	(-)1
5 - 10	0
4	(+)1
3	(+)2
2	(+)3
1	(+)4

The overall impact intensity for each landscape type is indicated in Table 12. The intensity, or degree of change will be highest for the ridge line areas.

Table 12: Intensity per landscape type

Landscape type	Intensity rating
The ridge line running in an east west direction close to the South Africa – Botswana border. All formal protected areas	27
Farmsteads, agricultural activities, rural settlements, grazing fields. All natural vegetated areas which are not formally protected	18
Towns and Mines (including mining infrastructure)	9

8.6 Impact consequence

The impact consequence is rated according to Table 1. Refer to Appendix A for the detailed individual impact assessment.

8.7 Impact significance

The impact significance is rated according to Table 1. Refer to Appendix A for the detailed individual impact assessment.

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8.8 Impact duration

The impact duration is rated according to **Error! Reference source not found.**. Refer to Appendix A for the detailed individual impact assessment.

8.9 Impact extent

The impact extent is rated according to Table 1. Refer to Appendix A for the detailed individual impact assessment.

8.10 Impact probability

The impact probability is rated according to Table 1. Refer to Appendix A for the detailed individual impact assessment.

8.11 Cumulative impacts

Although the proposed substation is not part of this application, the line will connect to it. It is located within a natural landscape, which can visually be regarded as a “greenfield” area. It will not add cumulatively to the visual impacts of any other existing or planned transmission lines, since there are no such facility of similar nature within 30km of the proposed project site.

As mentioned previously, the proposed 400kV transmission line will add visually in specific areas to the existing smaller scale transmission line network and thus increase the visual impact. The cumulative impact of the transmission line will be moderately significant as the visual character of the area is not defined by similar industrial type infrastructure.

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9 Mitigation measures

9.1 Transmission Lines

The potential impacts related to the transmission line relate to its height of up to 30.75m and the metallic, industrial aesthetic that contrast with the typically flat and rural character of the study area.

The management of the potential visual impacts associated with the transmission line should focus on careful alignment to avoid sensitive areas such as elevated ridges, koppies and pans that could be conserved as visual assets for tourist related activities. This was considered in the route selection process, where visual sensitivity was considered as a constraint to route alignment, thereby meeting the first step in the mitigation hierarchy, namely that of avoidance of the impact.

In addition, to further reduce the visual impact in sensitive areas, the following steps should be implemented where possible:

- A minimum buffer of five times the height of the pylons should be allowed between the alignment and any natural features such as elevated ridges, koppies and pans that could be conserved as visual assets for tourist related activities;
- Advantage should be taken of existing vertical features such as rows of tall trees to serve as a backdrop or screen for the transmission line;
- The alignment of the transmission line should maintain as much distance as possible from large concentrations of potential viewers;
- The design of the pylon structure should attempt to reduce the bulk of the steel girders thereby presenting a lighter structure with lesser silhouette; and
- Where the route crosses over several ridges, running parallel to the proposed route, the alignment should be located in the lower section so that the ridge lines forms a visual screen from both sides.

9.2 Access Roads

The potential visual impacts associated with construction and maintenance of access roads are related to the need to clear vegetation and carry out minor changes to the topography. The clearance of vegetation has the greatest potential to produce visual impacts. Clearing of vegetation especially in long straight lengths impacts on the sense of place, visual quality and landscape character.

- Make use of existing access roads where feasible;
- Locate access roads so that it minimizes modification of the existing topography and the removal of large trees, roads should curve around natural features, mature trees and shrub thickets;
- New access roads should not extend in straight lines for distances of more than 50m;
- Match the alignment and construction method of new access roads (i.e. stone in rocky areas etc.) to the topography and to the surrounding farm roads or tracks;
- Locate new access roads away from visual assets such as pans, ridges and koppies;
- New access roads must be at a minimum width requirement;
- Where access roads are constructed in agricultural areas, the shortest routes should be followed to the adjacent existing farm roads;
- Where the transmission line crosses a main road and views along the access roads extend for a significant length, the sightline should be reduced to a couple of meters by either curving the road or by aligning it alternatively on either side of the transmission line servitude;

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- Access roads shall not cross over the crest of elevated landforms such as koppies and ridges and;
- Roads shall run parallel to and at a minimum distance of at least the height of the feature from the outline of the foot slopes.

9.3 Clearing of servitudes

The potential visual impacts associated with the initial clearing and on-going maintenance of servitudes are related to the need to clear vegetation over a certain height as they could pose a fire risk to the transmission line. The clearing of vegetation would most likely result in a loss of visual quality and reduced visual absorption capacity along the servitude.

- Avoid a linear path of cleared vegetation that would strongly contrast with the surrounding landscape character;
- Where the alignment should pass over dense stands of trees and shrubs or over areas of tall trees, either increase the height of the transmission line above the safe margin or reduce the extent of flammable material while allowing a natural transition of vegetation height and allowing tall trees to remain, and;
- The vegetation within the servitude should not be cut to an even height across the servitude, instead the vegetation mass should rather be reduced by removing material from each of the vegetation layers, allowing for a diversity of height and plant material.

9.4 Construction camps and laydown areas

The potential visual impacts of construction camps and laydown areas relate to the possible clearing of vegetation and the foreign scale and aesthetics of the structures, security and stockpiled materials.

- Locate construction camps outside of visually sensitive areas and away from critical view sources such as main roads, existing urban and rural settlements and public gathering areas such as schools, sporting facilities, community halls etc.;
- Do not locate campsites in areas where it will be necessary to remove trees and shrubs or large areas of well-established vegetation;
- Limit the contrast between the vertical scale of the receiving environment and that of the camp infrastructure and material stockpiles;
- Where possible locate campsites in areas of low visual quality;
- Locate laydown areas and construction camps close to existing stands of exotic species which can serve as a screen or a backdrop to the camp;
- Where possible make use of sites which have been previously disturbed and that may not have been re vegetated, and;
- Stockpiles must not be higher than 3m.

Strict recommendations must be implemented for the substation as well, when it is planned, constructed and operated to ensure that the impacts are managed in a similar manner to that for the transmission line.

Decommissioning impacts will be similar to construction impacts and must be managed as such.

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10 Conclusion

The construction and operation of the proposed 400kV transmission line will result in visual impacts within the study area and the project activities or components will noticeably change existing features or qualities of the visual resource. The transmission line will constitute change to the overall sense of place and character as it introduces new features which are uncharacteristic with the existing character. Based on the theoretical methodology, the significance of the visual impacts will be moderate in most locations, due to the relative scale of the structures and the high visibility based on the generally flat topography and low vegetation height within the study area. As previously mentioned, possible highly sensitive receptors include motorists traveling on the N4 or N18 and tourist visiting lodges and game farms in the vicinity.

However, as a result of the following, the overall visual impacts can be regarded as moderate – low in most areas:

- The low receptor concentration;
- The prominent series of ridges located close to the settlements of Dinokana, Borothamadi, Mmutshweu;
- The proposed alignment traversed the N18 and N4 only once and;
- The viewshed analysis further shows that sensitive receptor locations associated with the tourism industry will have low visibility from their specific locations or are excluded from the viewshed analysis based on distance from the proposed impact.

The completed transmission line will result in a visual change greater than the baseline setting. The anticipated visual impacts as listed below are not considered to be fatal flaws or red flags from a visual perspective.

- The assessed visual impact of construction camps and laydown areas in natural areas, with mitigation measures, is very low. This is a temporary impact and it is expected that structures will be one storey high, therefore the visual impact is limited.
- The assessed visual impact of transmission lines in natural areas, with mitigation measures, is considered low. The transmission line will, for the majority of the length of the alignment, not be located close to major towns and national roads.
- The assessed visual impact of access roads, with mitigation measures, in protected areas is considered low. Access roads will typically be two track dirt roads which will to a degree blend in with the existing landscape if the proposed mitigation measures are implemented.
- The assessed visual impact of cleared servitudes, with mitigation measures, in natural areas is considered moderate. Cleared servitudes can visually scar the landscape as vegetation below the transmission line are cut to a minimum height, which will be considerably lower than the natural vegetation height.
- The assessed visual impact, with mitigation measures, of operational safety and security lighting at night is considered very low. This specific impact can be limited to the site if mitigation measures are implemented.
- The visual impact of transmission lines, with mitigation measures, in protected areas is considered low. The proposed alignment does not cross any formal protected area. The alignment does come into close proximity of the Madikwe Game Reserve, but as a result of the topography views from these areas will be limited.

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Appendix A – Impact rating (ESIA phase)

Code	Impact	Pre-mitigation:						Post-mitigation:					
		Duration	Extent	Intensity	Consequence	Probability	Significance	Duration	Extent	Intensity	Consequence	Probability	Significance
1	The visual impact of construction camps and laydown areas in natural areas changing the sense of place, landscape quality , landscape character and altering the VAC in terms of vegetation and pattern/diversity	Short-term	Local	Moderate - negative	Slightly detrimental	Very likely	Low - negative	Short-term	Site-specific	Low - negative	Negligible	Very likely	Very low
2	The visual impact of transmission lines in natural areas changing the sense of place, landscape quality, landscape character and altering the VAC in terms of slope, vegetation, pattern/diversity	Long-term	Local	Moderate - negative	Moderately detrimental	Very likely	Moderate - negative	Long-term	Site-specific	Low - negative	Slightly detrimental	Very likely	Low - negative
3	The visual impact of access roads in protected areas, changing the sense of place, landscape quality , landscape character and altering the VAC in terms of vegetation and pattern/diversity	Long-term	Site-specific	High - negative	Moderately detrimental	Fairly likely	Low - negative	Long-term	Site-specific	Moderate - negative	Moderately detrimental	Fairly likely	Low - negative
4	The visual impact of cleared servitudes in natural areas, changing the sense of place, landscape quality, landscape character and altering the VAC in terms of vegetation and pattern/diversity	Long-term	Local	Moderate - negative	Moderately detrimental	Very likely	Moderate - negative	Long-term	Local	Low - negative	Moderately detrimental	Very likely	Moderate - negative
5	The visual impact of transmission lines in protected areas , changing the sense of place, landscape quality, landscape character and altering the VAC in terms of vegetation and pattern/diversity	Long-term	Local	High - negative	Highly detrimental	Fairly likely	Moderate - negative	Long-term	Site-specific	Low - negative	Slightly detrimental	Fairly likely	Low - negative

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IMPACT DESCRIPTION: The visual impact of construction camps and laydown areas in natural areas changing the sense of place, landscape quality , landscape character and altering the VAC in terms of vegetation and pattern/diversity				
Predicted for project phase:	Pre-construction	Construction	Operation	Decommissioning
PRE-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	The impact will only continue between 1 month and 2 years and will cease once construction has ended	Consequence: Slightly detrimental	Significance: Low - negative
Extent	Local	The majority of the machinery and materials will not be higher than 10m and would therefore not be noticeably visible from nearby properties		
Intensity	Moderate - negative			
Probability	Very likely	If construction takes place there will be construction camps and laydown areas in specified locations		
MITIGATION:				
Locate construction camps outside of visually sensitive areas and away from critical view sources such as main roads, existing urban and rural settlements and public gathering areas such as schools, sporting facilities, community halls etc. Do not locate campsites in areas where it will be necessary to remove trees and shrubs or large areas of well-established vegetation. Limit the contrast between the vertical scale of the receiving environment and that of the camp infrastructure and material stockpiles. Where possible locate campsites in areas of low visual quality Locate laydown areas and construction camps close to existing stands of exotic species which can serve as a screen or a backdrop to the camp Where possible make use of sites which have been previously disturbed and that may not have been re vegetated Stockpiles must not be higher than 3m				
POST-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Short-term	The impact will only continue between 1 month and 2 years and will cease once construction has ended, there are no mitigation measure to decrease the duration	Consequence: Negligible	Significance: Very low
Extent	Site-specific	The extent will remain site specific		
Intensity	Low - negative	The impact intensity will be lower if the below mitigation measures are applied		
Probability	Very likely	If construction takes place there will be construction camps and laydown areas in specified locations. There are no mitigation measures to bring down the probability of this occurring		

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IMPACT DESCRIPTION: The visual impact of transmission lines in natural areas changing the sense of place, landscape quality, landscape character and altering the VAC in terms of slope, vegetation, pattern/diversity				
Predicted for project phase:	Pre-construction	Construction	Operation	Decommissioning

PRE-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Long-term	The impact will occur for as long as the transmission lines are erected	Consequence: Moderately detrimental	Significance: Moderate - negative
Extent	Local	The impact will extend for a maximum of 7km on both sides of the alignment		
Intensity	Moderate - negative			
Probability	Very likely	One of SAPP's long term goals is to supply electricity to rural communities, therefore the construction of the transmission line is almost certain		

MITIGATION:

The management of the potential visual impacts associated with the transmission line should focus on careful alignment to avoid sensitive areas such as elevated ridges, koppies and pans that could be conserved as visual assets for tourist related activities. Where possible, a minimum buffer of five times the height of the pylons should be allowed between the alignment and any of the natural features. Advantage should be taken of existing vertical features such as rows of tall trees to serve as a backdrop or screen for the transmission line.
The alignment of the transmission line should maintain as much distance as possible from large concentrations of potential viewers. Where the route crosses over several ridges, running parallel to the proposed route, the alignment should be located in the lower section so that the ridge lines forms a visual screen from both sides

POST-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Long-term	The impact will occur for as long as the transmission lines are erected, there are no mitigation measures to decrease the duration	Consequence: Slightly detrimental	Significance: Low - negative
Extent	Site-specific	If the mitigation measures are implemented the extent of the impact can be decreased in localized areas		
Intensity	Low - negative			
Probability	Very likely	One of SAPP's long term goals is to supply electricity to rural communities, therefore the construction of the transmission line is almost certain		

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IMPACT DESCRIPTION: The visual impact of access roads in protected areas, changing the sense of place, landscape quality , landscape character and altering the VAC in terms of vegetation and pattern/diversity				
Predicted for project phase:	Pre-construction	Construction	Operation	Decommissioning

PRE-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Long-term	The impact will occur for as long as the transmission lines are erected, and maintenance access is required, there are no mitigation measures to decrease the duration	Consequence: Moderately detrimental	Significance: Low - negative
Extent	Site-specific	The extent will only be site specific as there are no linear elements associated with the access and maintenance roads		
Intensity	High - negative	Roads leave a permanent visual scar, especially where vegetation is cleared in sensitive areas, this takes a long time to rehabilitate back to the pre-construction condition		
Probability	Fairly likely	Access roads might have to be constructed in some protected areas, this could be a possibility in areas where the alignment runs next to protected areas		

MITIGATION:

Make use of existing access roads where feasible
Locate access roads so that it minimizes modification of the existing topography and the removal of large trees, roads should curve around natural features, mature trees and shrub thickets
New access roads should not extend in straight lines for distances of more than 50m
Match the alignment and construction method of new access roads to the topography and to the surrounding farm roads or tracks
Locate new access roads away from visual assets such as pans, ridges and koppies
New access roads must be at a minimum width requirement
Where the transmission line crosses a main road and views along the access roads extend for a significant length, the sightline should be reduced to a couple of meters by either curving the road or by aligning it alternatively on either side of the transmission line servitude.
Access roads shall not cross over the crest of elevated landforms such as koppies and ridges
Roads shall run parallel to and at a minimum distance of at least the height of the feature from the outline of the foot slopes
If possible access roads should not be located in protected areas

POST-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Long-term	The impact will occur for as long as the transmission lines are erected, and maintenance access is required, there are no mitigation measures to decrease the duration	Consequence: Moderately detrimental	Significance: Low - negative
Extent	Site-specific	The extent will only be site specific as there are no linear elements associated with the access and maintenance roads		
Intensity	Moderate - negative	If the mitigation measures are implemented the impact can be moderately reduced.		
Probability	Fairly likely	Access roads might have to be constructed in some protected areas, this could be a possibility in areas where the alignment runs next to protected areas		

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IMPACT DESCRIPTION: The visual impact of cleared servitudes in natural areas, changing the sense of place, landscape quality, landscape character and altering the VAC in terms of vegetation and pattern/diversity				
Predicted for project phase:	Pre-construction	Construction	Operation	Decommissioning

PRE-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Long-term	The impact will occur for as long as the transmission lines are erected	Consequence: Moderately detrimental	Significance: Moderate - negative
Extent	Local	The impact will be local as cleared servitudes are between 23.5 - 27.5m which will be noticeably visible for some distance		
Intensity	Moderate - negative			
Probability	Very likely	According to Eskom requirements , vegetation needs to be cleared under overhead transmission lines		

MITIGATION:
Avoid a linear path of cleared vegetation that would strongly contrast with the surrounding landscape character Where the alignment should pass over dense stands of trees and shrubs or over areas of tall trees, either increase the height of the transmission line above the safe margin or reduce the extent of flammable material while allowing a natural transition of vegetation height and allowing tall trees to remain. The vegetation within the servitude should not be cut to an even height across the servitude instead the vegetation mass should rather be reduced by removing material from each of the vegetation layers, allowing for a diversity of height and plant material.

POST-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Long-term	The impact will occur for as long as the transmission lines are erected, there are no mitigation measure to reduce this	Consequence: Moderately detrimental	Significance: Moderate - negative
Extent	Local	The impact will be local as cleared servitudes are between 23.5 - 27.5m which will be noticeably visible, after mitigation measure have been implemented the servitudes will be less noticeable but still visible for some distance		
Intensity	Low - negative			
Probability	Very likely	According to Eskom requirements, vegetation needs to be cleared under overhead transmission lines		

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IMPACT DESCRIPTION: The visual impact of transmission lines in protected areas , changing the sense of place, landscape quality, landscape character and altering the VAC in terms of vegetation and pattern/diversity				
Predicted for project phase:	Pre-construction	Construction	Operation	Decommissioning

PRE-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Long-term	The impact will occur for as long as the transmission lines are erected and operational	Consequence: Highly detrimental	Significance: Moderate - negative
Extent	Local	The impact will extend for a maximum of 7km on both sides of the alignment		
Intensity	High - negative			
Probability	Fairly likely	One of SAPP's long term goals is to supply electricity to rural communities, therefore the consrtuction of the transmission line is almost certain		

MITIGATION:
The management of the potential visual impacts associated with the transmission line should focus on careful alignment to avoid sensitive areas such as elevated ridges, koppies and pans that could be conserved as visual assets for tourist related activities. Where possible, a minimum buffer of five times the height of the pylons should be allowed between the alignment and any of the natural features. Advantage should be taken of existing vertical features such as rows of tall trees to serve as a backdrop or screen for the transmission line. The alignment of the transmission line should maintain as much distance as possible from large concentrations of potential viewers. Where the route crosses over several ridges, running parallel to the proposed route, the alignment should be located in the lower section so that the ridge lines forms a visual screen from both sides

POST-MITIGATION				
Dimension	**Rating**	**Motivation**		
Duration	Long-term	The impact will occur for as long as the transmission lines are erected and operational, there are no mitigation measures to reduce this	Consequence: Slightly detrimental	Significance: Low - negative
Extent	Site-specific	The impact will extend for a maximum of 7km on both sides of the alignment		
Intensity	Low - negative			
Probability	Fairly likely	One of SAPP's long term goals is to supply electricity to rural communities, therefore the construction of the transmission line is almost certain		

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Appendix B – Photo montages

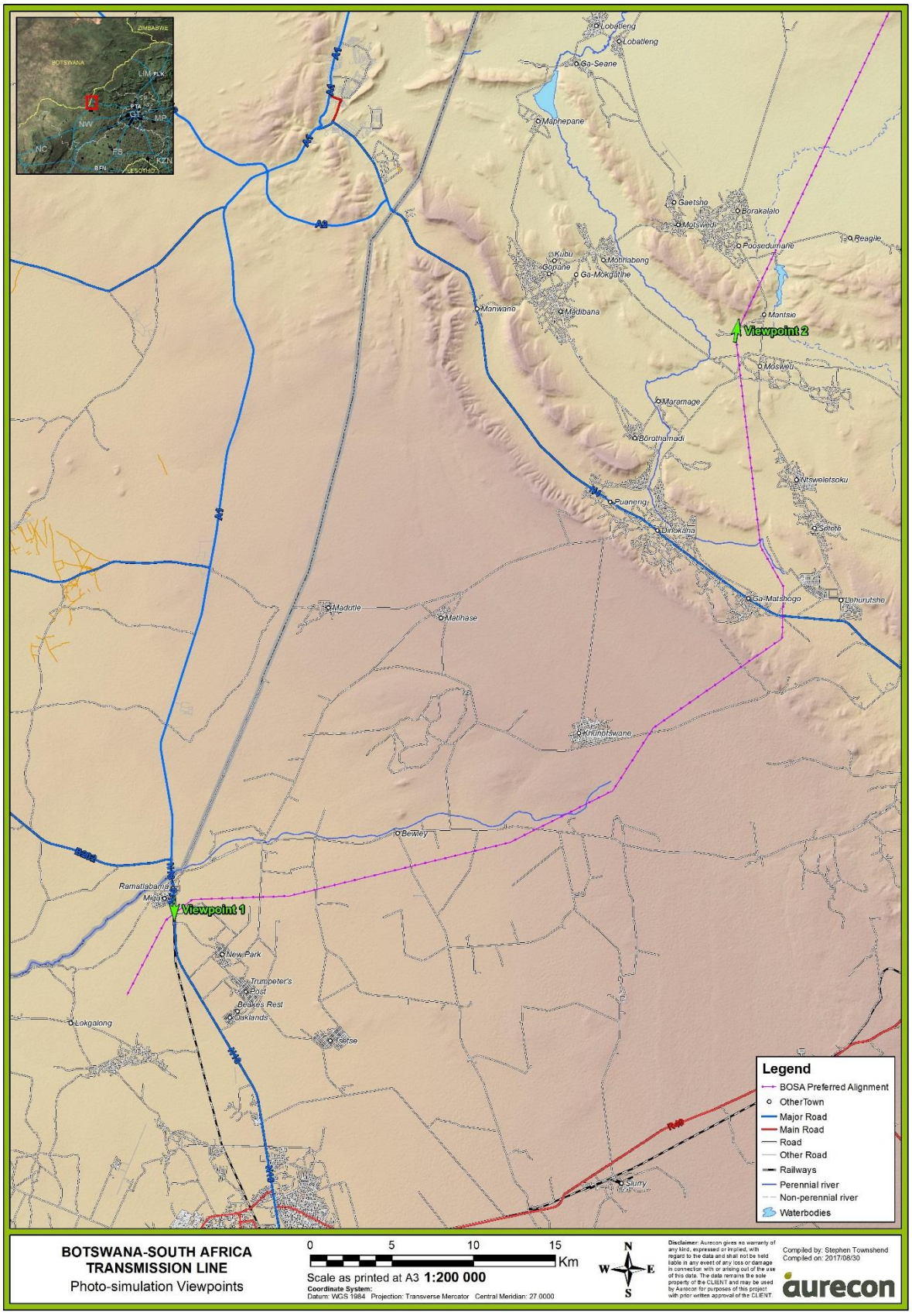

Figure 25: Photo montage locations

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Figure 26: Current view from viewpoint 1

Figure 27: Predicted view with alignment

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Figure 28: Current view from viewpoint 2

Figure 29: Proposed view from viewpoint 2

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