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BOSA Transmission Interconnection Project

14 June 2017
Revision: 2
Reference: 112581

Visual Impact Assessment – Scoping phase input

Eskom Holdings (Pty) Ltd.

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Contents

Figures

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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
NEM:PAA	National Environmental Management
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

Approach

- The landscape will be mapped using GIS (Graphical Information System) technology;
- The physical and technical characteristics of the project components will be described and illustrated;
- The visual resource (landscape character, landscape quality, sense of place and visual receptors) will be described; and
- The information will be depicted by maps. Critical areas will be highlighted during this phase, which will be studied in more detail during the impact assessment phase.

Gaps and Limitations

- The study is based only on available desktop information (minimal data were available for the Botswana side of the project).
- 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.
- Limited desktop information and spatial data is available for Botswana

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 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.

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) conclude to a large part of the economy, mines are concentrated around formalised towns or cities such as Ottoshoop (Chrome mining) and Nietverdiend (Fluorspar

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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 (refer to Figure 5), 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* 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 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 spreaded 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.

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:

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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 spreaded 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 can 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, 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, this could negatively influence sensitive views within the reserves, 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.

Issues to be addressed further in the ESIA

- Determine the extent of the study area, based on the project visibility which will be informed by a viewshed analysis;
- Determine the visual intrusion
- Determine the visual exposure of the project
- Give attention to important viewpoints, based on detailed available desktop information
- Describe the receiving environment in more detail, based on site photos (assessment of potential sensitive nature reserves etc.)

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- Identify the elements of visual value and quality that could be affected by the proposed project, (views to and from Nature Reserve's);
- Identify landscape and visual receptors in the study area that will be affected by the proposed project (if they were not listed in the scoping report);
- Further assessment of possible impacts as listed under Chapter 7;
- Recommend mitigation measures to reduce and/or alleviate the potential adverse landscape and visual impacts; and
- Document the finding of the study in a VIA report.

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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: Jun 2017

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1 Project description and locality

1.1 Background

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 280km, connecting the existing Isang 400kV substation in Botswana to the Watershed B area, close to Mafikeng in the North-West province of South Africa.

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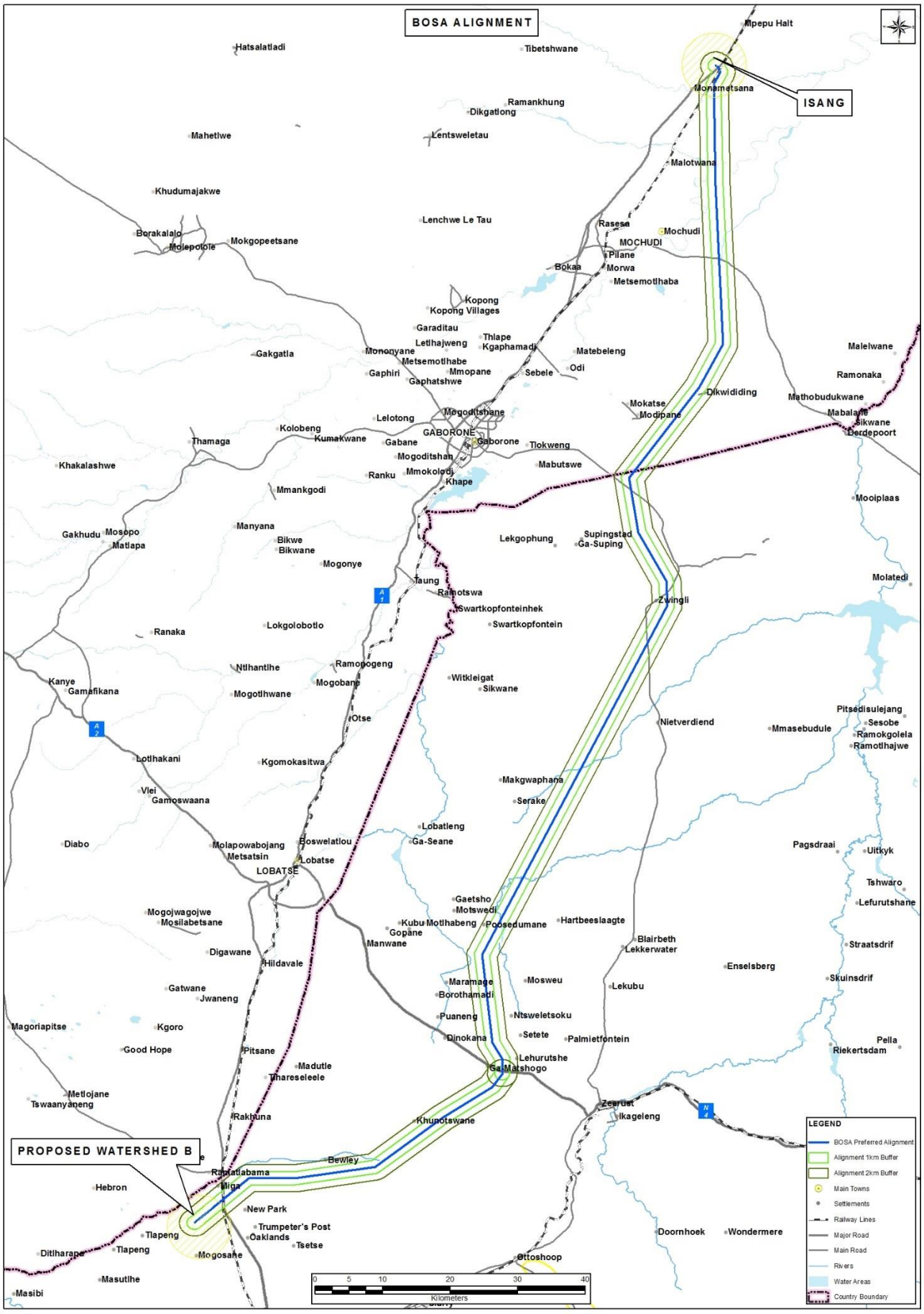

Figure 1: Locality map

2 Methodology

The following method will be used:

- A site visit will be undertaken;
- The landscape will be mapped using GIS technology;
- The physical and technical characteristics of the project components will be described and illustrated;
- The visual resource (landscape character, landscape quality, sense of place and visual receptors) will be described; and
- The information will be depicted by maps. Critical areas will be highlighted during this phase, which will be studied in more detail during the impact assessment phase.

2.1.1 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.

2.1.2 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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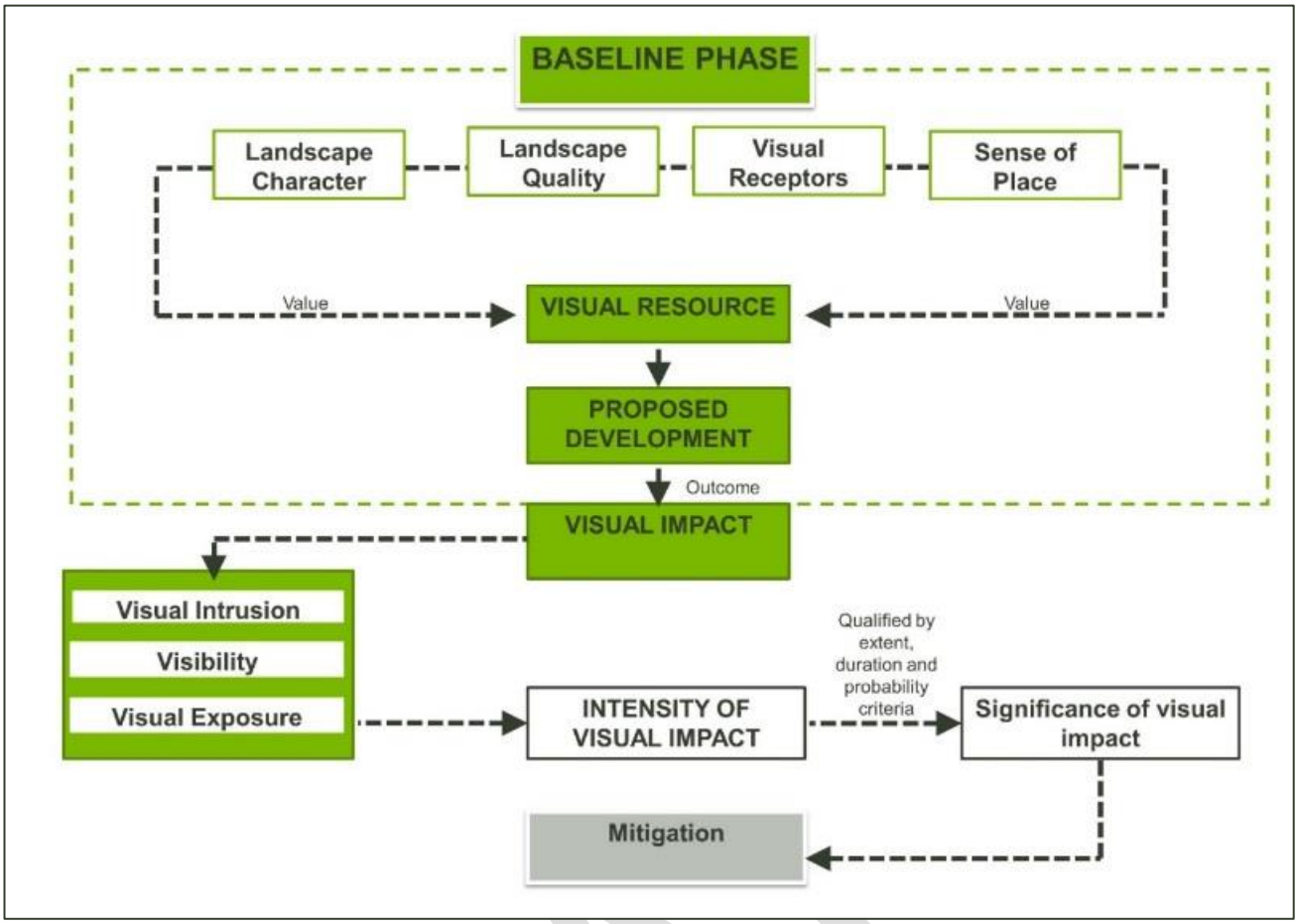

Figure 2: Visual impact methodology

2.1.3 Assessment of route alternatives

Nineteen possible routes were identified, after the screening exercise five remained. The remaining five went through an MCDM process which took place in May 2016, and based on an integrated outcome (considering technical, environmental, strategic and social criteria) the preferred route was chosen. 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 least amount 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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3 Gaps and limitations

The following limitations and assumptions are applicable to this report:

- The study is based only on available desktop information (minimal data were available for the Botswana side of the project).
- 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.
- Limited desktop information and spatial data is available for Botswana

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4 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:

4.1 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.

4.2 Botswana

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

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5 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 traverse various landscape types and therefore the sensitivity to visual impacts for each of the landscape types will differ.

5.1 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.

5.1.1 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.

5.1.1.1 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.

5.1.1.2 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 mostly concentrated close to larger towns.

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.

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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 (refer to Figure 5), 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.

Table 1: Nature Reserves bordering the proposed transmission lines

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

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.

5.1.1.3 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

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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 will determine 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.

5.1.2 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.

5.1.2.1 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.

5.1.2.2 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 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.

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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.

5.1.2.3 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.*

5.2 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.

5.2.1 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.

5.2.2 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.

5.3 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 low – high as indicated in Table 2.

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Table 2: 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
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

5.3.1 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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5.3.1.1 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 spreaded 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.

5.3.1.2 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 spreaded 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.

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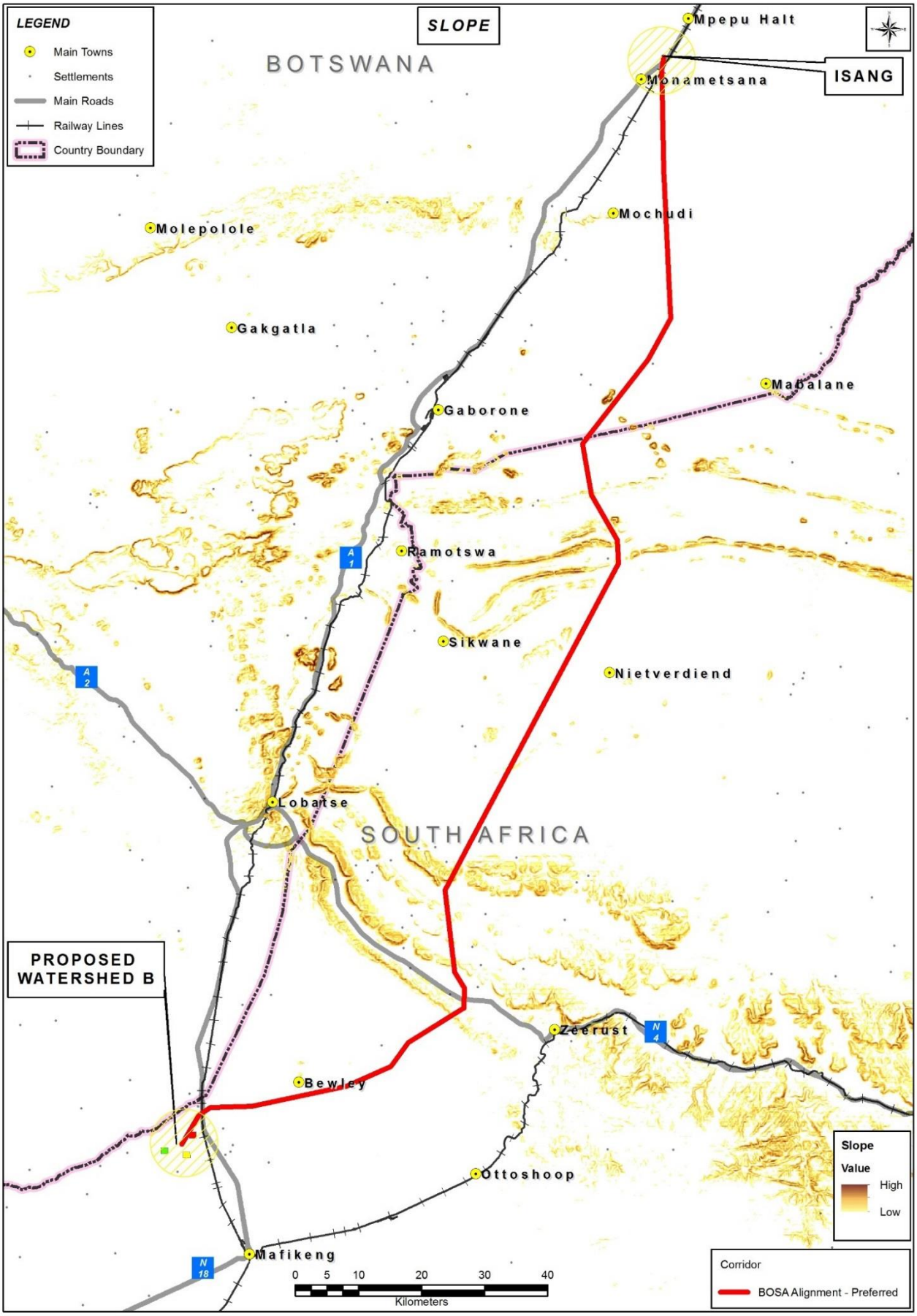

Figure 3: Topography

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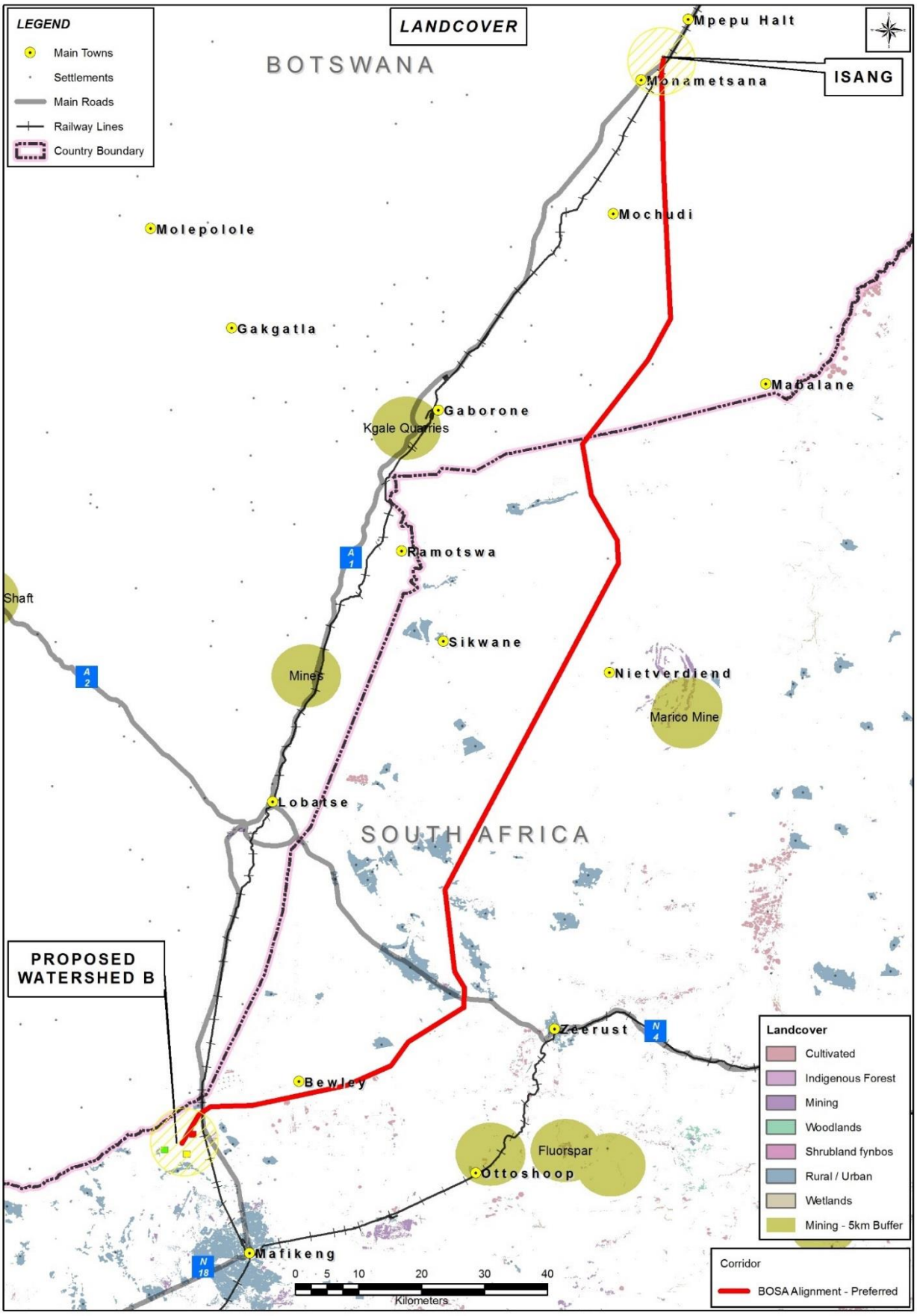

Figure 4: Land cover

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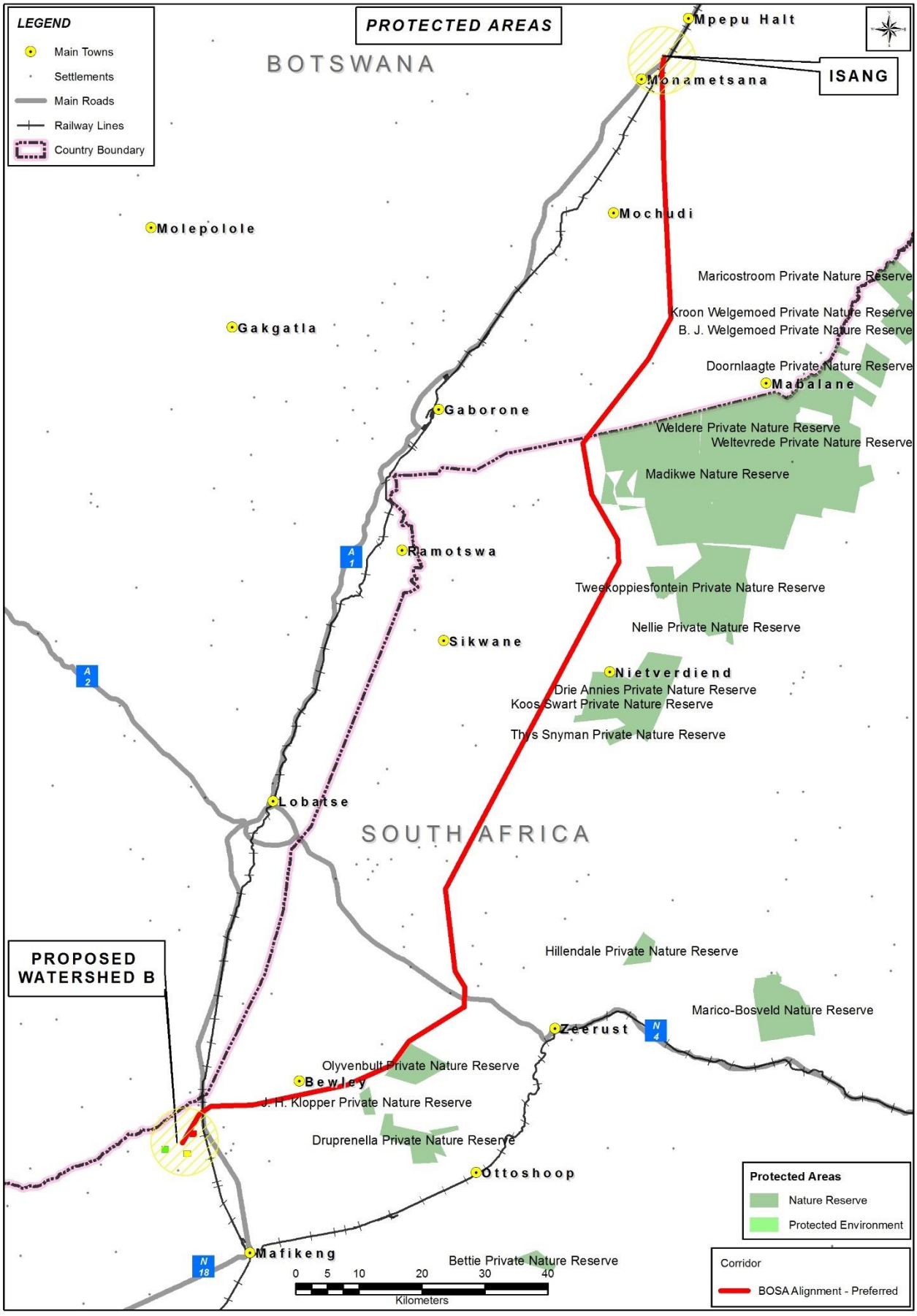

Figure 5: Protected areas

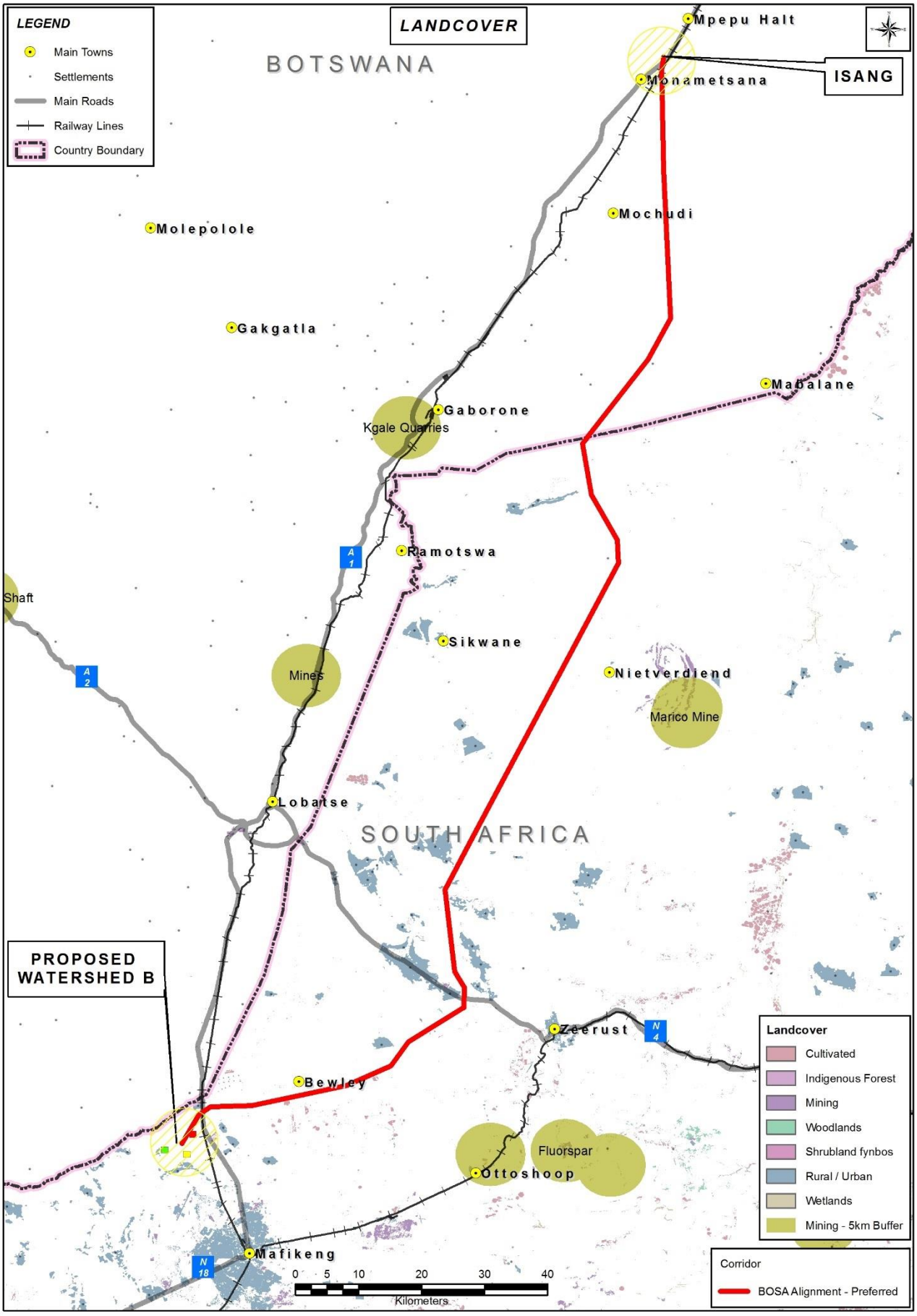

Figure 6: Land cover

5.4 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 3

Table 3: Receptor sensitivity

Receptor sensitivity rating	Criteria
High	Towns and cities along major national roads
Moderate	Settlements, less than 1000 people
Low	settlements, less than 100 people

The criteria used to define receptor perception are summarised in Table 4.

Table 4: 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
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.

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Low	People attach a low value to aesthetics, when compared to employment opportunities. Environment has already been transformed

5.4.1 South Africa

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. Other potential sensitive receptors could be tourists visiting nearby game lodges, such as The Bush House and Impodimo Lodge located within the greater Madikwe Nature Reserve.

Other sensitive receptors include the tourism industry and its related accommodation clientele from nearby game farms and formal conservation areas. The overall receptor sensitivity is regarded moderate to high in isolated areas where the visual amenity plays a significant part in the tourism industry. Stakeholder engagement should therefore include questions such as the importance of the visual amenity.

5.4.2 Botswana

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.

5.5 Technical specifications

5.5.1 Project components

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

5.5.1.1 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:

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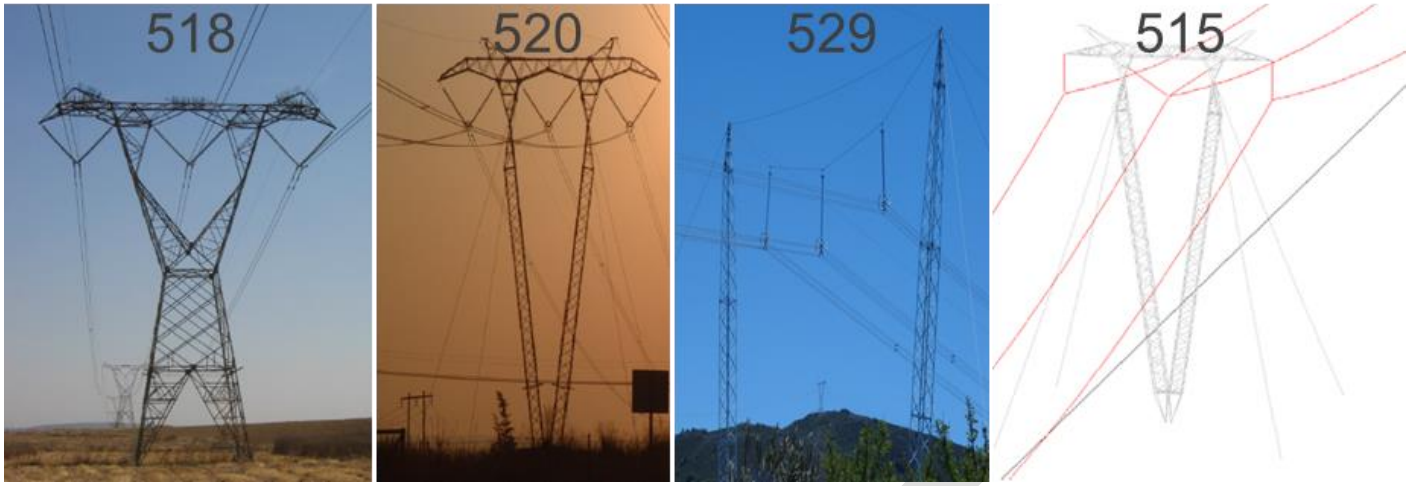

Figure 7: Proposed 400kV structures

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.

5.5.1.2 Access Roads

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

5.5.1.3 Cleared servitude

The clearing of vegetation beneath the proposed transmission line

5.5.1.4 Sub stations

The work to be done at the Isang 400kV substation will consist of the following:

- Extension of the 400kV main and transfer bushbar
- Add lighting/lighting masts
- Establish two 400kV line bays

Limited information is currently available for the proposed Watershed B substation and the design will be done by Eskom.

5.5.1.5 Construction camps and laydown areas

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

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6 Opportunities and constraints

6.1 Opportunities

Technical structures have not yet been chosen, therefore an informed decision can 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, higher lying ridges on both sides will form a natural visual buffer.

6.2 Risks and constraints

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, this could negatively influence sensitive views within the reserves, 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.

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7 High Level Impact Assessment

The high-level impact assessment can be divided into two phases, the construction and operational phase. For each phase potential risks were identified per project component on each of the identified landscape types listed under 5.1.1.2.

7.1 Construction phase

PRE-MITIGATION			
Construction camps and laydown areas			
Cultivated Areas			
Possible impact	**Probability**	**Significance**	**Further assessment required in EIA phase**
Sense of Place Due to the typical appearance and use the construction camp and laydown areas poses low visual impact to cultivated areas	Very likely	Low – negative	No
Landscape Quality Due to the typical appearance and use the construction camp and laydown areas poses some visual impact to cultivated areas	Very likely	Low – negative	No
Landscape character Similar features appear at farmsteads therefore low visual impact is predicted	Very likely	Low – negative	No
VAC slope The construction camp will have a vertical height of at least 3m that will exceed the visual absorption capacity of cultivated lands	Very likely	Very low	No
VAC Vegetation The establishment of construction camps and laydown areas involves the clearing of vegetation; the possible visual impact will be low	Very likely	Very low	No
VAC Pattern/Diversity	No long term potential impacts are considered		

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PRE-MITIGATION			
Construction camps and laydown areas			
Urban and rural settlements			
Possible impact	**Probability**	**Significance**	**Further assessment required in EIA phase**
Sense of Place	No possible impact expected		
Landscape Quality	No possible impact expected		
Landscape character	No possible impact expected		
VAC slope	No possible impact expected		
VAC Vegetation	No possible impact expected		
VAC Pattern/Diversity	No possible impact expected		

PRE-MITIGATION			
Construction camps and laydown areas			
Natural Areas			
Possible impact	**Probability**	**Significance**	**Further assessment required in EIA phase**
Sense of Place Due to the typical appearance and use the construction camp and laydown areas poses moderate to high visual impact to natural areas	Very likely	Moderate – negative	Yes
Landscape Quality Due to the typical appearance and use the construction camp and laydown areas poses moderate to high visual impact to natural areas	Very likely	Moderate – negative	Yes
Landscape character Features associated with construction camps and laydown areas are foreign to natural areas	Very likely	Moderate – negative	Yes
VAC slope The construction camp will have a vertical height of at least 3m that will exceed the visual absorption capacity	Very likely	Low – negative	No

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of the natural landscape			
VAC Vegetation The establishment of construction camps and laydown areas involves the clearing of vegetation; the possible visual impact will be moderate to high	Very likely	Moderate – negative	Yes
VAC Pattern/Diversity Clearing of vegetation within natural landscaped areas pose moderate impact as a cleared area would contrast with the natural vegetation	Very likely	Moderate – negative	Yes

It is assumed that no construction camps and laydown areas will be erected in formal protected areas

7.2 Operational phase

PRE-MITIGATION			
Transmission lines			
Cultivated Areas			
Possible impact	**Probability**	**Significance**	**Further assessment required in EIA phase**
Sense of Place The transmission line introduces a visual division in the landscape	Very likely	Low – negative	No
Landscape Quality The structures have an industrial aesthetic that intrudes on the natural aesthetic of the landscape	Very likely	Low – negative	No
Landscape character The metallic appearance of the pylons and cables intrude on the typical agricultural features that define the landscape character	Very likely	Low – negative	No
VAC slope The height of the pylon exceeds the capacity of the	Very likely	Low – negative	No

typically flat terrain. The transmission line will be silhouetted against the skyline and therefore intrude on the visual character			
VAC Vegetation The height of the pylon exceeds the capacity of croplands to screen and absorb the intrusion on the visual character	Very likely	Low – negative	No
VAC Pattern/Diversity The height and scale of the pylon exceeds the typical homogenous pattern of cultivated lands	Very likely	Low – negative	No

PRE-MITIGATION			
Transmission lines			
Urban and rural settlements			
Possible impact	**Probability**	**Significance**	**Further assessment required in EIA phase**
Sense of Place The transmission line introduces a visual division in the landscape	Very likely	Low – negative	No
Landscape Quality The structures have an industrial aesthetic that intrudes on the natural aesthetic of the landscape	Very likely	Low – negative	No
Landscape character The metallic appearance of the pylons and cables intrude on the typical natural features that define the landscape character	Very likely	Low – negative	No
VAC slope The height of the pylon exceeds the capacity of the relatively flat terrain. The transmission line will be silhouetted against the skyline and	Very likely	Very low	No

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therefore intrude on the visual character			
VAC Vegetation The height of the pylon exceeds the capacity of the natural vegetation to screen and absorb the intrusion on the visual character	Very likely	Very low	No
VAC Pattern/Diversity The height and scale of the pylon exceeds the homogenous pattern of human settlements	Very likely	Very low	No

PRE-MITIGATION			
Transmission lines			
Natural areas			
Possible impact	**Probability**	**Significance**	**Further assessment required in EIA phase**
Sense of Place The transmission line introduces a visual division in the landscape	Very likely	Moderate - negative	Yes
Landscape Quality The structures have an industrial aesthetic that intrudes on the natural aesthetic of the landscape	Very likely	Moderate - negative	Yes
Landscape character The metallic appearance of the pylons and cables intrude on the typical natural features that define the landscape character	Very likely	Moderate - negative	Yes
VAC slope The height of the pylon exceeds the capacity of the relatively flat terrain. The transmission line will be silhouetted against the skyline and therefore intrude on the visual character	Very likely	Moderate - negative	Yes

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VAC Vegetation The height of the pylon exceeds the capacity of the natural vegetation to screen and absorb the intrusion on the visual character	Very likely	Moderate - negative	Yes
VAC Pattern/Diversity The height and scale of the pylon exceeds the homogenous pattern of low trees and shrub vegetation	Very likely	Moderate - negative	Yes

PRE-MITIGATION			
Transmission lines			
Protected areas			
Possible impact	**Probability**	**Significance**	**Further assessment required in EIA phase**
Sense of Place The transmission line introduces a visual division in the landscape	Very likely	High – negative	Yes
Landscape Quality The structures have an industrial aesthetic that intrudes on the natural aesthetic of the landscape	Very likely	High – negative	Yes
Landscape character The metallic appearance of the pylons and cables intrude on the typical natural features that define the landscape character	Very likely	High – negative	Yes
VAC slope The height of the pylon exceeds the capacity of the relatively flat terrain. The transmission line will be silhouetted against the skyline and therefore intrude on the visual character	Very likely	High – negative	Yes
VAC Vegetation The height of the pylon exceeds the capacity of the	Very likely	High – negative	Yes

natural vegetation to screen and absorb the intrusion on the visual character			
VAC Pattern/Diversity The height and scale of the pylon exceeds the homogenous pattern of low trees and shrub vegetation	Very likely	High – negative	Yes

PRE-MITIGATION			
Access roads			
Cultivated Areas			
Possible impact	**Probability**	**Significance**	**Further assessment required in EIA phase**
Sense of Place Graded roads are typical features within cultivated areas	Fairly likely	Very low	No
Landscape Quality Removal of vegetation will decrease the local landscape quality	Fairly likely	Very low	No
Landscape character Landscape character would only be influenced should new roads be introduced	Fairly likely	Very low	No
VAC slope	No possible impact expected		
VAC Vegetation	No possible impact expected		
VAC Pattern/Diversity	No possible impact expected		

PRE-MITIGATION			
Access roads			
Urban and rural settlements			
Possible impact	**Probability**	**Significance**	**Further assessment required in EIA phase**
Sense of Place	No possible impact expected		
Landscape Quality	No possible impact expected		

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Landscape character	No possible impact expected
VAC slope	No possible impact expected
VAC Vegetation	No possible impact expected
VAC Pattern/Diversity	No possible impact expected

PRE-MITIGATION			
Access roads			
Natural areas			
Possible impact	**Probability**	**Significance**	**Further assessment required in EIA phase**
Sense of Place The introduction of new access roads will require the clearing of vegetation increasing the visual impact on this landscape type	Fairly likely	Low – negative	No
Landscape Quality The introduction of new access roads will require the clearing of vegetation increasing the risk of visual impact	Fairly likely	Low – negative	No
Landscape character The landscape character will be adversely affected if new roads are introduced	Fairly likely	Low - negative	No
VAC slope	No possible impacts expected due to the generally flat topography and little to no modification of the topography would be required		
VAC Vegetation The possible impact is dependent on careful and sensitive alignment to avoid indiscriminate clearing of vegetation	Fairly likely	Low – negative	No
VAC Pattern/Diversity The possible impact is dependent on careful and sensitive alignment to avoid	Fairly likely	Low – negative	No

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indiscriminate clearing of vegetation			

PRE-MITIGATION			
Access roads			
Protected areas			
Possible impact	**Probability**	**Significance**	**Further assessment required in EIA phase**
Sense of Place The introduction of new access roads will require the clearing of vegetation increasing the visual impact on this landscape type	Unlikely	Moderate – negative	Yes
Landscape Quality The introduction of new access roads will require the clearing of vegetation increasing the risk of visual impact	Unlikely	Moderate – negative	Yes
Landscape character The landscape character will be adversely affected if new roads are introduced	Unlikely	Moderate – negative	Yes
VAC slope	No possible impacts expected due to the generally flat topography and little to no modification of the topography would be required		
VAC Vegetation The possible impact is dependent on careful and sensitive alignment to avoid indiscriminate clearing of vegetation	Unlikely	Moderate – negative	Yes
VAC Pattern/Diversity The possible impact is dependent on careful and sensitive alignment to avoid indiscriminate clearing of vegetation	Unlikely	Moderate – negative	Yes

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PRE-MITIGATION			
Cleared servitude			
Cultivated areas/urban and rural settlements			
Possible impact	**Probability**	**Significance**	**Further assessment required in EIA phase**
Sense of Place	No possible impact expected, because no clearing of vegetation in cultivated areas		
Landscape Quality	No possible impact expected, because no clearing of vegetation in cultivated areas		
Landscape character	No possible impact expected, because no clearing of vegetation in cultivated areas		
VAC slope	No possible impact expected, because of the even topography		
VAC Vegetation	No possible impact expected, because no clearing of vegetation in cultivated areas		
VAC Pattern/Diversity	No possible impact expected, because no clearing of vegetation in cultivated areas		

PRE-MITIGATION			
Cleared servitude			
Natural areas			
Possible impact	**Probability**	**Significance**	**Further assessment required in EIA phase**
Sense of Place The clearing of the vegetation in natural landscape areas would result in an increased risk of visual impact	Very likely	Moderate – negative	Yes
Landscape Quality The clearing of the vegetation in natural landscape areas would result in an increased risk of visual impact	Very likely	Moderate – negative	Yes
Landscape character The clearing of the vegetation in natural landscape areas would result in an increased risk of visual impact	Very likely	Moderate – negative	Yes
VAC slope	No possible impacts as little to no modification of the topography would be required		

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VAC Vegetation The clearing of vegetation reduces the visual absorption capacity	Very likely	Moderate – negative	Yes
VAC Pattern/Diversity The potential impact on the pattern/diversity because of the linear nature of the servitude	Very likely	Moderate – negative	Yes

Land will not be cleared for servitudes in any formal protected area, therefore no impact with regards to this landscape type will be evaluated.

PRE-MITIGATION			
Sub station			
Cultivated land			
Possible impact	**Probability**	**Significance**	**Further assessment required in EIA phase**
Sense of Place The introduction of a single structure within a rural agricultural setting	Very likely	Low – negative	Yes
Landscape Quality An industrial type structure that intrudes on the aesthetic of the rural landscape setting	Very likely	Low – negative	Yes
Landscape character The industrial, engineered appearance of the structure intrude on the typical agricultural activities	Very likely	Low – negative	Yes
VAC slope	No possible impacts expected due to the generally flat topography and little to no modification of the topography would be required		
VAC Vegetation The height of the substation typically exceeds the height of the cultivated lands to screen and absorb the intrusion on the visual character	Very likely	Low – negative	Yes
VAC Pattern/Diversity The height and scale of the substation	Very likely	Low – negative	Yes

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exceeds the capacity of the typical homogenous cultivated lands to screen and absorb the intrusion on the visual character			

The proposed Watershed B substation will be constructed within an agricultural area, therefor the assessment will only be done for this type of landscape.

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8 Issues requiring further assessment for ESIA phase

The VIA will conform to the requirements of a level four assessment (Oberholzer, 2005) which requires the realisation of the following objectives:

- Determine the extent of the study area, based on the project visibility which will be informed by a viewshed analysis;
- Determine the visual intrusion
- Determine the visual exposure of the project
- Give attention to important viewpoints, based on detailed available desktop information
- Describe the receiving environment in more detail, based on site photos (assessment of potential sensitive nature reserves etc.)
- Identify the elements of visual value and quality that could be affected by the proposed project, (views to and from Nature Reserve's);
- Identify landscape and visual receptors in the study area that will be affected by the proposed project (if they were not listed in the scoping report);
- Further assessment of possible impacts as listed under Chapter 7;
- Recommend mitigation measures to reduce and/or alleviate the potential adverse landscape and visual impacts; and
- Document the finding of the study in a VIA report.

The VIA will give importance to assessing impacts from sensitive receptors such as larger towns and settlements, nature reserves, bush camps and other areas of high tourism value.

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